Humble Bumble

Using gamification as a motivator to create environmentally friendly habits

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Abstract

This thesis is an analytical review of *Humble Bumble,* a high-fidelity prototype of an application that aims to make people more environmentally friendly in their everyday lives. We go through the process of developing the app, utilizing a user-centered design approach in order to facilitate a good user experience.
Humble Bumble is a self-reporting app, where the users report environmentally friendly actions in exchange for rewards. The app is a virtual representation of the real world, seeking to show the users that their real-life actions make a difference.
Gamification was used in the app to promote motivation. An analysis of self-determination theory was performed to explain the psychology behind motivation in relation to gamification. We discuss how gamification should be applied to a system, how motivation can impact a user of a gamified system, and how to use gamification as a way of motivating environmentally friendly actions.

Acknowledgements

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