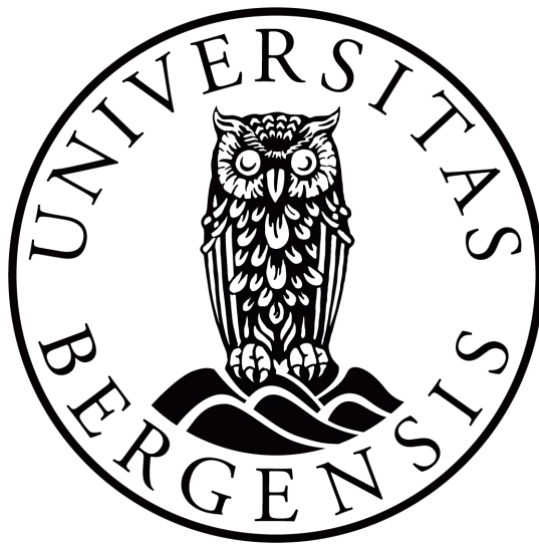


University of Bergen

Master Thesis

«Humble Bumble – Creating a mobile application to promote
environmentally friendly acts»



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Abstract

This thesis presents research involving the design and evaluation of a high-fidelity smartphone prototype, called Humble Bumble. Humble Bumble has been designed to motivate people to do environmentally friendly acts in their daily life. A user-centered design approach was utilized to facilitate an optimal user experience and to emphasize the end-user. The main features of the prototype are a self-reporting system for activities that are environmentally friendly. Adding activities will give the user visual feedback as a reward for their real-world actions in terms of statistics in a virtual planet game. The goal of the application is to make the users to engage in environmentally friendly activities. In the development of the application, we have employed research methods like expert interview, survey, concept testing, and usability testing.

The results of the research indicate that the Humble Bumble has the potential to become a fun and engaging application, that can motivate users with good user experience design and social integration.

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Chapter 1

1.1 Introduction

August 1, 2018 was the world's Overshoot Day. This day marked when we expended the budget of natural resources that our planet can produce in a year. As a result, we will be living on resources borrowed from future generations for the remainder of the year (World Wildlife Fund, 2018). We are exhausting our natural resources faster than ever, and the earth is suffering. Industry, energy, and transportation pollutes the most (Miljødirektoratet, 2018). Individuals, especially the ones living in first world countries, are also a big part of this statistic. Our actions in our daily life also contribute to polluting the planet. Our society is built upon being a consumer. A consumer society is a society in which shopping and consuming products and services are primarily socially motivated and where the products are not necessarily considered a value in themselves, but a signal of identity. This is especially true concerning trademarks that create distinct associations with social affiliation and status, such as costly sporting goods, automotive brands, digital products, exotic destinations, and branded clothing (Pihl, 2017). A new report measuring the environmental impact of fashion production indicates that the textile industry accounts for 8% of the world's greenhouse gas emissions (Quantis, 2019). The report shows that for each citizen, the emissions correspond to 442 kg CO₂ equivalents (2016) - however, this is the global average; in Europe, the figure is three times higher. A Norwegians' annual clothing consumption corresponds to about 12,000 km in aircraft, or 7,000 km of driving, according to the Quantis report. In addition, the clothing industry consumes 23,900 liter of water per capita - which equals roughly 150 filled bathtubs. It is not only fashion that is draining our recourses; our food habits are also a big problem. One-third of all the food that the world produce goes to waste, and in Norway, half of this happens in the consumers' homes (Lassen, 2019). It is about time awareness is raised towards these problems.

Consumers may feel small and without powers in this big world, but small actions can create ripple effects. Just look at Greta Thunberg, the young Swedish girl with Asperger's who started an environmental campaign on her own featuring a school strike every Friday, demanding action on the climate change from the government. The strike started with only

her sitting outside the Swedish parliament in August 2018. She continued doing this every Friday, getting more students to join her. On March 15, 2019, she managed to motivate over 1.4 million students from more than 300 cities around the world to join her (Cohen & Heberle, 2019). Greta is a motivation for us all and shows that one person can make ripple effects. Therefore, I believe that motivating people to go in the right direction is an interesting challenge.

The clock is ticking. It is predicted by over 1300 scientists that the temperature of the earth will rise by 2-6°C in the next century (NASA, 2019). It may not sound like a lot, but the consequences are dangerous and frightening. The poles are melting, wildfires are spreading, and species are dying out. The public authorities in Norway have several goals for solving the environmental issues. Norwegian legislation states that within 2030, the greenhouse gas emissions should be reduced by at least 40 percent, and the aim is to make Norway a low-emission society by 2050 (Lovdata, 2019). To reach this goal, individuals need to make an effort, as well. The society needs to push the government to follow through the goals. Furthermore, if the society wants greener choices, the market will follow. An excellent example in this matter, is the vast growth of electric vehicles in Norway. The electric car stock has increased by as much as 41% from 2017 to 2018 (Norsk elbilforening, 2019).

In this master's thesis, I am exploring how design can help people live a more sustainable life. The application, named Humble Bumble, is a smartphone application where users can learn and receive virtual rewards for doing environmentally friendly acts for the planet through real-life activities. The project is theoretically grounded in user-centered design and behavioural psychology.

Currently, there are some mobile games, social media applications as well as a lot of static information websites that focus on a green way of life. However, there are no applications that combines the aforementioned. The internet provides people with the opportunity to read and learn about the theme, and there are games to learn about garbage sorting and social media applications for tracking and sharing green acts. Humble Bumble is different because the user's real-life actions will give a healthy planet both in the real world and in the virtual world in the application. The motivation behind Humble Bumble is to show people the negative effect their choices may have, and therefore motivate them to start contributing more for the planet. Nowadays, when one is sorting plastic waste, one does not get any feedback on

how this affects the ecosystem in real life. When the user is reporting this in Humble Bumble, they get to see how this act has an impact. When the user walks instead of driving, or pick up litter, the application can visualize that the virtual world is getting healthier, indicating that this also happens with the physical planet.

In this project, I had a research partner, Marthe Karin Sanden Skauge. We worked together on data gathering as well as developing the prototype. When I am writing “we” in this thesis, I am referring to Skauge and myself. This thesis, however, is written by me.

1.2 User groups

The primary user groups we are targeting are young adults with a smartphone device. After taking part in a demonstration for the climate on the 14th of March 2019, we saw that thousands of teens had gathered for the sake of a greener future. The user group is interested in the environment and want to have a sustainable behaviour. The users will report in the application by adding their activities. In addition, the application will be used for tracking their accomplishments.

1.3 Research question:

How can the design of a mobile application enable people to adapt to, enhance, and continue environmentally friendly behaviour?

1.3.1 Purpose of the research

In this master thesis, it is researched how the development methods within user-centered design can contribute to have a positive impact on behavioural change. In particular, how these methods could be used as a design process to make individuals more environmentally conscious. In this research, we wanted to design a prototype to test if a mobile application can be used to promote sustainable actions. In addition, I wanted to learn more about the user’s

perceptions regarding which features the application needs to motivate them to contribute with environmentally friendly activities. We had a hypothesis about how the user would not like self-reporting, because it leads to much effort for them. Including to this hypothesis, we also assumed gamification could help in the process of making the user actively using the app, and eventually become more environmentally friendly. These are some of the topics we tested along the development.

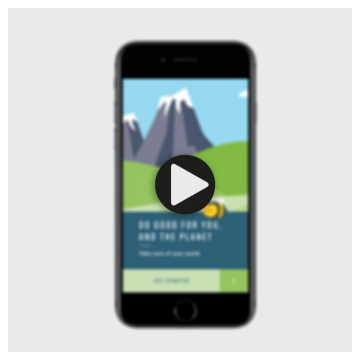
1.4 Short description of the prototype

The prototype is designed to be an application (app) for mobile phones. It is comprised of these primary aspects;

- Onboarding for the application.
- Virtual planet game with a bee avatar where the user can grow plants and take care of their planet.
- Self-reporting tool for environmentally friendly activities.
- Statistics page with data of the user's achievements according to the activities they have done.
- Profile page, where the user can among other things edit settings and see friends.

1.4.1 The prototype

The prototype can be viewed by clicking on the following image or link. An explanation on how to display the prototype is found in Appendix A.



Link to the prototype:

<https://xd.adobe.com/view/c68e4c53-4c1f-4328-40a1-cd8302788c12-b0bf/?fullscreen>

1.5 Outline

Chapter 2 is a literature review and will include an introduction to central terms relating to digitalization, sustainability, behavioural theory, as well as the design methodology. Lastly, there will be a small review of other applications' designs for behaviour change. Chapter 3 will cover the research methods used in the project, and introduces the framework of the research, user-centered design, development mythologies, user testing and research ethics. In Chapter 4, the development of the application by describing all the iteration phases is presented. In Chapter 5, there will be examining, and discussion about the prototype, methods, and development approaches. Chapter 6 is a concluding chapter that summarizes research findings and provides propositions for future development.

Chapter 2

2.1 Background Literature Review

The literature review includes different subjects from several different disciplines. Regarding the development, design terminology and user-centered design are the main fields.

Additionally, to the themes within sustainability, digitalization, gamification, and AR is mentioned. Apart from these disciplines, psychology concerning the environmental science and behavioural science, are essential in understanding how we can reach the users.

Sustainability and economy are also mentioned to explain the reason for the habit's individuals have today.

2.1.1 The world is going digital

The reason for choosing the smartphone platform is that the use of applications is immense.

Last year it was revealed that in Norway, 9 out of 10 Norwegians have a smartphone (SSB, 2018). The number of smartphone users is projected to pass the 5 billion mark in 2019 (Holst, 2018). We are changing our analogue objects with smartphone applications all the time.

Moreover, we use our smartphone for almost everything we are doing in our daily lives. It is used to wake up in the morning, talking to family and friends, reading the news, entertainment and so on. Unsurprisingly, there are also smartphone apps for environmentally friendly behaviour, and our contribution is to use technology to encourage real-world nature-friendly activities.

In 2015, researchers Paul Jepson and Richard Ladle published an article about how mobile applications can have a transformative power for engaging in the conservation of the environment. They investigated the growth of nature-themed applications, including games. Jepson and Ladle concluded that nature-related interests have yet to engage with the affordances and potential of these technologies in any significant way (Jepson & Ladle, 2015). One of their key points was that technology at the time was too premature to succeed with an application for nature conservation. The only nature-related application they found with mixed reality in the sense of blending the virtual and real world was Tree Planet (Hyung-

soo, Mincheol, & Jaehyun, 2012) an application where you can essentially have real trees planted by nurturing a virtual tree. Overall, they observed that most conservationists knew little about digital gaming and suggested that nature-based enterprises have yet to recognize the potential this medium of application offers. Few applications used the power of big data, cloud computing, and geolocation to their advantage. Even though it has only been four years since this article was published, the technology develops rapidly. The mobile phones have more embedded sensors, and this makes the smartphones powerful tools. The evolved sensory data can be used for our advantage in the development of a new application for the environment.

The field of augmented reality (AR) in applications are also fast growing within mobile applications. In the article “Mobile Augmented Reality” (Höller & Feiner, 2004), AR is defined to be a powerful user interface (UI) with a context-aware computer environment. AR is related to the concept of virtual reality (VR). In VR it is attempted to create an artificial world that a person can experience and explore interactively, predominantly through his or her sense of vision, but also via audio, tactile, and other forms of feedback. AR also brings about an interactive experience, but aims to supplement the real world, rather than to create an entirely artificial environment. The physical objects in the individual’s surroundings become the backdrop and target items for computer-generated annotations. In AR games, gaming components can be incorporated into real-life surroundings. One of the huge successes is the mobile application game Pokémon Go, which was released in 2016 (Niantic). The game uses geolocation and requires the players to walk around to catch and “hatch” virtual animals called Pokémon. In a study carried out in 2017, they saw that the participants had a considerable increase of physical activity after downloading the game. Before downloading the game, only 31% of the respondents met the recommended activity levels of 150 minutes per week, whereas 75% of them met the levels after they started using the game (Wagner-Greene et al., 2017). This indicates that it is possible to create a positive change in people’s behaviour with the help of an application.

2.1.2 Sustainability

Becoming sustainable is the first step to an environment-friendly behaviour. Sustainable lifestyles mean being aware of one’s surroundings. The definition of sustainability, as understood by environmental science, is “the quality of not being harmful to the environment or depleting natural resources, and thereby supporting long-term ecological balance”

(Dictionary.com Unabridged 2019). It means to be aware of the consequences of the choices being made, and therefore make the choices that do the least harm. It involves more than just caring for the environment – it also involves thinking about people and the community. It involves thinking about health and well-being, educational development, rather than just money and possessions (UNEP, 2010). A sustainable lifestyle is defined as a way of living in harmony with the environment. One should not use more of the resources than the earth can handle. For example: We are extracting far more petroleum than the earth can produce in the same period, which means that this is not sustainable. Sustainability is achievable if there is a social change in how we live our daily lives with respect to our consumer habits and how we organize societies. With our ecological waste, we cause water shortages, poor crops, eradication of species, and increased concentration of greenhouse gases in the atmosphere (Jensen, 2017). These are the main reasons why we need to change.

2.1.3 Circular economy

Today our economic system is mainly built upon a linear resource use. The linear economy is explained as the “take-make-use-dispose” model of consumption (Andrews, 2015). The linear model starts with extracting resources from the planet, then the resource goes into production and thereafter, distribution for consumption. When the consumer is finished with the product, it is thrown away to become trash, and that is the end of the life of the resource. This is, in fact, good for the economy, because people use more money and keep the retail business going. On the other hand, it causes several million tonnes of resources to go straight into landfills, polluting our environment, and missed opportunities for reuse of the materials. Circular economy, however, is an economic system that closes the linear resource use and makes the resources go back into stage one. It is about closing the line and creating it into a circle, making the “trash” usable again. Geissdoerfer et al. (2017) defined circular economy as a generative system in which resource input and waste, emissions, and energy leakages are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. Secondly, sustainability is defined as the balanced integration of economic performance, social inclusiveness, and environmental resilience, to the benefit of current and future generations (Geissdoerfer et al., 2017). Circular economy is about changing how our society works today. Citizens can contribute to this transformation by changing their mindset to the things they consume. An easy way of thinking circular is by applying the 5 R’s: Reduce, Refurbish, Repair, Reuse, and Recycle (Ho & Choi, 2012). Another way is to

support circular economy businesses, like Zero Waste stores, marketplaces, and repairers. These are some of the actions we promote with Humble Bumble.

2.1.4 The psychology behind the environmental issue

We live in a society where everything should be as easy as possible. At children's birthday parties we use onetime plastic cutlery to save time cleaning, we use cars because it is faster than walking, and we eat fast food because we do not have the time to cook. In our society, we are accustomed to an everyday life that builds upon a belief that we need new material things and massive consumption to live a happy life. After the Second World War, many countries needed a way of getting their economy up on their feet again (Coyle, 2014). To calculate what the countries were capable of loaning they started to use the calculation of Gross domestic product (GDP). GDP is equal to the sum of all goods and services produced in a country over a year, minus the goods and services used during this production (SSB, 2017). This is still the way of considering how wealthy a country is, which indicates that to maintain the wealth in a country, production and consumption are needed on a big scale. The consumerism period after the Industrial Revolution has led to all the market capitalism we have today (Barber, 2018). Our whole economic system is based on this, and it will be difficult to change.

In the book *The Psychology of Environmental Problems: Psychology for Sustainability*, psychologists Winter and Kroger explore why humans continue with the environmentally irresponsible behaviour in our daily lives. Research concerning the psychology behind our choices within sustainable behaviour has been conducted for many years. Winter and Kroger argue that people tend to intellectualize our environment predicament by failing to recognize our own hand in creating it or the implications it has on their future. Intellectualizing occurs when we distance ourselves emotionally from the problem by describing it in abstract, intellectual terms (Kroger & Winter, 2014). The authors shed light on the old psychoanalytic tradition with Sigmund Freud's ideas of the understanding of the unconscious and compassion. The Freudian tradition suggests that by changing the way one perceives oneself in the world, one will also acknowledge one's actions. Compassion is essential for forgiving our self and others. In the Freudian tradition, they recognize that changing the sense of ourselves in a world and our relationship to nature will not be an easy task (Kroger & Winter, 2014). The reason is that individuals feel frustrated and disappointed if they are not able to make a big change at once. The authors argue that over time, people can free up psychic

energy for the task of changing their behaviour and building a sustainable world (Kroger & Winter, 2014).

2.1.5 Consumer power

People have the power to make change. Small acts can have a significant impact if many people are doing it. Just think about if everyone on the earth would pick up one piece of litter from the ground, that would be 7,55 billion items. In a TED talk, Olivia Tyler, the Director of Sustainable Business Services at the Australian bank Westpac Group, talks about the complexity of sustainability (Tyler, 2017). She stresses that everybody is a consumer, and that consumers have the power to change the supply chain. She states that every individual needs to ask questions about the production of what one buys. If the consumers demand information, society can get more transparency of the resources used. To make sustainable choices, individuals need to have access to information to base their choices on. When consumers ask questions, businesses will take action to please their customers (Tyler, 2017). To encourage the users to be mindful and care about the impact of consumer habits, is something Humble Bumble will try to promote.

2.2 Designing for users

Design has always been around and has evolved with humans for centuries. One of the definitions of design is explained as “an outline, sketch, or plan, as of the form and structure of a work of art, an edifice, or a machine to be executed or constructed.” (Dictionary.com Unabridged 2019). Humans have always manipulated the environment around us, shaping it into objects that make sense for us either functionally or aesthetically. Design is everywhere, from the chair you are sitting on, the road you drove to get here, and the coffee machine you use every day. There are three main design disciplines which will be explained in this section; human-computer interaction (HCI), interaction design (IxD), and user experience (UX) design. These terms came along as computers became part of our professional and private lives, engineers and researchers have paid attention to how computers should be designed for optimal human interaction.

2.2.1 Human-Computer Interaction

The first field to grow out of this research field was human-computer interaction (HCI) (Saffer, 2009). HCI is a multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between humans (the users) and computers (Preece et al., 2015). While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design (Interaction Design Foundation, 2019).

2.2.2 Interaction design

Interaction design (IxD) on the other hand, is mainly used today to describe the interaction between humans and product. *The Interaction Design Foundation* (2019) describes IxD as the design of interactive products and services in which a designer's focus goes beyond the item in development to include the way users will interact with it. Thus, scrutiny of users' needs, limitations and contexts, etc. empowers designers to customize output to suit precise demands. It is a broader term than HCI, because it does not limit its use to computer interaction. Preece, Rogers and Sharp (2015) describe the main difference between HCI and IxD to be the scope. IxD casts a wider net, concerning the theory, research and practice of user experience for manner of products, systems, and technologies. HCI has a narrower focus traditionally, by focusing on design, implementations, and evaluation of interactive computer systems for human use (Preece et al., 2015). IxD is concerned with designing any interactive product to support the way the user interacts and communicates and have a pleasant experience. IxD is about creating the user interface (UI). The UI should be designed to create a good dialog between a product and the user, and the connection is the interaction one is designing for. In addition, IxD also focuses on selecting the right elements to include to make the product useful and effective.

2.2.3 User Experience design

In interaction design, the user experience is fundamental. Norman introduced User Experience design (UX) into the research field in the 90' when he was in Apple (Norman & Nielsen, 2019). He considered the term interaction design insufficient to explain all the variables regarding what the user perceives. "I invented the term because I thought human interface and usability were too narrow. I wanted to cover all aspects the person's experience

with the system including industrial design, graphics, the interface, the physical interaction, and the manual" (Norman, 1988). Designing for how the user will perceive the product or service has come to be referred to as user experience (often abbreviated UX design) and is defined by Norman and Nielsen (2019) as follows: "User experience encompasses all aspects of the end-user's interaction with the company, its services, and its product". UX design is about creating and shaping the experience the user receives. It includes all aspects of the experience: physical, sensory, cognitive, emotional, and aesthetic. Preece et al. (2015) points out an essential factor in UX design; one cannot design a user experience, one can only design for a user experience. When designing for the experience, it is about putting the user first in every step of development; starting with mapping what they need, what they prefer, how they prefer it, their pain points, making it enjoyable and so on. UX design is all about knowing the user and encompasses all subfield while developing to reach the goal of having a satisfied user.

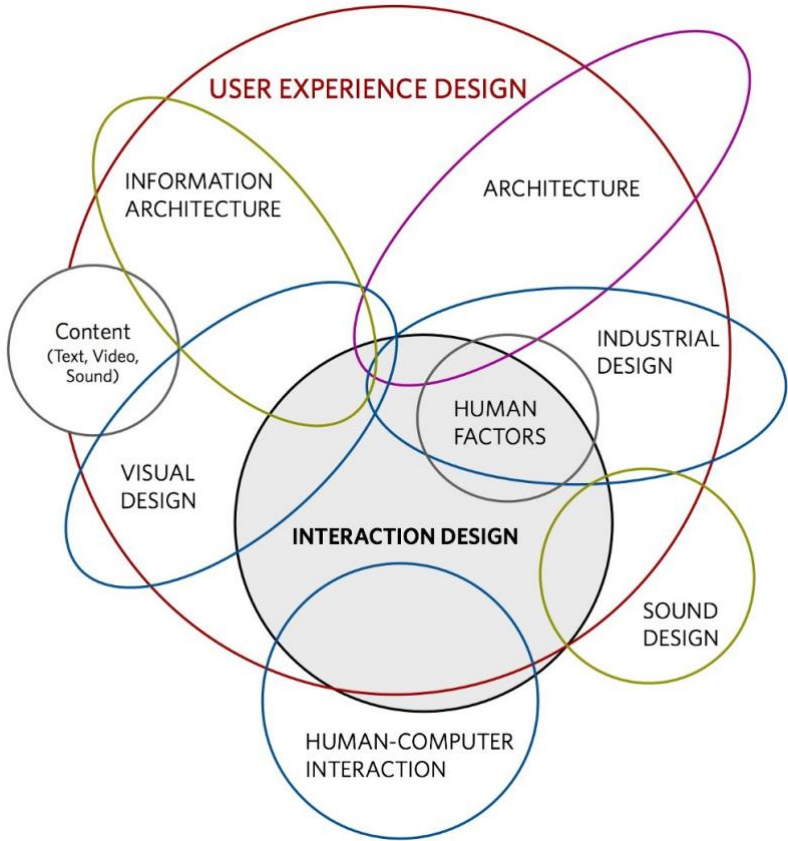


Figure 1 The disciplines surrounding interaction design (Saffer, 2009)

Which of these fields that are subsets of another is discussed widely, nevertheless there is no global definition the difference of the terms (Interaction Design Foundation, 2019). I,

therefore, decided to use the way Preece et al. (2015) differentiate between the terms IxD and HCI, and divide the terms by the amount subfields underling them, and put UX design at the top of the hierarchy. Dan Saffer (2009) published a diagram of the disciplines in his book “Designing for interaction” that shows the overlapping of the fields (*fig. 1*). In this model he shows that most of the disciplines fall at least partially under the umbrella of user-experience design, the discipline of looking at all aspects visual design, interaction design, sound design, and so forth of the user’s encounter with a product, and making sure they are in harmony (Saffer, 2009).

2.3 Human behaviour

2.3.1 Behavioural theory

When attempting to design an application for behavioural change, it is important to understand human behaviour. In this project, I am leaning on behavioural psychologist B.J. Fogg's behaviour model (Fogg, 2009). He says that for any behaviour to take place, three factors need to be fulfilled; sufficient motivation, sufficient ability and an effective trigger. He illustrates this in a simple formula:

Behaviour = Motivation + Ability + Trigger

If any of those factors are missing, the behaviour will not occur. Although the theory is simple, the factors are much more complex.

Motivation concerns energy, direction, persistence and equifinality - all aspects of activation and intention (Ryan & Deci, 2000). Motivation can seem to be a singular construct, however the factors causing people to act, can be very diverse. There are two main types of motivation: Intrinsic motivation, and extrinsic motivation. Intrinsic motivation is the inherent tendency to seek out novelty and challenges to extend and exercise one's capacities, to explore, and to learn (Ryan & Deci, 2000). Intrinsic motivation refers to doing an activity for the inherent satisfaction of the activity itself. In contrast to extrinsic motivation that refers to the performance of an activity in order to attain some separable outcome. Extrinsic motivation can be for example social acknowledgement. The experiences and consequences of the motivations can also be very varied. Individuals can be motivated by strong external coercion

or because they value an activity. They can also be bribed or scared into proceeding to do it. These examples show the contrast between these contrasts between cases of being externally pressured versus having internal motivation.

The reason for the motivation is explained as the trigger. As explained above, what triggers the motivation be external and internal. External triggers are external information about what to do next. It could be for example, a hand reached out for someone to grab or a sound from the doorbell. Internal triggers are association information on what to do next through an association in the user's memory. The mind can be triggered by for example, places, people, emotions, routines, and situations. Negative emotions like boredom, lonesome, dissatisfaction, and so on are powerful internal triggers. Ability is the capacity for an individual to do a particular action. The setting can have physical or social restrictions for the person to conduct the activity. For example, the object they are trying to interact with can be too far away, or it is not socially acceptable to do the behaviour in the setting. Timing is often the missing element in behaviour change (Fogg, 2009).

2.3.2 Designing for motivation

Fogg (2009) explains that motivation has three core motivators with two sides;

1. pleasure / pain,
2. hope / fear
3. social acceptance / rejection

In the first core of the motivation dimension, the factors for increasing motivation are often related to seeking pleasure or avoiding pain. Pleasure can be a sense of achievement. In the second core, motivation is characterized by the anticipation of the result of the outcome of the behaviour. For instance, seeking hope comes from the anticipation that something good will happen. The anticipation of something bad or loss happening will cause avoidance or fear. Fogg (2009) recommends using hope as a motivational factor in research and design since it is the most ethical and empowering motivator. Designing for the hunt for a reward can make the app exciting to use. Introducing a variable reward is shown to be motivating. Skinner (1956) did research on reinforcement behaviour with pigeons. When the pigeons pecked on a disk, they sometimes would get a reward and sometimes they would not. This variable result got them pecking more than before (Skinner, 1956). In the brain, the nucleus accumbens is activated when we crave, and this can be stimulated by variability. The unknown is

fascinating; variability causes us to focus and engagement. Today's applications such as Instagram have the same technique. The user is scrolling and scrolling until they find an interesting post. Three reward types can be included in the technology: tribe, hunt, and search (Eyal, 2014). The tribe can be the search for social rewards, empathetic joy, or relationship. The hunt could be the search for social recourses, slot machines, scrolling, feeds, or timelines. The last is the search for self-achievements that could be mastery, control, gameplay, next achievements, or unread messages. These three reward types are also mentioned in the field of gamification, which will be explained briefly in Section 2.3.3. The final core motivator is based on the social dimension. Seeking social acceptance or avoiding rejection is motivating factors one can see everywhere; it could be the clothing people wear or the language they use. Social technologies like for Facebook, practice the power of these factors to influence the users to use technology to gain social acceptance (Fogg, 2009).

2.3.3 Gamification

Gamification is a field that has grown significantly in recent years related to motivating users. It is an informal umbrella term for the use of game elements in non-game systems to improve user experience (UX) and user engagement (Deterding et al., 2011). The field is often considered synonymous with a reward system (Nicholson, 2014). Gamification is about using elements that have previously been seen in gaming contexts to be used in situations other than in a game. It is often used to gain more engagement and hopefully lead in a desired result. Gamification has existed for several centuries, for example, in the learning of children and the training of soldiers. In both cases, rewards and punishments are used to change the behaviour of the person. Some methods that are considered gamification are, for example; giving badges, medals, displaying leader boards, progression bars, and giving prizes (Deterding et al. 2011). It is also important to point out that gamification itself is not a product; one does not create gamification in the same way one makes one game. Game elements are added to change a process that already exists, to change how that process affects people (Landers et al., 2018). Many articles confirm that this type of motivation works, and it also shows that if rewards disappear, the motivation to continue with the rewarded action often disappears (Nicholson, 2014). The value of creating a system of gamification is that it could build personal incentive for the user to continue with the behaviour. My research partner Skauge will discuss further how we implemented gamification and game theory in Humble Bumble in her thesis.

2.4 Other similar applications

Looking outwards, there are other that applications aim for environmentally friendly behaviour and personal improvement. A minor heuristic evaluation is done of some related application in the market today. A heuristic evaluation is done by looking at an interface and trying to come up with an opinion about what is good and bad about the interface (Nielsen & Molich, 1990). In the method described by Nielsen and Molich, it is suggested that several people conduct the evaluation, this evaluation, however, is done solely by me. The evaluation is used to compare their designs with the choices we have taken for *Humble Bumble*. The evaluations investigate what the application is good at, how they keep their users interested, what do they want to accomplish, and the similarities to our application. The evaluations below are a summary of four different applications that is created to motivate and help the user improve or to act in environmentally friendly ways.

2.4.1 Joulebug

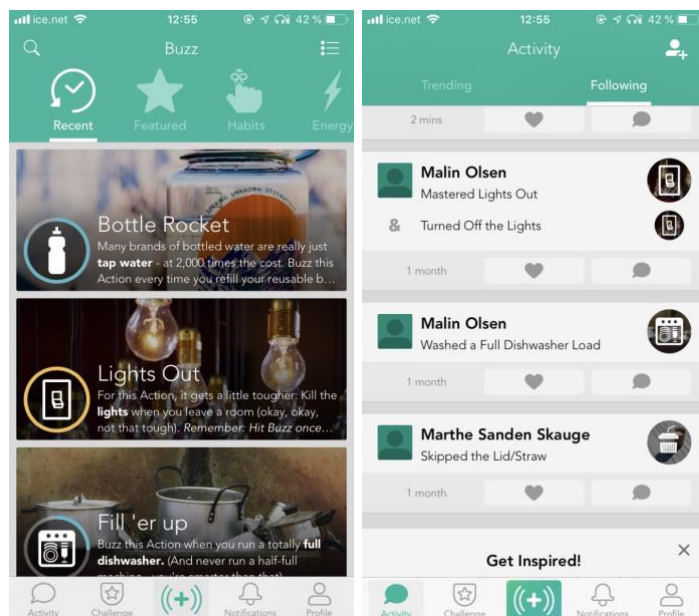


Figure 2 Screen shots from the application Joulebug

Joulebug (Cleanbit Systems. Inc, 2011) is a sustainable social media platform. In the *Joulebug* app, users can publish pictures and share sustainable actions with other people using the application (fig. 2). The idea is to use the social aspect, to encourage the users to act in sustainable ways. The user can compete in challenges with friends and receive badges. There is a range of different activities and challenges for the user to join, and information about what impact these activities have. The application has a similar structure to Instagram, with an

activity feed, and the possibility to signal approval and to comment on the posts. The downside of the application is that there is an overload of information; therefore, the readability is not particularly good. The rewards given are also very vague, and the app does not give the user any specific numbers or statistics. The challenges presented in the application can be a bit difficult to understand if one is not a frequent user. *Joulebug* had some features we used as inspiration when creating *Humble Bumble*. The application has a list of activities the user can add to their feed and show to their friends. *Joulebug* also has rewards and points for the good habits they log. However, they do not have statistics about how much the user is saving the environment. Comparing it to *Humble Bumble*, the social feature is the most essential factor for *Joulebug*. Whereas, the *Humble Bumble* app can be relevant for solitary users as well, since it includes a game and additional explicit statistic of the added activities.

2.4.2 Litterati

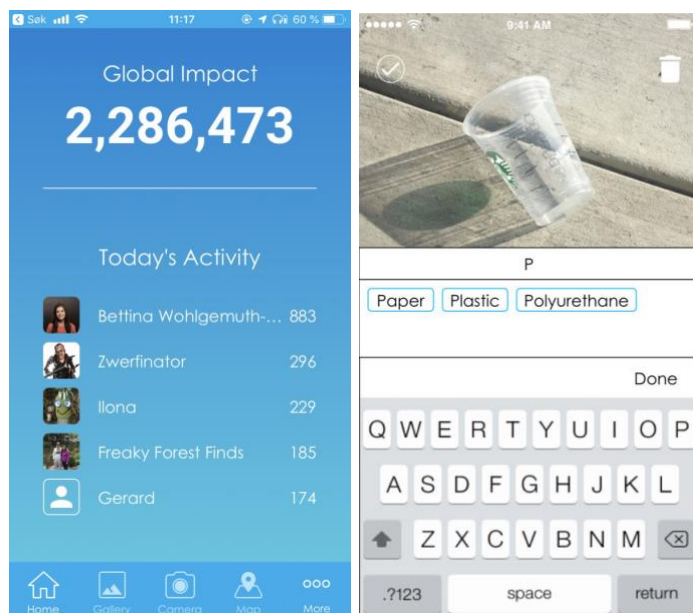


Figure 3 Screenshots from the application *Litterati*

Litterati (Litterati LLC, 2017) is an app with a community for identifying and collecting the world's litter. The idea is to mark a spot in the world map every time the user picks up litter. The user does this by posting a picture of what they pick up and shares it with hashtags of location and what kind of litter it is (fig. 3). For example, "#tobacco" or "#McDonalds". The information gathered about brands and products can then be used in collaboration with the producers to find more sustainable solutions. In January 2018, the count for trash picked up and tracked with this application is over 2.2 million (Litterati, 2017). It is a simple idea that

can give a lot of relevant data to countries about their waste problem and to the producers of the items that are found on the ground. In *Litterati* the users can create trash picking groups, to connect and compete with friends. The application is simple to use, but the downside is that it works better at locations where the user picks up small amounts of litter. In most big cities or neighbourhoods, the user would only need to walk a couple of meters to find handfuls of litter. To take a picture and tag all the trash picked up is very time-consuming. In the *Litterati* app, their main goal is to get people to pick up and track waste from the environment. Such an activity will also be appreciated and rewarded in *Humble Bumble*, but with our app, we wish the user will contribute to more activities. *Litterati* is using the GPS sensor of the phone, to pinpoint where the user is on a map. This technology might be useful for *Humble Bumble* to use as well in the future. For example, the purpose of making it easier for the user to add a relevant activity for the location.

2.4.3 Plant Nanny



Figure 4 Screenshots from the application *Plant Nanny*

Plant Nanny (Fourdesire, 2013) is an app that helps people to drink more water. *Plant Nanny* is not an application that promotes sustainability, but it is interesting to investigate the methods they are using for encouraging habit change. The user gets a virtual plant that needs water during the day to keep it alive (fig. 4). There are similarities to the “Tamagotchi” toy that was popular in the 90s, in which the user takes care of a virtual animal in a keychain. In *Plant Nanny*, the user registers their daily intake of water. For every glass of water, the plant in the app will be watered accordingly. It is a way to keep track of one’s daily water goals,

where the user fills up until their goal is reached. If the user does not drink enough water, their plant will suffer and eventually die. If it survives, it can be placed in a virtual garden, and it will give seeds. Seeds can be used to buy new plants. The plants have a face that shows emotions, to get the user to become emotionally involved in the virtual plant. Who would like to kill a cute creature? The concept of adding a character with emotions to the game has inspired us to do the same in *Humble Bumble*. *Plant Nanny* is using push notifications during the day to remind the user to drink water. In *Humble Bumble*, we are also hoping to enrichen the experience by using notifications.

2.4.4 Forest



Figure 5 Screenshots from the application Forrest

Forest (Seekrtech, 2014) is a mobile app that helps the user focus and reduce mobile screen time. The application allows the user to plant a virtual tree (fig. 5). While the user is working, the plant will grow. If the user manages not to use their smartphone during this time, the tree will grow to be healthy and be added to the user’s collection. If the user accesses their smartphone, the tree will die. The application has simple graphics but is still effective due to its clever textual feedback when the user tries to their phone. Examples are verbal messages such as “Go back to work”, “Hang in there”, “Stop phubbing”. The user can also plant trees in groups, and if they are working together with someone, they get a double reward. The user can buy a real seed to plant a tree in India with the points they gather using the app. The idea is simple and works well for its purpose, to get the user to focus. In *Forrest*, the user does not explicitly do environmental acts while using the app. However, with dedicated use, they could help the environment by paying for a tree to be planted with the points from the app. *Forrest*

and *Humble Bumble* have opposite approaches. In *Humble Bumble*, the user will need to do environmentally friendly acts in real life to get rewards in the app. While in *Forrest*, the user needs to use the app to be able to plant a tree in real life. Both applications have virtual gardens but have different ways to plant trees. The planet in *Humble Bumble* is to be more interactive and includes more than just trees. If the user does not do environmentally friendly acts, trash will appear in the, and the bumblebee will be unhappy.

Chapter 3

In this chapter I will introduce the development methods used in this research, Kanban and User-centered design. In addition, there will be an explanation of research methods used.

3.1 Development Methods

3.1.1 Kanban

The first development method chosen for this project is Kanban. This method has its origin from Japan and is a lean method which focuses on the process. Lean is a production principle where one focuses on creating value for the end-user, continually improve, eliminate waste, and optimize the workflow (Poppendieck, 2003). Compared to the waterfall method, which is linear and sequential, the lean the development has continuous improvement cycles with four steps: identify, plan, execute, and review (Planview, 2018). The main difference between lean, and agile methods like scrum is the time limitations and planning for each iteration (Lei et al. 2017). The word Kanban is Japanese and means "short" or "sign/signal". Kanban was developed by *Toyota* in the 1940s to increase the production of car parts (Ahmad et al., 2018). It could be used as both a development method as well as a project management method. What makes Kanban special, is the idea to split up every task into smaller assignments on cards, and sort them after what needed to be completed first. For example, in the making of a wheel, tasks can be broken down into extracting the rubber, connecting the rubber to the rim, making screws for connecting it to the car body and so on. In the latest years, it has become a popular method to use in software engineering (Ahmad et al., 2018). This is a method of organizing the work and splitting up bigger tasks into smaller tasks. In Kanban, the most important thing one does is to visualize the work that needs to be done and limit the work in progress. Using this method takes into consideration learning and acquiring knowledge on how to solve requirements along the way. With the Kanban method, one visualizes the workflow by using a board with tasks. The board defines the different stages of a task. The stages should be defined to fit one's needs. A simple example of stages is: "To do", "Doing", and "Done". In Kanban, one of the most important factors is limiting the amount of work in progress. One sets a limit on work initiated in production, depending on the team size and the scope of the task. When switching back and forth between tasks, one is wasting valuable time to readjust focus (Planview, 2018). Tasks that need to be done are placed in an incoming line

and moved accordingly to where they are in the process. A new task must wait if the number of tasks started have reached a set limit. As soon as a task is completed, the next waiting task can be started.

In this project, two Kanban boards have been used. One personal board for the writing part of the thesis, and one shared board for the distributed assignments for user studies and prototyping with my research partner, Skauge. The Kanban boards were made with the tool *Trello* (Atlassian, 2011). *Trello* is a digital board where one creates task as digital post-its. *Trello* allows the users to share the board, assign tasks, set due dates, and mark them with fitting tags. It is an easy drag and drop system that shows updates in real-time for the ones you are sharing the board with.

When starting to write this thesis, I started with a disposition. I continually wrote short sections that I wanted to include in the thesis. In collaboration with my supervisor, we agreed on a schedule for delivering chapters of the thesis. With my personal Kanban board (fig. 6) made in *Trello*, I set up all the task with submission dates. Thereafter, I started to focus on only one part of the assignment at the time. This helped me to stay in focus and be more effective when writing.

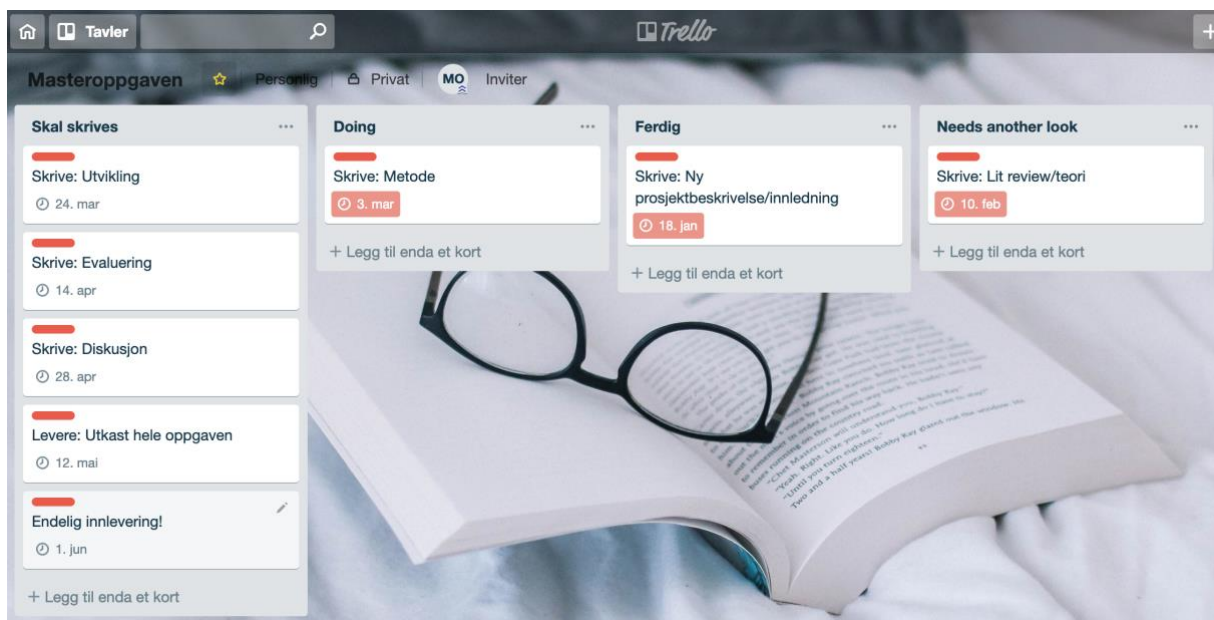


Figure 6 My personal Kanban board from (March 2018)

In the shared Kanban board, we set up all the tasks that we worked on together (fig. 7). In this board, we had to increase the task limit. We ended up with a limit of five tasks that could be

active. The limitation was set higher because of certain tasks included waiting for responses from participants and the Norwegian Centre for Research Data. To increase productivity, it was necessary to allow these cases some flexibility. Developing the prototype was also an ongoing task for the entire research period, and we split this task up into subtasks along the way. We planned different days for writing and prototyping. This approach enabled us to be focused on one task at the same time, even though we had different tasks ongoing. On our board, we marked our tasks with colours to see what was most important to finish first. Red for “extremely important”, orange for “important” and green for “important, but not urgent”. The colour system was a way to manage to prioritize the crucial assignments first.

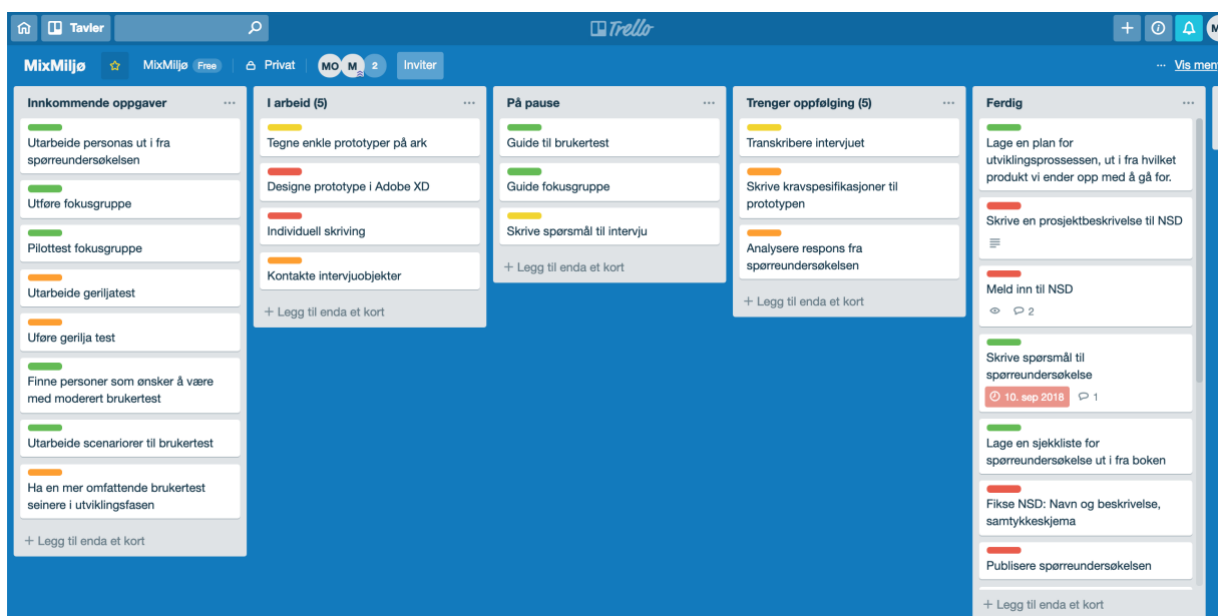


Figure 7 Shared Kanban board (March 2019)

3.1.2 User-centered design

In our project, we chose a user-centered design approach (UCD) with emphasis on the user experience (UX). User-centered design (UCD) is a broad term describing design processes in which end-users influence how a design takes shape (Abrams et al., 2005). User-centered design indicates including the user in all the stages of the development (fig. 8). It is essential to include the end-user to learn about their expectations and needs. If the designer fails to do this, the project may result in frustrated users who end up not using the product. The term user-centered design has its origin from 1980, created in Donald Norman’s research laboratory, and it has been widely used after this (Abrams et al., 2005). In user-centered design, the attention is centered on the end-user, and the primary goal is to make an end result that is

meaningful, useful, and usable for the user. By applying UX design principles in the development, we forced ourselves to consider the total user experience to an even greater extent, and not just make the product intuitive and user-friendly. We had thought about the whole experience of the user, attempting to make the best possible impression.

The general phases of a user-centered design process are:

1. **Specify the context of use:** Understand who are the people who are going to want to use the product, for what will they use it for and under what conditions?
2. **Specify requirements:** What are the user goals and product qualification needed for the product to be successful?
3. **Create design solutions:** This part of the process may be done in stages, building from a rough concept to a complete design.
4. **Evaluate designs:** Evaluation - ideally through usability testing with actual users - is as integral as quality testing is to good software development (Interaction Design Foundation, 2019)

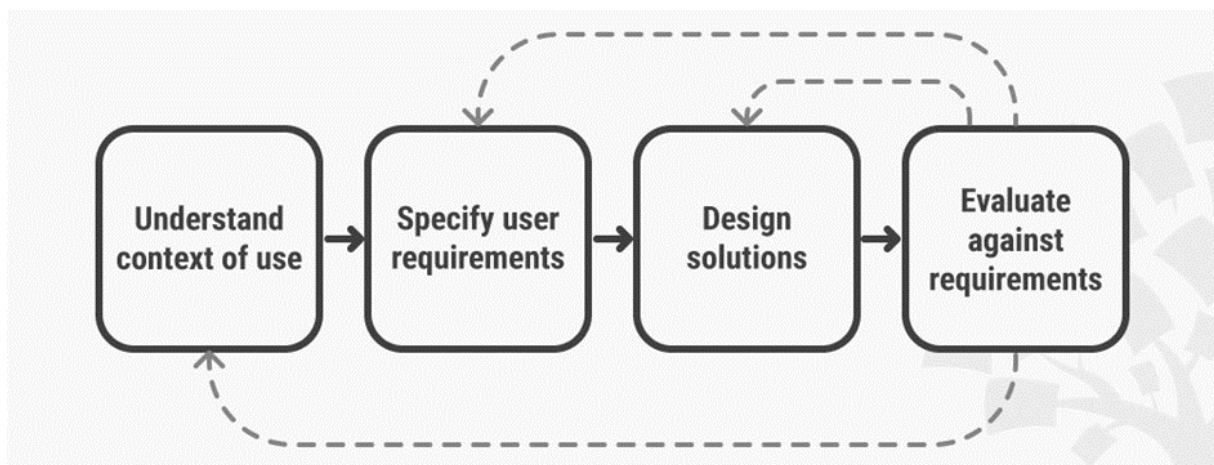


Figure 8 Illustration of phases of UCD (Interaction Design Foundation, 2019)

The first phase in the user-centered design process is first to identify a need (*fig. 8*). In our case, we saw a need for people to become motivated to do sustainable deeds in their daily lives. To specify the context of use, we conducted online surveys and researched other similar applications. When specifying the requirements, we carried out expert interviews, made personas, and created the requirements specification for the application. Subsequently, we started development of the application by making low-fidelity prototypes and worked our way towards a high-fidelity prototype. At this stage, we conducted usability tests to ensure that the application would be useful and usable for the end-user. In the last stage of this iteration, we

evaluated the design against the requirements through usability testing. In chapter 4, there will be an elaboration on how and why these methods were selected for the user-centered design process step by step.

3.2 Research Methods

In order to understand the motivations, interests, and needs of the potential end-users of *Humble Bumble*, we used a number of methodological approaches. These are presented and discussed in this chapter.

3.2.1 Triangulation

We had a triangulated approach and used both quantitative and qualitative research methods. *Triangulation* involves the use of two or more research methods to validate the data. In that way, we could cross-check our data to be more confident in our results. Mixed methods are proven to strengthen the research (Jick, 1979). In our research, we used different methods to research the user's perspectives, needs, and motivations. We have incorporated both quantitative and qualitative research methods, as will discuss below. By using multiple data sources in the case study to support the research, there is a strong argument in favour of the interpretation (Lazar et al., 2017).

3.2.2 Survey

At the beginning of the project, we decided to start with a quantitative method. A quantitative method is a way of collecting large amounts of data, to be used for an analysis. Quantitative data are often used to draw descriptive conclusions and about whether one or two variables are linked. It can, for example, be used to assume how people in a particular age group or country are based on a selection of people from the group. The data collected with quantitative research methods are easier to manage towards creating statistics analysis of the information (Lazar et al., 2017). With this method, data was collected about potential users' habits and values, enabling us to get a clearer idea of what kind of application would fit them.

To kickstart the project, an online survey was conducted to get an overview of our potential users and their interest. A survey is a well-defined and well-written set of questions to which an individual is asked to respond (Lazar et al., 2017). Usually, the participant completes a survey without the researcher present, therefore the data collected is not generally as in-depth as other research methods such as interviews or focus groups. Surveys can, however, be an effective way of collecting data quickly from many people. A survey is a collection of short questions to learn more about, for example, someone's opinions about something or habits. Surveys can provide valuable data, but only if the questions are constructed in a smart and practical way. It is vital to think clearly through what we want to learn, what kind of information are we looking for, and how-to analysis the data afterward. Otherwise, one could end up with a lot of unnecessary data that is difficult to analyze. When formulating the questions for the survey, we started by writing down everything we wanted to learn more about within the theme. Thereafter, we decided what kind of type of data we wanted to receive. We decided to use checkboxes and multiple-choice questions. With these types of answers, it would be easier for us to analyse the data as numbers to get statistics from it.

3.2.3 Expert interviews

We chose to conduct an interview to gather qualitative data about the topic. In qualitative research, the researcher goes one step further from the numerical data and look deeper into meanings and interpretations (Lazar et al., 2017). A survey can be limited; therefore, a direct conversation can provide perspectives and useful data the survey might miss. (Lazar et al., 2017). The qualitative research method we used in this initial phase was an expert interview. The interview was used to acquire better perspectives in situations where data surveys can be inaccurate. The form we selected for the interview was a semi-structured interview. The semi-structured interview form typically has questions that can lead up to discussion and can make room for clarifications and added questions along the interview (Lazar et al., 2017). In a conversation, the researcher has the opportunity to ask to follow up questions to their answers. It is also possible to get the respondents full reflections to the questions asked, while a survey provide short answers. With this research method, the researcher can discuss with the participant. The data gathered from the interviews was saved in password-protected folders.

3.3.4 User testing

User testing is the most common name for the technique used in the design process to evaluate a concept, feature, or product with real users. It is discussed whether the name "user testing" is explanatory, since it is not the user, but the designs and ease of use such tests are investigating (Lazar et al., 2017). Therefore, I divide the two kinds of techniques we used in our study in concept testing and usability testing. A concept test is a way of learning if the users like, need, and to understand the concept of a design. Usability testing is a way of researching the user interface. Usability is defined by Nielsen (2012) as a quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process. When one is usability testing, one finds representative users and conduct a test with representative tasks (Lazar et al. 2017).

Throughout the development process, usability testing has been valuable for validating if the design choices were suitable for what we wanted to achieve. Usability can be measured by a system of components; learnability, efficiency, memorability, errors, and satisfaction (Nielsen, 1994). We used a method that is called *guerrilla testing* to validate our concept. *Guerrilla testing* is a "discount usability engineering" method, where there are used three techniques:

- Scenarios
- Simplified thinking aloud
- Heuristic evaluation (Nielsen, 1994)

The name Guerrilla testing comes from the similarity to guerrilla warfare, but not the part of war, peace, explosives, mutilation. It is about penetrating the intimidation barrier, conducting the test rapidly and acquire results right away (Nielsen, 1994). The main principle with this method is to be a small force that lies in ambush and tests spontaneously in the users' natural environment. It is a quick method to try out a feature or theory about a design. The method is also useful to find errors and fix them early in the process (Nielsen, 1994). The concept test we conducted included questions about their understanding of our idea and their opinions on the concept of *Humble Bumble*. We had a low number of concise questions that only took the users approximately five minutes to answer.

A usability test was carried out at the end of the research period. In this test, we had a more detailed examination of the design. Usability testing is considered to be one of the most important and most widely used methods to evaluate product designs (Lazar et al. 2017). It

aims to assess the usability of a product by simulating the user-product interaction under controlled conditions. Usability is defined according to the International Standardisation Organisation as "the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in a particular environment" (Sonderegger & Sauer, 2009). According to Dumas and Redish (1993), usability testing aims to achieve the five following goals:

- the primary goal is to improve the product's usability
- include participants that represent real users
- provide the users' real tasks to accomplish
- enable researchers to observe and record the actions of the participants
- enable researchers to analyze the data obtained and make changes accordingly

In general, user testing involves representative users attempting to complete tasks in a representative environment (Lazar et al., 2017). We tested the usability with the focus on the goals listed above with the prototype we developed during the project. What a prototype is, and the conduction and evaluation of the usability test will be presented in Chapter 4.

3.3 Research ethics

It is important for researchers to keep their research subjects and data safe. To have good research ethics has been our key priority while conducting our project. Good research ethics is about protecting the subjects and their data. This includes being open about the goal with the research is, and why and what we are trying to accomplish.

3.3.1 Safe research

Applying for approval to Norwegian Centre for Research Data (NSD) to conduct our research, was our first priority. This is important for us because we wanted to assure that our research subjects safe, and the methods to be executed appropriately. We followed their guidelines on what to include in the consent form and how to collect, store, and plan for data handling (Norwegian Centre for Research Data, 2018). In our application to NSD, we elaborated on how and why we wanted to conduct our field research. We sent in a draft of questions we could be asking, consent form, and a plan for data handling. Unfortunately for us, the General Data Protection Regulation (GDPR) law came into force, and NSD had a

more significant workload than usual at the time we applied. GDPR is a set of rules for the protection of the users' privacy and right to their personal data, that regards everyone who is handling personal data (European Commission, 2019). After we sent in our application for conducting the research, it took over 2.5 months to get our project accepted. This caused a delay in our schedule, as we were not allowed to start the research until the application was approved. The acceptance letter from NSD, can be found in Appendix B.

In our research, the participants participate in activities that might be unfamiliar to them. It is therefore important that we do our best to make them comfortable in the setting we set up. While conducting the concept test, we always respected the individual's wishes of not contributing. In the more formal settings, of interviews and usability testing, the participants were invited to our school to participate. This was done because it is a safe place for both the participants and us. For them to feel welcomed, water, coffee, and snacks were available when they arrived. When writing the consent form and talking to them, we tried not to use unclear or expert language. This is not because they were not competent, but to make sure everything was clear and understood before we started the interview or usability testing. Even though many of the participants accepted their names to be published, it was decided to anonymize them all. The reason for this is that we did not see any practical reasons to publish them, as the results are the most important data gathered.

3.3.2 Consent

Prior to the survey, interviews, and usability tests, the respondents were given a consent form to read and sign before we proceeded (Appendix C). The consent forms were customized to each research method. It includes an explanation of the research project, why we are conducting our research, how we use the data, and how we ensure their and their data's security. We ensured they had time to read it properly and ask questions before they signed the consent to contribute.

In the concept test, we did not provide the consent form on paper. We gave information and received consent orally on the basis that we did not collect any personally identifying information. The reason we chose not to ask for signatures is because it can seem daunting when we look for potential participants. With no personal information saved, signing the consent form was considered an unnecessary complication concerning the recruiting process.

In the test, we only asked them for their first name and age, in order to be able to keep them separated in our notes. No microphone or camera was used, and the results of the test were written on paper. Unfortunately, we stumbled upon an ethical problem which we did not expect. When selecting people arbitrary outside to perform our test, we managed to ask two 15-year-old girls. We forgot to ask about their age beforehand and conducted the test. We realized our mistake only after the test was carried out. Since they are under the legal age to give consent, we had to discuss if it would be ethical to use their answers without their parents' consent. We decided to remove their names from our note's right way, even though we would not publish any of the subject's names. Other than the name, the only identifying information we had where the general location and age. This information could not in any way give away who the actual participants were, the city and age group are too big. We decided to keep their answers despaired not having their parents' consent. We did this based on that we did not ask any ethical, political, or personal questions. Their answers where mainly about their first impressions and thoughts of a design, that we consider is completely unharful. We went through our routines again to prevent a mistake like this to happen again, and we will remember to always ask potential subjects of their age before conducting research.

Chapter 4

4.1 Designing solutions

The following chapter will present the design iterations in the prototype development and go in-depth about difference iterations that were conducted throughout the research process. The iterations mark the phases of the different stages of the project.

4.1.1 Prototypes

In this research, it has been developed different kinds of prototypes to present the design. A prototype is a manifestation of design that allows interaction to explore its suitability (Preece et al., 2015). A low-fidelity prototype is a rough representation of a concept that helps with validating the concept early in the design process. It generally has limited function, limited interaction, and prototyping efforts. They are constructed to depict concepts, design alternatives, and screen layouts, rather than to model the user interaction with a system (Rudd et al., 1996). A low-fidelity prototype is a fast, simple and cheap way of showing a concept. In our project, we started with drawing simple wireframes of the application on paper. A wireframe is a conceptual model and suggestion of how the software will perform and look (Preece et al., 2015). Due to these characteristics, low-fidelity prototypes are ideal for evaluating the concept of the app.

A high-fidelity prototype is a visualization of a concept or product of higher complexity. It is functional and interactive, so it can be user-driven and has a navigational scheme (Rudd et al., 1996). The prototype is supposed to look and feel like the final product so that it can be used for exploration and testing. A mid-fidelity prototype is somewhat in-between the low- and high- fidelity prototype. In our case, it had the digital wireframes but did not include navigation for interactivity.

We used the digital prototyping tool *Adobe Experience Design* (Adobe XD) for creating a mid- and high-fidelity prototype (Adobe, 2019). We chose Adobe XD because it is free and efficient in making interactive interfaces. Adobe XD is a UX/UI design and collaboration tool. It is one of the few free software Adobe System delivers. It is a wireframing and

prototyping tool to create interactive prototypes. In Adobe XD, one can simulate a real mobile application by linking different sketches. It has a system for simple scaling and editing of elements that makes the development fast. With a cloud-based system, XD enables quick sharing for collaboration and usability testing (Adobe, 2019). Adobe is compatible with both Windows OS and Mac OS. Compared to Sketch, that is another big actor in prototype software, that is only available on Mac OS. We decided to use Adobe Systems because Skauge, and I use different operating systems (OS) on our personal computers.

4.1.2 Design iterations

Designing the application has been done through four development iterations (*Table 1*) from an idea sprint to find a concept, drawing on paper, to implementing it digitally and eventually making it interactive. The evaluation of the prior iteration is used to improve the next iteration. In the iterations, we were building the design by creating a low-fidelity prototypes to a high-fidelity prototype. In the second iteration, we conducted a concept test with the low-fidelity prototype to validate our idea, and at the end of the project, we had a comprehensive usability test with the high-fidelity prototype.

Table 1: Design iterations

Iteration	Aim
1.	Defining the concept. Writing requirements.
2.	Creating a low-fidelity prototype. Evaluating concept.
3.	Creating a mid-fidelity prototype. Defining design requirements.
4.	Creating a high-fidelity prototype. Evaluate the prototype with usability test.

4.2 Design Iteration one - Defining the concept

Skauge and I initially started our master projects with two different ideas to get people engaged in eco-friendly activities. Both of us had the same main goal: to make people act more sustainably and take care of the planet. Therefore, we began to collaborate on the practical part of the project – the development of Humble Bumble. We started the joint project with a brainstorming session to assemble our ideas and collect our thoughts of what we wanted to achieve with our project.

4.2.1 Survey

As the first step in deciding the direction of what to include in our project, we conducted an online survey, described in detail in the methods chapter. In the first period of our brainstorming, we were among other things wondering if a social media platform would be interesting for people. We decided to base this survey on questions regarding what mediums they use, how they use it to learn about their habits. Additionally, we wanted to know more about their main interest of topics within sustainable behaviour and the environment. The survey questions can be viewed in Appendix D. The survey led us into the first phase of finding the context of use. We used the University of Bergen's survey tool Skjemaker (2018) to publish our survey. Prior to publishing, we printed the survey and tested it with on a couple of volunteers. Based on their feedback on their understating of the questions, we made some adjustments before we published it. We wanted to share the survey online to reach out to as many different people as possible. The survey was shared on Facebook because it is a commonly used social media platform in Norway. It was shared in different groups, and some of our friends shared it so it would reach more people.

In this case, the survey was used to learn more about the potential users' routines and environmental interests. We also wanted to explore people's media habits and see if there were any connections between that and what environment-friendly themes they cared for. The survey included mainly multiple-choice questions, with the possibility to freely write text if the response options were insufficient. The survey got 138 respondents in total. Based on the responses, we saw that people rarely or never created content on social media, so the idea of a sharing-based social medium was dismissed. We also learned that 36% play mobile games at least once a month. The top interests they had related to the environment were cleaning trash

from nature, reduce plastic, protection of Norwegian nature, and sustainable development. Using this information, we decided on three main elements we wanted for our application:

1. It was going to be a mobile application.
2. The application was going to have an informative and enlightening aspect.
3. The intention was to make individuals act in more environmentally friendly ways.

The next step was to figure out how to implement these elements into a concept. In addition to reading relevant research, we examined other applications to find inspiration of methods and features to achieve the goals they set for their applications. The findings lead us to wanting to include gamification to motivate users, an avatar to engage the user's emotions, and have an overall user-friendly and fun to use interface.

4.2.2 Personas

The data acquired from the online survey, assisted us in creating personas. A persona is a fictional character with a detailed description that represents a user or customer of a product (Pruitt & Adlin, 2010). Personas are based on real data collected from potential users. Based on the data collected, a user profile is created to decide who the primary users are. Personas are a way to empathize with our potential users thought the phases of the development. Using personas in the development can increase usability, utility, and general appeal. Improve collaboration and progress and help make decisions (Pruitt & Adlin, 2010). We chose to create personas because it is a way of making statistics and data collected from the survey into something relatable. Personas are used to include users during the entire process by having them as a guideline to who please. It is a way of making it easier to remember them in discussions and choices one needs to make during the design process. It is a common mistake in a development process that developers focus on their own wishes and habits, rather than thinking of the potential users. Personas are a way of remembering the primary goal (Baxter et al., 2015). Typical traits seen in the results of the online survey added up to be a fictional character with the use of real data collected. A persona is usually defined with these characteristics:

- Identity and photo
- Status
- Goals and tasks

- Skillset
- Requirements and expectations
- Relationships

The tool “Make my Persona” from Hubspot (2019) was used to create the illustration. The tool is originally for creating a “buyer” persona, and initially have some characteristics which are not relevant in our case. The characteristics were modified to fit the data collected and what was relevant for us in this project. The personas content is made mainly from the responses from the survey, for example, the apps they have used, what goals they have, and their internet habits. It is not based on one person, but on several of the answers received. The results are Hilde Hipster and Kim Kind (*fig.9 & fig.10*). Hilde Hipster cares about plastic waste, uses social media and applications to connect with friends (*fig. 9*). Kim Kind cares about nature and animals. He also uses many applications, but more for entertainment value than the social aspect (*fig. 10*).



Figure 9 Persona Hilde Hipster, created from the data acquired from the survey

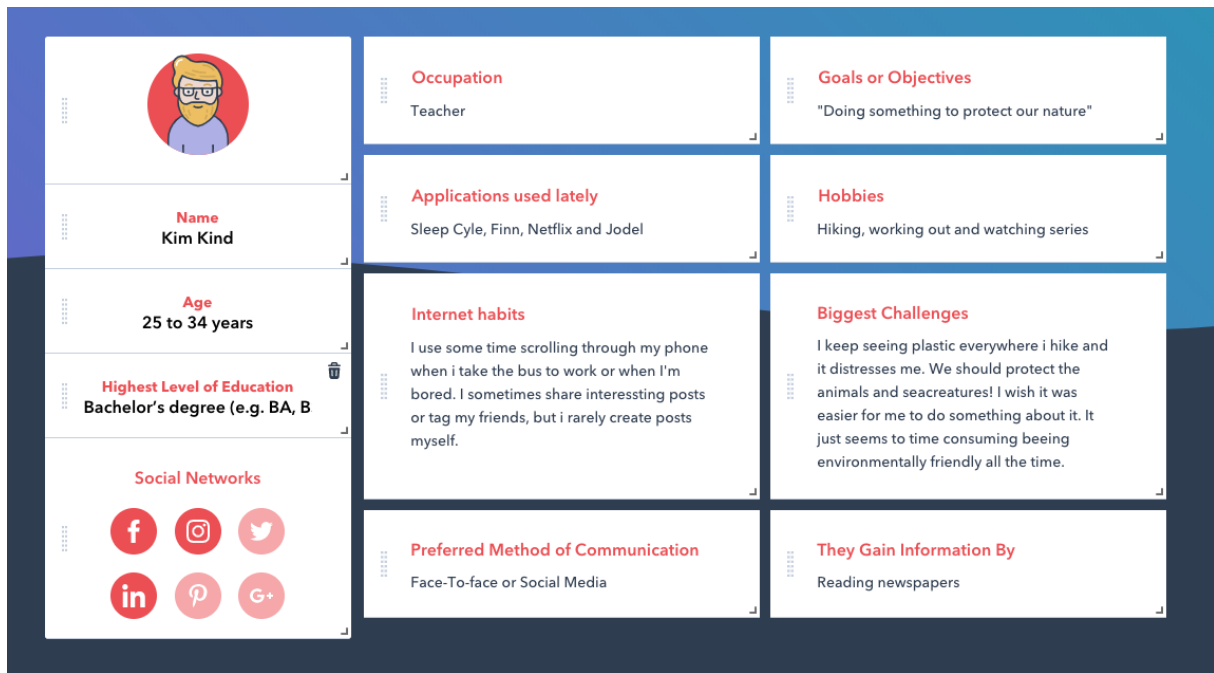


Figure 10 Persona Kim Kind, created from the data acquired from the survey

4.2.3 Requirements

After settling on a concept, we specified requirements for the application. Requirements are made to identify the objectives to include in the development (Preece et al., 2015). The requirement goals are there to make sure of the usability, and user experience demands are met. Requirements can be seen as statements about an intended product that specifies what it should do and how it should perform (Preece et al., 2015). The goal of specifying requirements is to establish a sound understanding of the users need. To specify requirements is essential to keep track of the goals, and to show what one is working against accomplishing. It makes it easier to remember the direction of the project and make decisions along the way. One of the aims of the requirements activity is to make the requirements as specific, unambiguous, and clear as possible (Preece et al., 2015).

In software engineering, there are two kinds of requirements that are identified. A functional requirement describes the specifications of the product's functionality, what it should do, and non-functional requirements that describe the constraints of the system and its development (Preece et al. 2015). The functional requirements are often specifications regarding the scope of work, product, or functions. The non-functional requirements are often based on usability, experience, security, and performance. Legal and security requirements and other operational

requirements mentioned within non-functional requirements. The requirements have been revised during the project, from the data we gathered. In the table below, the chosen requirements for Humble Bumble is presented:

Table 2: Requirements

Functional requirements	Non-functional requirements
The user should have the possibility to create a personal account in the application	The application should be easy to use for both technical and non-technical people
The user should have the possibility to add their sustainable activities	The application should be easy to learn and remember how to use
The user should get facts about how much CO2, water and money they are saving by doing the activities added in the app	The application should respond in the way the user expects it to do
The users should get acknowledgement for the actions they add in the application	The application should be efficient to use
The users should have the possibility to grow plants on their planet with the point system	The application should be responsive and work on different types of smartphones
The user should be able to see their history of activities	The application should be accessible
The user should get visual rewards in the game for their actions	The users' data should be stored in a safe way
The user should have the possibility to connect with friends	The user's data should be able to be viewed or deleted by request of the user.
The user should be able to change the settings for: language, measurements, privacy and notifications	The application should be fun and engaging to use

4.3 Design iteration two – low-fidelity prototype

In iteration two, the process of designing the solution began. The requirements defined in Section 4.1, were helpful to start envisioning the application and start drawing simple sketches. The first prototype was a low-fidelity prototype created on paper, which included the main pages we suggested for the application (*fig. 11*). This iteration started with one expert interview. The next step was to continue developing the prototype for concept testing on real users. The concept test was carried out, and the prototype was evaluated at the end of this iteration.

4.3.1 Expert interview

We selected the respondent based on his environmental work and because of the effort he is doing to change in the Norwegian society. We wanted to learn more about the organization's work for the environment. It was especially important for us to learn the methods that organizations are using to make people take sustainable actions. One of the key questions were how they establish and maintain motivation to make smart choices. As we planned the interview, we began with defining what we wanted to learn, and we wrote down a draft of questions. We contacted the interview subjects by mail. We were in contact with two potential expert users, but only took the time to participate. When the interview was confirmed, we tailored the questions to the respondent's specific expertise (Appendix E). We did a pilot test of the interview, to make sure the questions were reasonable and to make sure it would fit the scheduled time frame. In the interview, we had two roles: Skauge would observe and write notes, I was going to conduct the interview. Our interview guide was set to be a semi-structured conversation. In this way, we were able to ask follow-up questions for clarifications. We booked a quiet room at Media City Bergen for the occasion. Prior to starting the interview, we asked the respondent to sign a consent form (Appendix C). We gave the interviewee time to read it and ask questions before we began.

From the interview, we learned more about which sustainable acts we should promote in our application, and information on how to motivate the users to contribute to sustainability. We received solely positive feedback from the expert on the paper prototype (*fig. 11*). He said he liked the concept and helped us set up a list of activities with proven positive effect. One of the key points he believed could help increase the interest in the environment, was to give the

user rewards and make the actions seem meaningful to them. The expert recommended to include more significant rewards for the user to join a demonstration. He thought that the most important message we should convey is that "Even though you are only one of the 7 billion, and feel powerless in the mass, it has something to say what you do. It is possible to change yourself and those around you." This statement corresponds very well with the goals we have for the application. We did not recruit more expert users because of the time limitation. The information we received made us feel confident to continue with further development and to start testing the application on other potential users. At this point, we understood that the experts are not necessarily our main user-group and decided usability testing will be more beneficial in the design process.

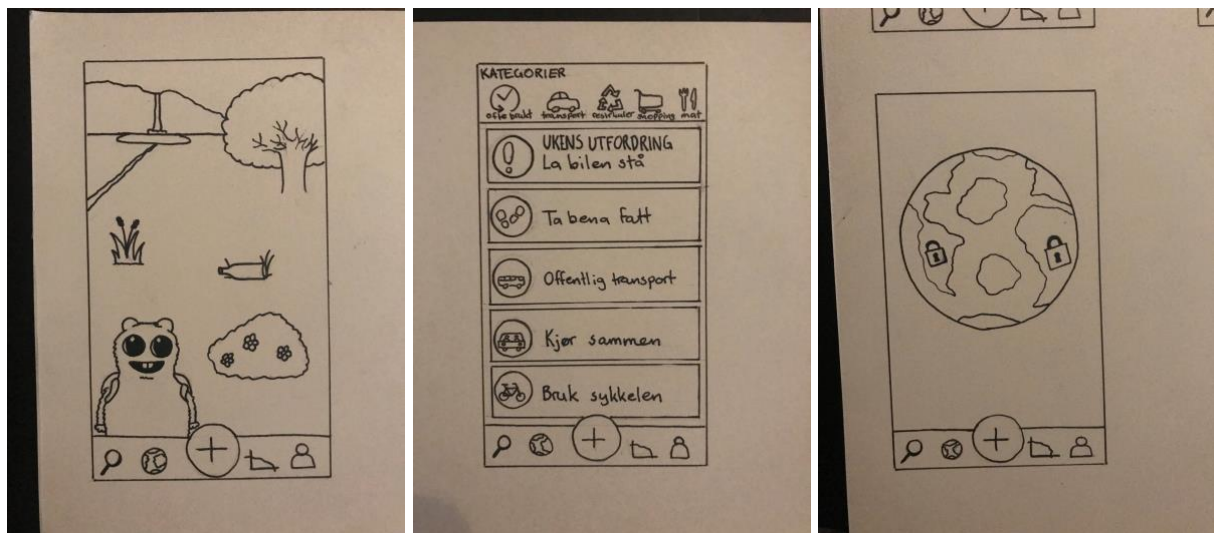


Figure 11 Pictures of the first low-fidelity paper prototype.

2.3.2 Digital paper prototype

We continued to develop several wireframes on paper. To test this prototype on users, Skauge imported the prototype into the prototyping software tool Pop - Prototyping on paper. This application makes it possible to create simple clickable interactions on the paper wireframes on a mobile device. Pop is an application that helps transform pen and paper ideas into interactive applications. Pop is created by Marvel and is used by over 1 million students and companies worldwide (Marvel, 2012). The application enables the user to upload images and make them clickable in the preferred platform. The wireframes were connected with Pop, and we defined the information architecture visually. With this prototype (fig. 12), we conducted a concept test of the app. We wanted to get answers to the following questions:

- What are their first impressions?
- What do they expect such an app to contain?
- Do they understand the concept?
- Does the app appear simple and user-friendly?
- How do they interact with the application?
- Feedback on design choices
- Which target group responds the best to the application?
- What is working well or not so well with what we have designed so far?

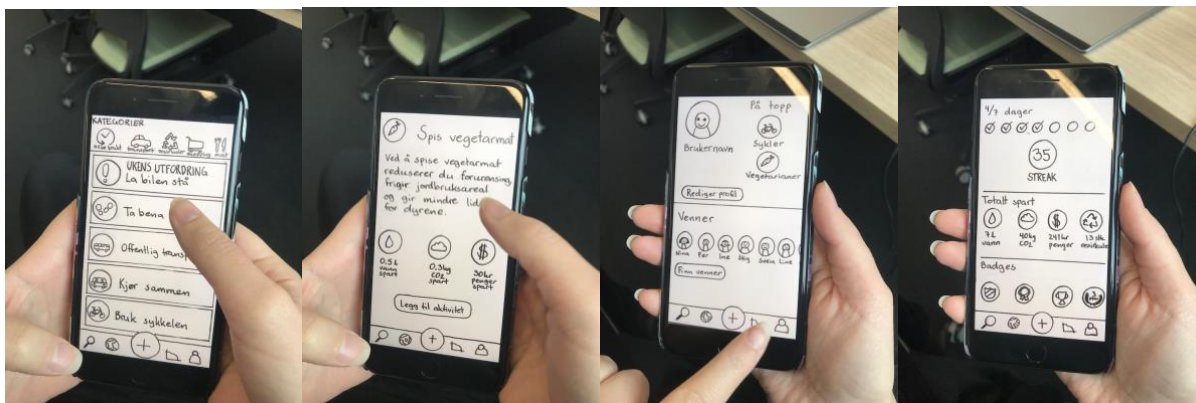


Figure 12 Pictures of the first the low-fidelity prototype on an iPhone 8.

I set up two scenarios of questions for the user test (Appendix F). One where I started the test with explaining the idea of the application, and then let them interact with the application. In this scenario, we could see if the application fulfilled their expectations. In the second scenario, I asked the test subjects to describe the application after interacting with it, without telling them anything about it first. This scenario was to learn if the concept of the application is comprehensible and intuitive to the users. The test was conducted in Media City Bergen and outside in the Bergen city centre. The test was conducted on six people, three men and three women between the age of 15-38. There were no recordings or gathering of personal data to ensure their anonymity. The test had six short questions that took each subject about five minutes to complete. Skauge observed and wrote notes on paper while I moderated the test.

4.3.4 Research findings

By asking the participants to explain what they thought the application was concerning, we learned that all of them understood that it was an app for adding environmentally friendly

activities. Three of the participants specifically pointed out that they enjoyed getting information about how much they saved by doing an activity. However, we learned that the planet seemed a bit unclear to the participant in scenario two that did not receive an explanation of the application. Regarding how they interacted with application, we saw that many of the participants tried to click on the locked places of the planet, and on the trash in the landscape, expecting something to happen. Several of the participants also tried to swipe right or left to go back and forth between pages in the app. Two of the participants commented that they missed a “back button” to find the previous page. Furthermore, all of them managed to use the bottom menu without a problem.

4.3.5 Evaluation

Pop was an excellent tool for making the drawings feel like an application. The menu worked very well, and we saw that they tried to use standard interaction like sliding between pages and clicking on elements in the app. They all understood the concept of adding activities to get rewards in the game, but it was somewhat unclear to some of them what the planet was supposed to do. The idea of showing data on the amount of water, CO₂, and money they save by doing different activities were well received.

4.4 Design iteration three – mid-fidelity prototype

Taking this insight from the concept test into consideration, the development of the mid-fidelity prototype started. The mid-fidelity prototype is a higher detailed prototype visually than the low-fidelity prototype. We used the prototyping tool Adobe XD to set up the screens. We had a shared document in Adobe Cloud, and we tried to work on the same document, but this resulted in problems with saving our work. The program has not facilitated for conflict management. If we worked with the document at the same time, it ended up with one of us losing our work. Therefore, we ended up splitting up the different wireframes and worked on separated prototype documents. When working on two separate documents, it became even more important with a common design system. In this iteration, we mainly work with creating content for our next iteration. We decided not to conduct a formal usability test in this iteration because the prototype was not set up for the possibility for interaction at this time. We did, however, ask friends, co-students and collages of input on small design choices along the way. Informal testing helped check the information structure in the prototype, correcting

typos, and making minor design adjustments.

4.4.1 Creating design system

A design system is a collection of reusable components, guided by clear standards, that can be assembled to build an application (Fanguy, 2019). I started building a design system guide for our application to ensure a consistent design, recurring theme, and set the appearance of the Humble Bumble brand (*fig. 13*). The style guide is the cornerstone of a good design system (Frost, 2016). Common recommendations (guidelines) are summarized to improve consistency of product design and to promote good user interface practices. It provides the benefits of improving the visual and functional consistency within an application (Park et al., 2011). The style guide includes some building blocks such as colours, typography and icons, in addition to a pattern library featuring components, elements and modules. It includes rules of design and implementation guidelines. The style guide provides consistency and effectiveness in designers work (Park et al., 2011). In bigger design teams or organizations, having a style guide distributed is ensuring everybody to convey the same standards and styles. With these implemented in the design process, Skauge and I both had the same base for creating the application. The style guide helped avoid inconsistency in the design. The style guide was implemented in the prototyping program as key colours, document fonts, and symbols. Skauge created most of the icons and illustrations in the photo and design software Adobe Photoshop. Adobe Photoshop is an advanced image editing software from Adobe Systems for raster graphics (Adobe, 2019). To have a rapid workflow, we also downloaded some of the icons made by Freepik from Flaticon (Flaticon, 2019). When building this style guide, I continuously worked with making the design as accessible as possible for every type of user.

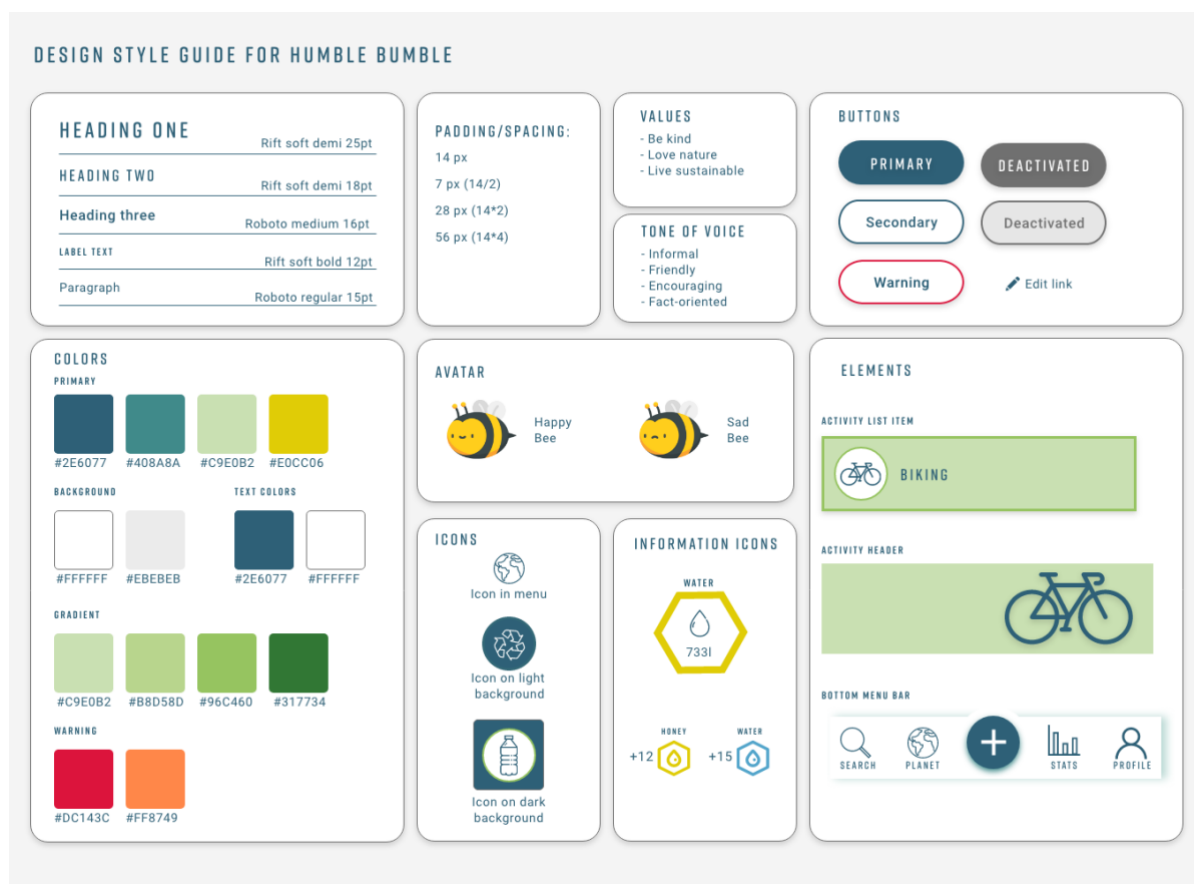


Figure 13 The style guide for Humble Bumble

4.4.2 Universal Design and Accessibility

Designing for everyone is not just a preferable choice; it is also imposed by law in Norway. When developing and designing, it is important not to discriminate users. This was pivotal when I made the style guide for the design. I made design decisions using the criteria for Available Web Content (WCAG) 2.0 as a guideline. This guideline is created to help people not break the law §14 in the Anti-Discrimination and Accessibility Act and the regulations that legislate universal design of information and communication technology (ICT) in Norway (Difi, 2019). The law is created to not discriminate individuals with disabilities, such as reduced vision or hearing.

The suggestions of the WCAG standard includes guidelines for design, content, front-end and back-end, colour choice, sizes, and information hierarchy. Even though we are not programming neither back-end nor front-end at this time of the project, it is necessary to build a design that can easily comply with the guidelines. Some of the criteria for having a good standard by the design perspective is that the contrast level between foreground and

background should be above 4,5:1 to text and background. To find functional colours for our project, I used the online tool *Colour Contrast checker* from The Centre for persons with Disabilities in Utah (WebAim, 2019). This tool is excellent for checking the colour contrast ratio on graphical objects, normal and large text. Another recommendation is to have text in addition to a visual presentation. Thus, I added the page names to the icon links in the bottom menu.

Moreover, free fonts were chosen for applications. The font *Rift Soft* that is used for heading and labels is an all caps font from the *Adobe* font packet that has a license that accepts personal and commercial use (Adobe Fonts, 2019). The font *Roboto* is an open-source font that was selected for paragraphs and provides a natural reading rhythm. This font is used in over 23 billion webpages (Google Fonts, 2019). Regarding sizes, there were set up rules on margins and spacing according to *Apples* guidelines (Apple, 2019). Furthermore, *Apple* suggests that target points and interactive elements should be at least 44x44 pixels, so we kept within this standard (Apple, 2019). The content should also be presented in a logical order. This is achieved by having clear headings, subheadings, and by grouping the content. Having a hierarchy will also make it easier for the developers to implement screen reader code and a clear reading direction. We have not worked directly on the accessibility for screening machines because of the limitations of the prototype tool we are using. This is, of course, something I would advise to be implemented in the back-end code.

4.4.3 Tone of voice

Setting the tone of voice is a way of making the experience of the design. The tone of voice refers to how we communicate our personality (Morgan, 2016). Defining the tone of voice is a way of giving the brand a personality of its own. It should reflect the values the application has and be recognizable by the user. Going back to the first the requirements, we wanted the application to be enlightening and motivating. With the background of gamification, we wanted to make the application fun and engaging. This should be represented in the way we communicate with the users in both visual and textual. In this process, it was clear that the tone of voice could be the link between the planet, activity adding, and statistics. The first avatar we had was supposed to look like a lemming, but we learned in the first usability test that the test subjects did not understand it and misinterpreted it. Instead, we changed the avatar to a bumblebee. The bumblebee was going to be the running theme in the application and the representation for change. Saving bees is already a known fight cause to make a

change towards an environmentally friendly life (Greenpeace, 2019). The bees are tremendously important for pollination of the food we are eating. They are now suffering from pesticides, drought, habitat destruction, nutrition deficit, air pollution, global warming, and more (Greenpeace, 2019). Therefore, we wanted to use the bees as an icon for sustainability in our application. To set the tone of voice, I first wrote down the key values the brand should present. “**Be(e) kind**”, “**Love nature**”, and “**Live sustainable**”. With these values set, it was time to take a stand of where to put the application regarding tone dimensions. Nielsen Norman group presents a scale of four dimensions of the Tone of voice (Moran, 2016). The four dimensions are:

- Funny vs. serious
- Formal vs. casual
- Respectful vs. irreverent
- Enthusiastic vs. matter-of-fact.

Within these dimensions, the tone of voice was carefully decided that our brand should appear informal but fact-oriented, friendly, and encouraging. With this mindset, our messages to the users could be funny and enthusiastic but still have a focus on real data and facts.

4.5 Design Iteration four - high-fidelity prototype

With the basis of the application designed, the work began with making it interactive and making the design as accurate to a real application as possible. At this point, we were going into precise detail of the application elements. In the profile, different settings were added to show that the user may change language and preferred units. It was also essential to include information about the users’ data and privacy. They should have the possibility to know what data is saved and how it is used in the application, according to the law of General Data Protection Regulation (GDPR). At this point, we combined our separated documents and started linking the artboard screens together. Connecting a phone to the computer allowed us to check out that the design is responsive.

4.5.1 Error prevention

While linking the different screens, we continually added more data to the design, giving the application affordances and constraints. Affordance is a term originally coined by the perceptual psychologist J. J. Gibson (1977), who defined it as that what nature provides, offers or furnishes to an animal or human. *Affordances* are today used to indicate the characteristics of the environment and how objects invite certain kinds of interaction possibilities. Norman brought the word into the design perspective after publishing the book *The Psychology of Everyday Things* in 1988. The rules he proposes for design are simple: make things visible, exploit natural relationships that couple function and control, and make intelligent use of constraints (Norman, 1988). The goal is to effortlessly guide the user to the right action on the right control at the right time. We added constraints to the design to prevent user errors and confusion. One way we designed for error prevention was making buttons inactive when the user has not provided the information needed to proceed to the next step. This button changes colour from grey to blue when the user clicks on an alternative (fig. 14). We also used grey and underline in buttons in the menu-bar, for showing the users position in the application.

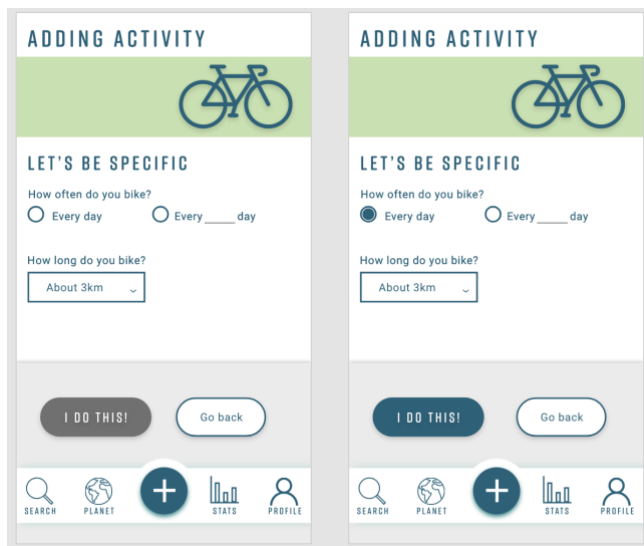


Figure 14 Inactive button for error preventing vs. active button after the user input.

4.5.2 Onboarding

After the concept test in iteration two, we learned that the user had some trouble understanding the concept of without us explaining the core features. Therefore, we decided to include an onboarding process. Onboarding is described by Renz et al. (2014) as the sum of

methods and elements helping the user get to know a digital product or digital application. The provided onboarding mechanisms should enable the user to smoothly pass into the efficient usage of the digital product (Renz et al., 2014). The onboarding process suggested, include three phases:

- Onboarding - Help the user to become an effective user of the system
- Help and Support - Providing support and Motivation to the user while using the platform
- Re-engagement - Reactivating users who have not been active within a course or the platform for some time (Renz et al., 2014).

In *Humble Bumble*, we created a simple step by step introduction for the user. The introduction includes a description of some of the main features presented in the application (fig. 15). The user can also skip the introduction. This introduction is meant to give them a heads up to what to expect from the application.

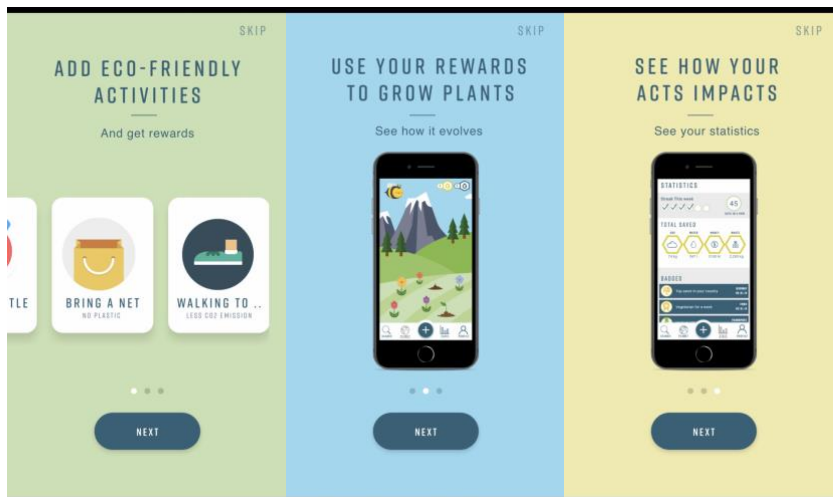


Figure 15 Pictures of the Onboarding

For the second phase to engage and motivate the user, we have included gamification elements such as rewards and challenges. The user will receive a start packet of honey and water when they enter the application. The seed and water are the rewards the user receives from adding their environmentally friendly actions in the app. The user can now try out some of the features right away, allowing them to learn how to use the platform. When browsing

the application, elements eventually will appear, to try and guide them into adding activities. The example we designed now is a water bottle thrown at the ground. When the user clicks on it, they will get a message about how to remove it. The message is, “Oh no! Your planet is filling up with garbage. Add an activity in the recycle category, and the item will disappear!”. This is a way of trying to engage the user in completing the challenge.

Regarding re-engaging users in the application, the prototyping tools we are using are limited. We are planning in the future to include push-notifications to remind the users about the application and help them be more efficient in its use. Even though the prototype is not in a phase where we could test this type of feature, we have noted down some example of how it can be used. In the picture below is a suggestion of a push-notification, that leads to a specific action according to the users’ location (*fig. 16*).

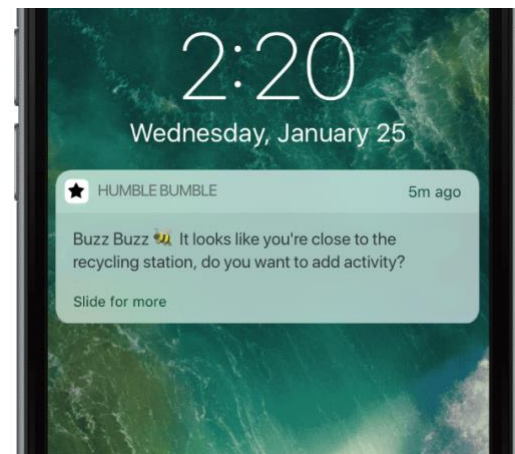


Figure 16 Example of push-notification from Humble Bumble

4.5.3 Usability test

We performed a more extensive usability test at the end of the research period. Usability testing is a way of researching the user interface. You find representative users and conduct a test with representative tasks (Lazar et al., 2017). In contrast to the guerrilla testing, where we only tested a small part of the application, the usability test was done on the entire application. This was a planned test, where we looked at how the users try to solve different tasks and had dialogs with them. Depending on the success rate of the tasks completion, we would learn about what we had done correctly and where the pain points are. While we worked on completing the prototype, we prepared scenarios for the usability test that was to be performed.

The usability-test involved five usability-test sessions and with a retrospective analysis. This study was a moderated usability test. Moderated usability testing is usually done in-person, where the participant, moderator, and observer are in the same room (Lazar et al. 2017). To record the test, I wanted to use the digital tool *Lookback* because it records the screen, input from the device’s camera, and sound of a usability test (Lookback, 2019). The tool enables remote testing, where one can test with users in their own environment. However, I did not

find sufficient information about how the data is safely stored according to NSD's guidelines (2018). Therefore, we decided to take notes of the interview to keep the participants' data safe.

An outline of the manuscript of usability test was written at the beginning of the project period when writing the application for NSD. It now needed adjustments to fit the current status of the project. When writing the first draft of the usability test, we made scenarios for the users to guide them through the application. We performed one pilot test to check the manuscript and the technical. The manuscript was revised using the feedback we received. In addition to the feedback from the pilot test, we got some guidance from one of the industry teachers, who is a professional UX designer with many years of experience in user testing. Together with him, we reviewed the test questions. He recommended that instead of having only scenarios, we could let the user self-manueverer through the application to see what they instinctively wanted to click. With this method, it was avoided saying too much about the features and rather letting them find out for themselves. The users where asked to speak out their thoughts, and we asked follow-up questions to their choices along the way. The manuscript for the usability test can be viewed in Appendix G.

The main questions we wanted to have answered with the usability test were:

- Do they understand the concept of the application?
 - The connection of the planet and self-reporting activities
- Do they understand that they have to perform the activities in real life to add them to the game?
- How do they navigate in the application?
- Do the pages and menu match their expectations?
- Do they understand how to add an activity, and what the results are?
- Do they understand what the statistics page includes?
- Do they like this application?
 - Which part do they like the most?
- What do we need to improve?

The participants that were recruited were in the age group 21-24, two men and two women. We did not take any videotapes or audio-recordings. Skauge was the observer and wrote down quotes and notes from the interview. I was the moderator and simultaneously wrote down notes on how the subject interacted with the application. The test was held at the University of Bergen premises, both at Media City Bergen and the Faculty of Social Sciences. All the participants read and signed the consent form (Appendix C) before we started. The usability test lasted for 20-30 minutes. After the fourth person, we decided not to invite more test subjects to perform this test. We saw reoccurring answers and that the test users encountered the same problems. Instead of continuing to get repetitive responses, we wanted to do the adjustments we saw was necessary and make a plan for the next iteration. This was also recommended by the expert that advised us on the development of the test. After we wrapped up the usability-test sessions, we had a retrospective analysis. With this knowledge, we could do an evaluation report of our design.

4.5.4 Findings from the Usability-test

When analyzing the research findings, we saw that everybody managed to manoeuvre in the app easily. They all used the menu and browsed the different pages. The first information box regarding their starter kit of honey and water, encouraged all of the participants to click on the grass to start planting. Everyone got curious about the bottle that appears, and that leads them into adding activities in the recycling section as we expected. This leads them naturally into learning about the adding activity functionally of the application. All of the participants added activities without any guidance from the moderator. After adding an activity, half of the participants pointed out that they enjoyed the text and facts about the activities. This shows that the tone of voice is something they appreciate. Regarding what the participants enjoyed the most varied. Test person one's favourite feature was that she could see how much CO₂ and money she is saving with her actions. Test person two's favourite feature was that she could see how well his friends are doing in the game. Test person three was colour blind; nevertheless, he stated that he enjoyed the visuals, colours, and bee-wordplay and the rewards in the game. This was especially good news regarding the colour selections I made according to the accessibility standards. Test person four loved the game part of the application. He liked that he got an introduction to the application. He also enjoyed the information about how much (CO₂, water, and money) he saves by acting environmentally friendly. He was the only one that said the game element was his favourite feature; the others seemed more interested in the statistics and connection with friends. That they all enjoyed different parts of

the application, shows that design is heading in the right direction for the features we included.

Nevertheless, we also saw that some design choices need reassessment. Even though everyone used the menu, the constraints did not work as we wished. Some of the users still tried to click on the inactive menu elements. Some other findings were that three of the participants thought the rewards of water and honey was somewhat confusing. Some of them wondered what the difference was rewards in the game vs. what was saved in real life. Two of the participants mentioned that they would like the application to connect it with their activity tracker, like Fitbit. Three of the participants also commented on how it could be possible to cheat (to add activity without actually doing it) in the application. By mentioning this, it shows that they understand the concept that they need to actually proceed with the activities in real life.

4.5.5 Technical issues

Unfortunately, we had some technical issues during the test. There were problems with the scroll functions in Adobe XD, and this caused confusion in the onboarding pages. One screen missed links to proceed in the prototype, so we had to step in to help them continue during one test. Since this is a prototype, the “logic” of the gained water and honey was wrong in some cases. Two of the subjects commented on this. Adobe XD is also poorly adapted to implement animations for the design.

4.5.6 Evaluation of the usability test

Adobe XD is a great tool for showing design for basic mobile applications, as it feels authentic for the users. Some of the test subjects needed explanation several times that the application was not fully functional. Unfortunately, it was hard to make the game part genuine for the users. I believe micro animations and a better set up for the logic, would have helped the users get a better understanding and feeling of the game. We learned a lot of the results of the usability test. The menu works well, but it could be adjusted to fit the users' desires in a better way. In the next iteration, I suggest that we remove the Search from the menu, since the test subjects did not seem to need it as an important shortcut. The shortcuts in the menu should generally be linking to the pages that are most commonly used. The Search could be implemented to the activities page instead. Since three of the potential users found the

connection to friends to be exceedingly interesting, I suggest we add this to the menu, and make connections with friends a more significant part of the application. I believe the similarities about the visual icons of both honey and water, that is the reward in the game and the icons for CO₂, water, and money saved in the real world are too similar. This might be the reason the test subjects were confused. Differencing these icons might help, and we should test this further. It might also be an idea to drop water as a reward in the game, and only have honey to make it simple for the users to understand the difference in reward in the game and total saved. Overall the feedback was positive, and some of the participants were eager to know when the final product would be available.

Chapter 5

In this chapter, the different methods, methodologies, and the high-fidelity prototype that were utilized in the research will be discussed. The research questions from section 1.3 will be answered. Lastly, there will be a conclusion and suggestions for further development.

5.1 Summary of the process

As stated early in the research, the framework for our project would be to create a good user experience. The primary goal for the application was to make the user to act more environmentally friendly by utilizing user-centered design. The process of making people act in more sustainable ways is not necessarily straightforward. As Winter and Koger (2014) explained, people tend to follow old habits and proceeding with their daily habits without thinking about the impact their actions have on the climate. While looking into behaviour theory, I believe the way to achieve our goal is by motivating the users by using methods to increase the anticipation for something good to happen. Within the behavioural theory, it is mentioned that including to motivation, the user needs a trigger and the ability to carry out the behaviour (Fogg, 2009). In our research, we have tried to figure out what the end-user finds interesting, regarding what features could trigger their motivation to use the application. With the methods that were carried out in the research, we have attempted to create an optimal user experience and at the same time increase the end-users' intrinsic and extrinsic motivation towards sustainability, as well as the ability to perform such actions.

The first phase of the user-centered design (UCD) method was the exploration to specify the context of use. The data from the survey helped create personas and set a few requirements as starting points for the application. It would have been advantageous if we had applied to NSD at the beginning of the project to be allowed to run the test on youths under 18. As we were missing insight on their digital habits and interests within sustainability. If the process of applying to NSD had not been so cumbersome, we would have applied for this later in the research period. The personas were useful to create, because it contextualized the data we collected. However, the personas were set aside when we started testing on the users. The

personas would have been more valuable if we had stakeholders or a bigger team, to show who the application is created for.

The next step in the process was to specify the context of use and the requirements. We were supposed to have several expert interviews but ended up with only conducting one. The input we got from the interview helped us, among other things to define the activities to include. The expert was the first person to give feedback on the paper prototype. If we had another expert, it might have given us more insight on how to work with promoting our goal of sustainable behaviour. Nevertheless, I still believe it was the correct decision to prioritize the concept testing usability testing regarding the time limitation we had. As Jick (1979) stated about triangulation the research is strengthened by using mixed methods.

The next step was to start including the end-users more in the process. We conducted a concept test, which was very useful for validating our idea. Additionally, this was useful to see how the users interacted with the first prototype. The method of going out doing concept testing on random people, worked very well to find out their first impressions of the application concept. It is a cheap and efficient method to get feedback from users. The users that participated especially enjoyed the information about how much water, CO₂, and money they are saving by doing the activities. This shows that the visual statistics can be perceived as a reward and be an extrinsic motivation for the user.

Regarding the concept test, we unfortunately came across the ethical problem of conducting the research on two participants that were under-aged. The data that was personally recognizable was cleared, but we did keep their answers as they were in no way harmful or controversial. If we had applied to NSD, for researching on minors earlier in the process, we might have had a better preliminary plan for rectifying our mistake.

In the next step of UCD process, we started developing the prototype from the concept to a more lifelike application design. I created guidelines for how the design to be implemented in order to make it easier for me and Skauge to collaborate. The design guide was fairly simple but worked well to assure the design to become consistent. If the guide were to be shared with a bigger team, I would have created a more complementary document with directory structure, to make it easier for everyone to use. This would have also included grid guides and specific standards for the front-end developers. In this phase, we did not conduct a formal test

with the prototype on users. However, I did test if colours, text and readability complied with the WCAG guidelines (Difi, 2019), regarding the accessibility for the user. In retrospect, a short usability test might have been useful to crosscheck if we were targeting the right audience with the tone of voice and design choices. I would like to add that in our usability test, we did get a positive feedback on colours and visuals from a colour-blind participant.

In the final step of the UCD process, the high-fidelity prototype was made interactive so that we could conduct a more complementary usability test. The usability test was essential to check if we managed to achieve some of the requirements we set for the application. Not all of the requirements were possible for us to test, as the design is not fully developed and programmed. Examples are the requirements concerning security and data handling. We checked if the features in the application corresponded to the requirements in Section 4.1.3. Moreover, it was important to see if the application was easy and enjoyable to use, and if the application responded in the way they expected it do.

The usability test had five participants, including the participant in the pilot study. According to Nielsen (1994), a usability test conducted with about 5-8 representatives is enough to find about 80% of usability issues. To be more resolute on the results gathered from the usability test, we could have recruited more participants. The plan, however, was to conduct another test shortly after the proposed changes were done. There was, unfortunately, no time for this at the end of the research period.

While conducting the usability test, we learned that all of the users managed to use the application. The onboarding process worked very well and led them into further exploring the application. However, the game part of the application seemed challenging to visualize for the user in the prototype. The design in Adobe XD is somewhat flat, and if the game had more animations, it might have been more attractive to the user. Since the prototype is very similar to a real application, some of the participants found it confusing that not everything worked as they expected. For example, when they added an activity, it was expected that the amount of honey and water would increase in the page of the game. We should have explained the concept of prototype more in-depth in the beginning, this might have helped to clarify it for them. It did, however, prove that they were conscious of the rewards they were to receive.

As for what the users enjoyed in the application; we revised different responses on what they preferred the most. Two of the users said they might not use the planet as much as the other parts. Another user, however, liked the planet game the most and said specifically it would motivate him to be more environmentally friendly. Even though not all of the users mentioned the game as their favourite feature, they all enjoyed the gamification part of receiving points, streaks, badges, and competing with friends. All of the participants were interested in the concept of comparing themselves to their friends that would also use the application. This indicates that we have done something correct regarding including the motivating factor of social acceptance mentioned in behaviour theory. The insight from the users was beneficial for finding out what they find enjoyable, what to include, and, which changes to make in the next iteration of the development of the design. The hypothesis about how self-reporting of activities can be a hassle for the user was confirmed by two of the participants. They declared that integrations with, for example, activity trackers would improve their experience.

It is, however, difficult at this moment in the development process, to know if the application has enough triggers, and motivational factors to change their behaviour over time. It is important to point out that behavioural psychology is a complex field and that even though the theory may explain behaviour in relatively simple terms, human beings interact in complex social situations, and motivation and triggering are always affected by the complex reality. Not everybody will behave as anticipated even in situations when motivation, ability, and trigger are all in place. For this reason, although our app is based on Fogg's theory, it may not be enough to make people behave in a more environmentally friendly way.

5.2 Answering the research question

RQ: "How can the design of a mobile application enable people to adapt to, enhance, and continue environmentally friendly behaviour?"

As discussed in Section 5.1.1, the human mind is complex, and people do not necessarily respond as anticipated. It is, however, possible to design for facilitating for motivation. One way of designing for using the user-centered design process is to include users in the development process. Concept testing can be used to validate the idea, interviews can be used

to get expert feedback and usability testing to improve the design. The participants can provide feedback on which features of the application they would like to use, and if they find it useful. The participants were unreservedly positive to *Humble Bumble*, some of them even wondered was going to be released. Through observation and conversations with users one can draw conclusions on what the end users would find motivating. As Wewer et al. (2008) also mention in their research with product design, to create the right feature or product it is essential to study user behaviour, characteristics, skills and needs, and implementing solutions that fit those. There is a potential for designers to influence the user's behaviour in a more sustainable direction.

5.3 Conclusion

In this master's thesis, I have researched how a user-centered design approach can be used to design an application promoting behaviour change. The methods used in the research were survey, expert interview, concept testing, and usability testing. This combination of data gathering methods allowed for useful feedback in order to investigate how the application can contribute to increase people's awareness concerning environmentally positive actions. Furthermore, the findings indicate that including several methods involving users, help to define and form an application the user wants. After conducting the usability test, I believe the application has an opportunity to become a motivational factor for the users to become more environmentally friendly. The feedback we received from the different participants, implies that the application has features they find intriguing.

The research on how to motivate people to become more environmentally friendly, is relevant because the environmental crisis is a fact. As Jepson and Ladle (2015) mentioned in their research on environment application, there are not many decent applications out there yet. Hopefully, the approach of including users can help making the applications for the environment more popular. Creating applications to promote environmentally friendly actions like *Humble Bumble*, could eventually lead to a chain reaction of people becoming more sustainable in their lives.

5.4 Future work

The next step for the further development for *Humble Bumble* is to make the design changes suggested from the evaluation in section 4.4.5 and conduct another usability test. The application could then be presented for potential investors. If we receive funding to develop the application, a team of developers will be needed. The next step is to start developing the application natively for iOS and Android. To realize the idea integrations with other exciting companies could be smart to limit the time building the information structure and an application programming interface (API). The Norwegian company *Ducky* has a data API for counting environmental footprint (Ducky, 2019). This API could be used to create an algorithm to determine the statistics for counting the amount of Co2 and water a person has saves.

Regarding the future work for the application, I believe the application would be massively improved if sensory data and other sources of data were connected. If the application had a connection to the GPS, bank account, email, etc. there would be many possibilities to help the user report acts and give advice. It could, for example, pick up on if the user ordered a plane ticket or fast-food, to calculate the user's actual footprint. The user could get credit for choosing environmentally friendly brands or buying a bus ticket instead of driving. E.g., If the app was connected to the phone's accelerometer to track activity, it would notify the user is using a bike or walking. If the geolocation is activated, another ton of opportunities opens. The map can include location-based push-notifications. For example, if the user is close to a recycling point, the application could ask the user are recycling and give a quick entrance to add it to the application. If the user is in another town, the app could ask what kind of transportation the user used to get there. Tracking location could also open an opportunity to give relevant suggestions specified for the location they are at, like zero waste or second-hand stores. Sensory data could lead the application to be context-aware, and hopefully incorporate AR-technology to make the application more useful and fun for the user.

References

- Abras, C., Maloney-Krchmar, D., & Preece, J. (2005). User-centered design. *D-Lib Magazine*, 11(1), 1–14. <https://doi.org/10.1045/january2005-editorial>
- Adobe. (2019). Design already ahead of its time. Retrieved 29 April 2019, from <https://www.adobe.com/no/products/xd.html>
- Adobe. (2019). Reimagine reality. Retrieved 29 April 2019, from <https://www.adobe.com/products/photoshop.html>
- Adobe Fonts. (2019). Rift Soft. Retrieved 29 April 2019, from <https://fonts.adobe.com/fonts/rift-soft>
- Ahmad, M. O., Dennehy, D., Conboy, K., & Oivo, M. (2018). Kanban in software engineering: A systematic mapping study. *Journal of Systems and Software*, 137, 96–113. <https://doi.org/10.1016/j.jss.2017.11.045>
- Andrews, D. (2015). The circular economy, design thinking and education for sustainability. *Local Economy*, 30(3), 305–315. <https://doi.org/10.1177/0269094215578226>
- Apple Inc. (2019). Human Interface Guidelines. Retrieved 29 April 2019, from <https://developer.apple.com/design/human-interface-guidelines/ios/visual-design/adaptivity-and-layout/>
- Arnowitz, J., Arent, M., & Berger, N. (2010). *Effective Prototyping for Software Makers*. San Francisco: Elsevier Inc. Retrieved from https://books.google.no/books?id=zqwDogXzn2UC&hl=no&source=gbs_navlinks_s
- Atlassian. (2011). Trello. Retrieved from <https://trello.com/nb>
- Barber, N. (2018, May). Why We Consume So Much. Retrieved 21 August 2019, from <https://www.psychologytoday.com/us/blog/the-human-beast/201805/why-we-consume-so-much>
- Cleanbit Systems. Inc. (2011). Joulebug. Apple Inc. Retrieved from <https://joulebug.com/>
- Cohen, I., & Heberle, J. (2019, March 29). Youth Demand Climate Action in Global School Strike. Retrieved 3 August 2019, from <http://harvardpolitics.com/united-states/youth-demand-climate-action-in-global-school-strike/>
- Coyle, D. (2014). *GDP: A Brief but Affectionate History - Revised and expanded Edition*. Oxford: Princeton University Pres.
- Deterding, S., Khaled, R., Nacke, L. E., & Dixon, D. (2011). Gamification: Toward a definition. In *CHI 2011 gamification workshop proceedings* (Vol. 12). Vancouver: Vancouver BC, Canada. Retrieved from

https://www.researchgate.net/publication/273947177_Gamification_Toward_a_definition

- Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification. using game-design elements in non-gaming contexts. *Proceedings of the 2011 Annual Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '11*, 2425. <https://doi.org/10.1145/1979742.1979575>
- Design. (2019). In *Dictionary.com Unabridged*. Based on the Random House Unabridged Dictionary. Random House, from <https://www.dictionary.com/browse/design>
- Direktoratet for forvaltning og IKT (DIFI). (2019). WCAG 2.0-standarden. Retrieved 10 April 2019, from <https://uu.difi.no/krav-og-regelverk/wcag-20-standarden>
- Ducky. (2019). Hjelp kundene dine til å velge bærekraftig. Retrieved 24 April 2019, from <https://www.ducky.eco/climate-data-api>
- Dumas, J. S., & Redish, J. (1993). *A Practical Guide to Usability Testing*. Exeter: Intellect. Retrieved from https://books.google.no/books?id=4lge5k_F9EwC
- European Commission. (2019). 2018 reform of EU data protection rules. Retrieved 1 April 2019, from https://ec.europa.eu/commission/priorities/justice-and-fundamental-rights/data-protection/2018-reform-eu-data-protection-rules_en
- Eyal, N. (2014). *Hooked: How to Build Habit-Forming Products*. Penguin UK.
- Fogg, B. J. (2009). A Behavior Model for Persuasive Design. In *Proceedings of the 4th International Conference on Persuasive Technology* (pp. 40:1--40:7). New York, NY, USA: ACM. <https://doi.org/10.1145/1541948.1541999>
- Fanguy, W. (2019). A comprehensive guide to design systems. Retrieved 5 August 2019, from <https://www.invisionapp.com/inside-design/guide-to-design-systems/>
- Fourdesire. (2013). Plant Nanny. Retrieved from <https://plantnanny.app/>
- Freepik Company S.L. (2019). Flaticon. Retrieved from <https://www.flaticon.com/>
- Frost, B. (2016). *Atomic Design*. Pittsburgh: Brad Frost. Retrieved from <http://bradfrost.com/blog/post/atomic-web-design/>
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>
- Gibson, J. J. (1977). The theory of affordances. *Hilldale, USA*, 1(2).
- Google Fonts. (2019). Roboto. Retrieved 29 April 2019, from <https://fonts.google.com/specimen/Roboto>

- Greenpeace. (2019). Save the bees. Retrieved 2 April 2019, from <https://www.greenpeace.org/usa/sustainable-agriculture/save-the-bees/>
- Ho, H. P., & Choi, T. (2012). A Five-R analysis for sustainable fashion supply chain management in Hong Kong: a case analysis. *Journal of Fashion Marketing and Management: An International Journal*, 16(2), 161–175. <https://doi.org/10.1108/13612021211222815>
- Holst, A. (2018). Smartphones industry: Statistics & Facts. Retrieved 10 January 2018, from <https://www.statista.com/topics/840/smartphones/>
- Hyung-soo, K., Mincheol, J., & Jaehyun, K. (2012). Tree planet. Retrieved from <https://treepla.net>
- Hubspot Inc. (2019). Make my Persona. Retrieved 2 February 2019, from <https://www.hubspot.com/make-my-persona>
- Interaction Design Foundation. (n.d.). User Experience (UX) design. Retrieved 13 February 2019, from <https://www.interaction-design.org/literature/topics/ux-design>
- Jensen, N. (2017). I dag er jordas ressurser «brukt opp» for i år. Retrieved 21 September 2018, from https://www.nrk.no/urix/i-dag-er-jordas-ressurser-_brukt-opp_-for-i-ar-1.13625042
- Jepson, P., & Ladle, R. J. (2015). Nature apps: Waiting for the revolution. *Ambio*, 44(8), 827–832. <https://doi.org/10.1007/s13280-015-0712-2>
- Jick, T. D. (1979). Mixing Qualitative and Quantitative Methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 601–611. Retrieved from [http://www.business.illinois.edu/josephm/BADM504_Fall_2015/3_Jick_\(1979\).pdf](http://www.business.illinois.edu/josephm/BADM504_Fall_2015/3_Jick_(1979).pdf)
- Kroger, S. M., & Winter, D. D. N. (2014). *The Psychology of Environmental Problems: Psychology for Sustainability* (2nd ed.). Psychology Press. Retrieved from https://books.google.no/books?id=2iN5AgAAQBAJ&printsec=frontcover&hl=no&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Landers, R. N., Auer, E. M., Collmus, A. B., & Armstrong, M. B. (2018). Gamification Science, Its History and Future: Definitions and a Research Agenda. *Simulation and Gaming*, 1–23. <https://doi.org/10.1177/1046878118774385>
- Lassen, K. (2019). Vi lar maten bli til søppel før vi kaster den. Retrieved 3 April 2019, from <https://forskning.no/forbruk-mat-og-helse-oslomet/vi-lar-maten-bli-til-soppel-for-vi-kaster-den/1287598>
- Lazar, J., Feng, J. H., & Hochheiser, H. (2017). *Research methods in human-computer interaction* (Second edi). Cambridge: Morgan Kaufmann.
- Lei, H., Ganjezadeh, F., Jayachandran, P. K., & Ozcan, P. (2017). A statistical analysis of the effects of Scrum and Kanban on software development projects. *Robotics and Computer-Integrated Manufacturing*, 43, 59–67. <https://doi.org/10.1016/j.rcim.2015.12.001>

- Litterati. LLC. (2017). Litterati. Apple Inc. Retrieved from <https://www.litterati.org/>
- Lookback. (2019). Talk to your users. Retrieved 2 March 2019, from <https://lookback.io>
- Lovdata. (2017). Lov om klimamål (klimaloven). Retrieved 19 January 2019, from <https://lovdata.no/dokument/NL/lov/2017-06-16-60>
- Marvel Prototyping LTD. (2012). Pop - Prototyping on paper. Retrieved from <https://marvelapp.com/pop/>
- Miljødirektoratet. (2018). Globale utslipp av klimagasser. Retrieved 18 June 2019, from <https://miljostatus.miljodirektoratet.no/tema/klima/globale-utslipp-av-klimagasser/>
- Moran, K. (2016). The Four Dimensions of Tone of Voice. Retrieved 28 April 2019, from <https://www.nngroup.com/articles/tone-of-voice-dimensions/>
- National Aeronautics and Space Administration (NASA). (2019). How climate is changing. Retrieved 31 March 2019, from <https://climate.nasa.gov/effects/>
- Niantic Inc. (2016). Pokémon GO. *Niantic*. Retrieved from <https://pokemongolive.com/en/>
- Nicholson, S. (2014). A Recipe for Meaningful Gamification. In *Gamification in Education and Business* (pp. 1–710). <https://doi.org/10.1007/978-3-319-10208-5>
- Nielsen, J. (2012). Usability 101: Introduction to Usability. Retrieved 12 April 2019, from <https://www.nngroup.com/articles/usability-101-introduction-to-usability/>
- Nielsen, J. (1994). Guerrilla HCI: Using Discount Usability Engineering to Penetrate the Intimidation Barrier. Retrieved 1 February 2019, from <https://www.nngroup.com/articles/guerrilla-hci/>
- Nielsen, J., & Molich, R. (1990). Heuristic Evaluation of User Interfaces. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 249–256). New York, NY, USA: ACM. <https://doi.org/10.1145/97243.97281>
- Norman, D. A. (1988). The psychology of everyday things. *The Psychology of Everyday Things*. New York, NY, US: Basic Books.
- Norman, D., & Draper, S. W. (1986). *User Centered System Design* (1st ed.). Boca Raton: CRC Press. <https://doi.org/https://doi.org/10.1201/b15703>
- Norman, D., & Nielsen, J. (2019). The Definition of User Experience (UX). Retrieved 8 March 2019, from <https://www.nngroup.com/articles/definition-user-experience/>
- Norsk Elbilforening. (2018). Over 200.000 elbiler i Norge. Retrieved 18 January 2019, from <https://elbil.no/over-200-000-elbiler-i-norge/>
- Norsk senter for forskningsdata (NSD). (2018). What information must I give? Retrieved 1 September 2018, from

https://nsd.no/personvernombud/en/help/information_consent/information_requirements.html

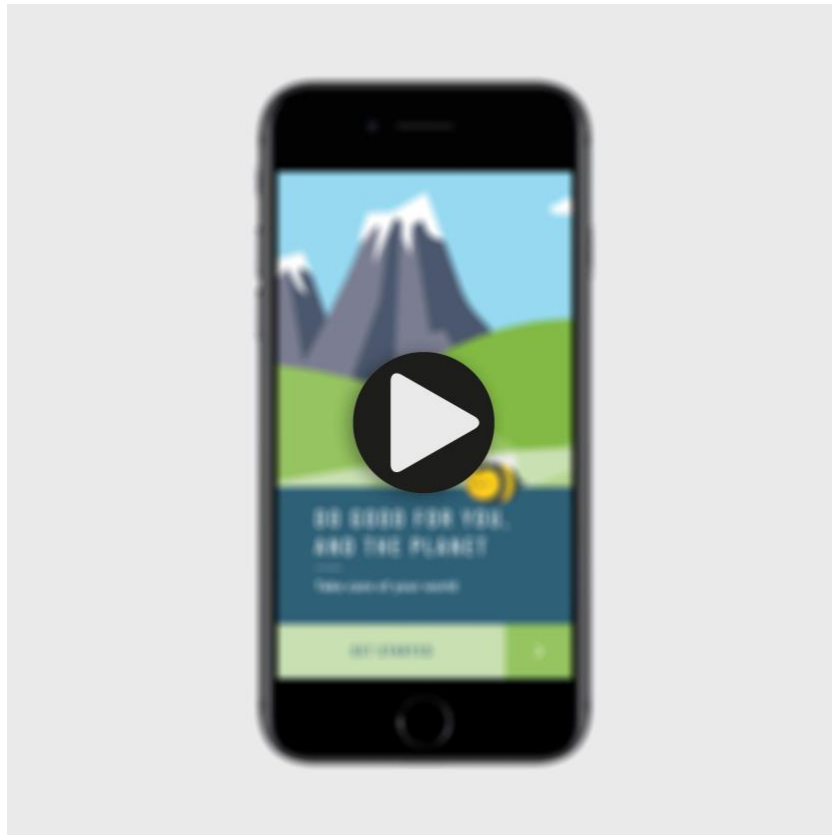
- Park, W., Han, S. H., Kang, S., Park, Y. S., & Chun, J. (2011). A factor combination approach to developing style guides for mobile phone user interface. *International Journal of Industrial Ergonomics*, *41*(5), 536–545. <https://doi.org/10.1016/j.ergon.2011.04.002>
- Pihl, R. (2017). Forbrukersamfunn. Retrieved 17 June 2019, from <https://snl.no/forbrukersamfunn>
- Poppendieck, M., & Poppendieck, T. (2003). *Lean Software Development: An Agile Toolkit*. Addison-Wesley. Retrieved from <http://www.poppendieck.com/>
- Planview Inc. (2018). Lean, Kanban, and How They Work Together. Retrieved 14 September 2018, from <https://leankit.com/learn/lean/lean-kanban/>
- Preece, J., Sharp, H., & Rogers, Y. (2015). *Interaction design: beyond human-computer interaction* (4th ed.). West Sussex.
- Pruitt, J., & Adlin, T. (2010). *The Persona Lifecycle: Keeping People in Mind Throughout Product Design*. San Francisco: Elsevier.
- Quantis. (2018). Measuring Fashion: Insights from the Environmental Impact of the Global Apparel and Footwear Industries study, 1–65. Retrieved from <https://quantis-intl.com/measuring-fashion-report-2018/>
- Renz, J., Staubitz, T., Pollack, J., & Meinel, C. (2014). Improving the Onboarding User Experience in MOOCs. *Proceedings EduLearn*.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. US: American Psychological Association. <https://doi.org/10.1037/0003-066X.55.1.68>
- Rudd, J., Stern, K., & Isensee, S. (1996). Low-versus High-fidelity Prototyping debate. *Magazine Interactions*, 76–85. Retrieved from <https://dl.acm.org/citation.cfm?id=223514>
- Saffer, D. (2010). *Designing for interaction. creating innovative applications and devices*. Retrieved from <http://www.gbv.de/dms/ilmenau/toc/602565936.PDF>
- Seekrtech. (2014). Forest. Apple Inc. Retrieved from <https://www.forestapp.cc/>
- Skinner, B. F. (1956). Reinforcement today. *American Psychologist*, *13*(3), 94–99. <https://doi.org/http://dx.doi.org/10.1037/h0049039>
- Sonderegger, A., & Sauer, J. (2009). The influence of design aesthetics in usability testing: Effects on user performance and perceived usability. *Applied Ergonomics*, *41*(3), 403–410. <https://doi.org/10.1016/j.apergo.2009.09.002>

- Statistisk Sentralbyrå (SSB). (2018). Bruk av IKT i husholdningene. Retrieved 6 November 2018, from <https://www.ssb.no/teknologi-og-innovasjon/statistikker/ikthus>
- Statistisk Sentralbyrå (SSB). (2017). Hva er egentlig BNP? Retrieved 5 August 2019, from <https://www.ssb.no/nasjonalregnskap-og-konjunkturer/artikler-og-publikasjoner/hva-er-egentlig-bnp>
- Tyler, O. (2017). The complex path to sustainability. Retrieved 14 October 2018, from https://www.ted.com/talks/olivia_tyler_the_complex_path_to_sustainability
- Sustainability. (2019). In *Dictionary.com Unabridged*. Based on the Random House Unabridged Dictionary. Random House, from <https://www.dictionary.com/browse/sustainability>
- United Nations Environment Programme (UNEP). (2010). Task Force on Sustainable Lifestyles. Retrieved 17 February 2019, from <http://www.unep.fr/scp/marrakech/taskforces/lifestyles.htm>
- University of Bergen. (2019). Skjemaker. Retrieved 29 August 2019, from <https://skjemaker.app.uib.no>
- Wagner-Greene, V. R., Wotring, A. J., Castor, T., Kruger, J., Mortemore, S., & Al., E. (2017). Pokémon GO: Healthy or Harmful? *American Journal of Public Health*, 107(1), 35–36. <https://doi.org/10.2105/AJPH.2016.303548>
- WebAIM. (2019). Color Contrast Checker. Retrieved 1 February 2019, from <https://webaim.org/resources/contrastchecker/>
- Wever, R., van Kuijk, J., & Boks, C. (2008). User-centred design for sustainable behaviour. *International Journal of Sustainable Engineering*, 1(1), 9–20. <https://doi.org/10.1080/19397030802166205>
- World Wildlife Fund. (2018). Overshoot Day. Retrieved 6 November 2018, from <https://www.worldwildlife.org/pages/overshoot-day>

Appendix A

How to access and use *Humble Bumble*


How to access and use Humble Bumble



Link to the prototype:

<https://xd.adobe.com/view/c68e4c53-4c1f-4328-40a1-cd8302788c12-b0bf/?fullscreen>

This link allows access to the prototype of *Humble Bumble*. The prototype is developed for Apple iPhone 7 screen, but can be previewed at any screen size. We recommend using a desktop, because of some bugs with the preview mode in phone browsers. Please keep in mind that the prototype is developed for a phones, and so some of the interactions such as drag from left to right, might not work as well on desktop.

In order to see all artboards, press esc on the keyboard and click the  icon in the top left corner.

The recommended navigation method is to click through the prototype as one would do when using an app, however the arrows on screen or keyboard can also be used. Keep in mind that by using arrows, the prototype will not be displayed in the intended order, and might be confusing.

Sometimes blue, transparent boxes will appear when clicking an area in the prototype. These blue boxes are indicators that show a clickable area in the app, and work as guidance in the instance of eliminating uncertainty as which elements are clickable or not.

Appendix B

Approval from NSD

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD sin vurdering

Prosjekttittel

Et mulighetsstudie for å kombinere natur, miljø og teknologi

Referansenummer

223708

Registrert

27.09.2018 av Marthe Karin Sanden Skauge - Marthe.Skauge@student.uib.no

Behandlingsansvarlig institusjon

Universitetet i Bergen / Det samfunnsvitenskapelige fakultet / Institutt for informasjons- og medievitenskap

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Kristine Jørgensen, Kristine.Jorgensen@uib.no, tlf:

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Marthe Karin Sanden Skauge, marthe_ss@hotmail.com, tlf: 90503766

Prosjektperiode

30.09.2018 - 01.09.2019

Status

17.07.2019 - Vurdert

Vurdering (2)

17.07.2019 - Vurdert

NSD har vurdert endringen registrert 17.07.2019.

Vi har nå registrert 01.09.2019 som ny sluttdato for forskningsperioden.

I tilfelle det skulle bli aktuelt med ytterligere utvidelse av den opprinnelige sluttdato (01.06.2019), må vi vurdere hvorvidt det skal gis ny informasjon til utvalget.

NSD vil følge opp ved ny planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til videre med prosjektet!

Kontaktperson hos NSD: Karin Lillevold
Tlf. Personverntjenester: 55 58 21 17 (tast 1)

16.11.2018 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg 16.11.2018. Behandlingen kan starte.

MELD ENDRINGER

Dersom behandlingen av personopplysninger endrer seg, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. På våre nettsider informerer vi om hvilke endringer som må meldes. Vent på svar før endringer gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 1.6.2019.

LOVLIG GRUNNLAG

Prosjektet vil innhente samtykke fra de registrerte og deres foreldre til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER

NSD finner at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET

NSD vil følge opp ved planlagt avslutning for å avklare status på behandlingen av personopplysninger.

29.8.2019

Meldeskjema for behandling av personopplysninger

Lykke til med prosjektet!

Kontaktperson hos NSD: Lasse Raa
Tlf. personverntjenester: 55 58 21 17 (tast 1)

Appendix C

Consent form



UNIVERSITETET I BERGEN

Institutt for informasjons- og medievitenskap

Vil du delta i forskningsprosjektet “En grønn digital plattform”?

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å utvikle en digital plattform som skal skape fokus rundt miljø, natur og resirkulering. I dette skrevet gir vi deg informasjonen om målene for prosjektet og hva deltakelse vil innebære for deg.

Formålet med prosjektet

I forbindelse med vår masteroppgave i medie- og interaksjonsdesign ved Universitetet i Bergen, ønsker vi å skape en nettapplikasjon som fokuserer på natur, miljø og resirkulering. Vi ønsker å skape noe som skaper engasjement og fokus rundt å forbedre miljøet. Vi ønsker å forske om et nytt digitalt medium kan påvirke brukere til å ta miljøvennlige valg.

Opplysningene vi samler i denne undersøkelsen vil bli brukt i vår masteroppgave som skrives i tidsperioden 01.08.18-01.06.19.

Hvem er ansvarlig for forskningsprosjektet?

Feltarbeidet utføres av Malin Fjell Olsen og Marthe Karin Sanden Skauge, masterstudenter i medie- og interaksjonsdesign, som har det utøvende ansvar for prosjektet.

For spørsmål angående prosjektet kan du enten ta kontakt med Malin Fjell Olsen på telefon 98 80 80 98, eller e-post mol002@uib.no. Eller kontakt Marthe Karin Sanden Skauge på telefon 90 50 37 66, eller e-post msk054@uib.no.

Faglig ansvarlig for masterutdannelsen er professor Kristine Jørgensen. For generelle spørsmål om forskningsprosjektet kan du ringe Jørgensen på 90 94 66 49, eller sende en e-post til kristine.jorgensen@uib.no.

Studien er meldt til Personvernombudet for forskning, Norsk senter for forskningsdata AS (NSD), med det formål å sikre at forskningsetiske retningslinjer blir fulgt.

Hvorfor får du spørsmål om å delta?

Du har fått spørsmål om å delta i dette forskningsprosjektet fordi vi ønsker å lære mer om forskjellige personers perspektiver på hvordan teknologi og miljøvern kan kobles sammen. Vi vil bruke det vi lærer av deg til å utvikle en digital plattform som er brukervennlig og nyttig.

Alle som deltar må være 18 år.

Hva innebærer det for deg å delta?

Spørreundersøkelse:

Dette er en kort spørreundersøkelse der formålet er å lære mer om interessen for en ny digital plattform for miljøvern. Undersøkelsen er blitt gjort i sammenheng med et masterprosjekt i Medie- og Interaksjonsdesign ved Universitetet i Bergen.

Det tar ca. 2 minutter å svare.

Personopplysninger vil bli behandlet konfidensielt, og det er frivillig å delta i studien. Du må være fylt 18 år for å delta.

Undersøkelsen gjennomføres av masterstudentene Marthe Sanden Skauge og Malin Fjell Olsen, og er meldt til Personvernombudet for forskning (NSD). Deltagelse i undersøkelsen regnes som samtykke. Ved prosjektslutt (01. juni 2019) vil alt datamateriale anonymiseres.

Fokusgruppe:

Dersom du velger å delta i dette prosjektet, innebærer det at du er med i en fokusgruppe. I denne fokusgruppen vil du bli stilt spørsmål som du kan diskutere i en gruppe med andre deltakere. Spørsmålene vil omhandle miljø- og teknologivaner. Deretter vil vi vise noen prototyper, som du i samtale med de andre deltakerne vil vurdere.

Fokusgruppen vil bli filmet og tatt lydopptak av. Opptakene vil bli forsvarlig lagret og slettet etter bruk.

All informasjon du gir oss vil bli anonymisert i masteroppgaven.

Ekspertintervju:

Dersom du velger å delta i prosjektet, innebærer det at du svarer på spørsmål i et intervju.

Spørsmålene vi vil stille deg omhandler miljøengasjement, hvordan du jobber med miljørettede grep i hverdagen og hvordan du mener vi kan engasjere flere til å være mer miljøvennlig. Informasjonen vi samler i dette intervjuet vil hjelpe oss med å forstå tematikken rundt dette prosjektet bedre

Informasjonen du gir oss vil bli gjengitt i vår masteroppgave og vi ønsker derfor å publisere opplysninger som navn og yrke etter din godkjenning.

Dersom du tillater det, ønsker vi å ta lydopptak av intervjuet. Dette opptaket vil ikke bli publisert og vil kun bli brukt for å senere gjengi informasjonen korrekt slik som du fortalte det.

Opptakene vil bli forsvarlig lagret og slettet etter bruk.

Brukertest:

Dersom du velger å delta i prosjektet, innebærer det at du deltar i en brukertest. I denne brukertesten vil du bli spurt om å gjennomføre en rekke oppgaver som utforsker en prototype. Vi kommer også til å stille deg spørsmål om hvordan du følte det var å utføre disse oppgavene.

Brukertesten kommer til å bli tatt opp med lyd og film. Vi ønsker også å utføre brukertester hvor vi bruker eye-tracking teknologi. Her vil du få på deg briller som sporer øyebewegelsen din, slik at vi kan se hvor du ser.

Alle film- og lydopptak vil bli forsvarlig lagret og slettet etter bruk.

I den ferdige masteroppgaven vil alle opplysningene vi samler om deg være anonymisert.

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert.

Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern - hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt i samsvar med personvernregelverket.

Personopplysninger vil bli lagret på passordbeskyttede maskiner i perioden 01.10.2018 til 01.06.2019.

Veileder vil ha tilgang på masteroppgaven underveis i prosjektet, men vil ikke tilgang til personopplysninger om deltakere i prosjektet.

Alle personopplysninger vil bli slettet til 01.06.19

Spørreskjemaet er laget i Universitetet sitt system Skjemaker.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Prosjektet skal etter planen avsluttes 01.06.19. Resultatene skal presenteres i masteroppgaven som en del av relevante funn. Oppgaven vil bli vurdert av en eller to forskere. Persondata vil bli behandlet konfidensielt og deltakernes navn vil anonymiseres og alle opptak vil bli slettet etter levert masteroppgave 01.06.19.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Universitetet i Bergen har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med: Universitetet i Bergen ved fagansvarlig Kristine Jørgensen på telefon 90 94 66 49, e-post kristine.jorgensen@uib.no

Student Malin Fjell Olsen på telefon 98 80 80 98, på e-post mol002@uib.no

Student Marthe Karin Sanden Skauge på telefon 90 50 37 66, på e-post msk054@uib.no

NSD – Norsk senter for forskningsdata AS, på e-post (personverntjenester@nsd.no) eller telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig
Malin Fjell Olsen

Prosjektansvarlig
Marthe Karin Sanden Skauge

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet En grønn digital plattform, og har fått anledning til å stille spørsmål.

Intervju:

- Jeg samtykker til å delta i intervju
- Jeg samtykker til at informasjonen jeg gir i et intervju kan bli gjengitt i masteroppgaven
- Jeg samtykker til at mitt navn (og evt. yrke) blir publisert i masteroppgaven
- Jeg samtykker til at det blir tatt lydopptak under intervju

Brukertest:

- Jeg samtykker til å delta i brukertesting
- Jeg samtykker til at det blir tatt video- og lydopptak av meg under brukertesten.
- Jeg samtykker til at mitt navn (og evt. yrke) blir publisert i masteroppgaven

Fokusgruppe:

- Jeg samtykker til å delta i fokusgruppe
- Jeg samtykker til at det blir tatt video- og lydopptak av meg under fokusgruppen.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, 01.06.19.

(deltaker)

(dato)

Appendix D

Survey questions

Alder _____

Kjønn

Kvinne

Mann

Annet/ønsker ikke å oppgi

Hvilke av disse mediene bruker du ukentlig? (Her kan du krysse av på flere)

Nettaviser

Facebook

SnapChat

Messenger

LinkedIn

Twitter

Kvinneguiden

Pinterest

Google+

YouTube

Reddit

Instagram

VG Debatt

Blogg

Annet:

Hvilke av disse påstandene kjenner du deg igjen i? (Kryss av i boksen)

	Kjenner meg ikke igjen	Kjenner meg delvis igjen	Kjenner meg veldig igjen
Jeg kommenterer på innlegg i nettaviser eller på Facebook			
Jeg publiserer egne innlegg eller bilder på sosiale medier			
Jeg deler innlegg med andre på sosiale medier			
Jeg publiserer innlegg i forum			
Jeg reagerer på innlegg ved bruk av tommel opp/emojis			
Jeg spiller mobilspill			

Hvilke tema engasjerer deg? (Her kan du krysse av på flere)

Bærekraftig mote

Søppel/plast i naturen

Redusere plastbruk i hverdagen

Vern av norsk natur

Vern av dyrearter

Kompostering

Secondhand klær/møbler

Redesign/repasere klær/møbler

Bærekraftig utvikling

Vegetarmat

Økologiske matvarer

Miljøvennlige husholdningsartikler

Økonomisk gevinst ved miljøvennlighet

Miljøvennlige reisealternativer (kollektivtransport, sykle, gå)

Ingen av de over

Jeg har andre interesser innen naturvern:

Hvilke typer apper har du brukt regelmessig det siste året for å endre vaner eller forbedre deg? *

Trening (f.eks MyFitnessPal, Runkeeper, Endomondo)

Søvn (f.eks Sleep Cycle, Calm, Leggetid)

Matvaner (f. eks Lifesum, Calorie Counter)

Mental helse (f.eks Headspace, Mindfit)

Uvaner (f.eks Slutta, Habit Tracker, Drikkevett)

Økonomi (f.eks Dreams, Think!, Wallet - Budsjett Tracker)

Læring (f. eks Memrise, Duolingo, Peak - Brain Training)

Miljø (f.eks Litterati, JouleBug)

Ingen av de over

Annet:

Appendix E

Interview guide

Intervjuplan

Innledning

Innledningsvis vil vi notere ned de demografiske dataene om personen som:

- Navn:
- Alder:
- Yrke:
- Type miljøengasjement:
For eksempel verv og lignende

Intervjuspørsmål:

- Hvilke metoder bruker dere i [REDACTED] for å få befolkningen til å bli mer miljøbevisst?
 - Hvordan opplyser dere? (Nettsider, magasiner etc.)
 - Hvordan jobber dere med forskjellige aldersgrupper? Har dere forskjellige plattformer for forskjellige aldersgrupper?
 - [REDACTED] har holdt på siden [REDACTED], hvordan har dere endret metodene deres gjennom årene? Er det noe som har fungert bedre eller dårligere?
 - Hvordan bruker dere teknologi som for eksempel internett, apper eller lignende for å nå ut til folket?
- I din erfaring, hva motiverer folk til å opprettholde interessen for miljø?
- I din erfaring, hvilke utfordringer møter dere i [REDACTED] når dere skal engasjere andre til å opptre mer miljøvennlig?
 - Hvordan tilpasser dere metoder for å nå personer som viser motstand mot å opptre mer miljøvennlig?
- Hva mener dere i [REDACTED] er det største miljøproblemet i dag?
- Hva tenker du er det viktigste budskapet som må frem til allmennheten om miljøtiltak?

Vise tegningene

- Førsteintrykk
- Drøfte tanker og idéer

Vise listen

- Har han noe å tilføye?
- Eventuelt ta vekk

Appendix F

Concept test manuscript

Konsepttest

To scenario

- 1. Der vi viser appen først og ber de om å forklare hva de tror det er.**
 - Navn, alder
 - Kan du beskrive denne appen?
 - Hva er førsteinntrykket ditt?
 - Hva likte du?
 - Hva likte du ikke? / Er det noe du savner?
 - Har du noen andre kommentarer eller innspill?

- 2. Der vi sier hva appen skal gjøre først, og så viser de appen.**
 - Dette er en app der du kan ta vare på din egen virtuelle jordklode, ved å rapportere de miljøvennlige valgene du gjør i hverdagen.
 - Hva tenker du at en slik app burde inneholde?
 - Hva er førsteinntrykket ditt av konseptet?
 - Hva likte du?
 - Hva likte du ikke?
 - Har du noen andre kommentarer eller innspill?

Scenario 1

Spørsmål	Svar	Kommentarer
Navn, alder		
Kan du beskrive denne appen?		
Hva er førsteinntrykket ditt av denne appen?		

<p><i>Oppfølgingsspørsmål</i></p> <ul style="list-style-type: none"> - Hva forventer du skal skje når trykker på “legg til aktivitet”? - Hva tror du disse viser? (statistikken) 		
Hva liker du med appen?		
Hva liker du ikke? Er det noe du savner?		
Andre kommentarer		

Scenario 2

Spørsmål	Svar	Kommentarer
Navn, alder		
<p><i>Dette er en app der du kan ta vare på din egen virtuelle jordklode, ved å rapportere de miljøvennlige valgene du gjør i hverdagen.</i></p> <p>Hva er førsteinntrykket?</p>		
Hva tenker du at en slik app burde inneholde?		

<p><i>Oppfølgingsspørsmål</i></p> <p>- Hva forventer du skal skje når trykker på “legg til aktivitet”?</p> <p>- Hva tror du disse viser? (statistikken)</p>		
<p>Hva liker du med appen?</p>		
<p>Hva liker du ikke? Er det noe du savner?</p>		
<p>Andre kommentarer</p>		

Appendix G

Usability test manuscript

Brukertest

Navn:

#	Hva	Scenario og spørsmål	Hva ser vi etter?	Notater
1.0 Introduksjon	Alder	Hvor gammel er du?		
1.1 Introduksjon	Bakgrunn	Hvilken bakgrunn har du? (jobb feks)		
1.2 Introduksjon	Forhold til miljø	Har du brukt noen apper som er miljørelatert før?	Er det noen apper de kan relatere til?	
2.1 Onboarding	Onboarding	<i>Du har lastet ned appen Humble Bee som er en app som skal hjelpe deg å bli mer miljøvennlig.</i> Du åpner denne appen for første gang nå. Trykk deg gjerne litt rundt for å bli kjent.	Se hva de syns er interessant å trykke på	
2.2 Konseptet	Onboarding	Kan du igjen forklare hva du tror denne appen gjør?	Hvilke tanker har de om planeten?	
2.3 Onboarding	Konseptet	Hva er førsteinntrykket ditt?	Hvor vil de trykke? Si hva du tror trykker på innfrir det forventninger?	
2.3	Forstår de planeten	Hva ser du her? Kan du forklare hva du har lyst å	Finne ut forventninger	

		<p>trykke på?</p> <p>Hva tror du at du har mulighet til å gjøre her?</p>	<p>til denne siden, samt hva de ønsker å trykke på.</p>	
2.4	<p>Forstår de honning/ vann og hvordan man skaffer mer</p>	<p>Hvis de planter en blomst eller trykker på honning/vann spør:</p> <ul style="list-style-type: none"> - Hva tror du “dette” er? (honning og vann) - Hvordan tror du at du kan skaffe mer honning og vann? (Demonstrer gjerne) 	<p>Forståelsen av sammenheng mellom honning/vann og legge til aktiviteter</p>	
3.1	<p>Menyen</p>	<p>Nederst her er det en meny, hva kan du tror du kan ligge under disse menypunktene?</p> <ul style="list-style-type: none"> - Gjerne trykk deg igjennom og forklar hva siden inneholder - Er siden slik du forventet? 	<p>Se om menypunktene tilsvarer forventningene</p>	
3.2	<p>Menypunkt Search</p>	<ul style="list-style-type: none"> - Hva forventer du er under Search - Kan du forklare hva denne siden inneholder? 		
4	<p>Menypunkt (Legg til aktiviteter)</p>	<ul style="list-style-type: none"> - Hva forventer du er under (+) - Kan du forklare hva denne siden inneholder? 	<p>Forstår de at det er aktiviteter du må gjøre irl?</p>	
5	<p>Menypunkt Statistikk</p>	<ul style="list-style-type: none"> - Hva forventer du er under “Stats” - Kan du forklare hva denne siden inneholder? 		

		<ul style="list-style-type: none"> - Hva er streaks? - Hvordan tror du "total saved" er regnet ut? - Hvordan tror du at du får badges? 		
6	Menypunkt Profil	<ul style="list-style-type: none"> - Hva forventer du er under "Profile" - Kan du forklare hva denne siden inneholder? 		
7.1	Legge til aktivitet	<ul style="list-style-type: none"> - Du fikk et hull i favoritt-buxsen din. Istedenfor å kaste den. Er det noe du kan bruke i denne appen? - Hvor tror du at du kan finne igjen den badgen du fikk? 	<p>Forstår de hvordan de legger til aktivitet? Hva tenker de at de oppnår med det?</p> <p>Forståelse av badge, hvordan man får den og hvor den vises etterpå</p>	
7.2	Aktiviteter	<p>Se for deg at du er vegetarianer. Kan du vise oss hvordan du ville gått frem for å registrere dette i appen?</p> <p>-Var det slik du forventet?</p>	<p>Forståelse av hvordan man legger til gjentakende aktiviteter</p>	
8		<p>La oss si at har brukt denne appen daglig en stund nå. Kan du forklare hva du tenker du har oppnådd ved å bruke appen?</p>	<p>Forståelse av hva som skjer videre etter gjentakende bruk av appen</p>	
9.1	Utfordringer	<p>Var det noe du synes var vanskelig?</p>		
9.2	Forbedringer	<p>Var det noe du ville gjort annerledes?</p>		
9.3	Hva liker de?	<p>Hva likte du med denne</p>	<p>Er det noe som</p>	

		appen?	skiller seg ut? Er det noe de ville brukt igjen?	
9.4		Er dette en app du kunne tenke deg og brukt? Hvorfor/hvorfor ikke?		
	Tilbakemelding	Hvordan syns du det var å være med på brukertest?	Er det noe vi kunne gjort annerledes?	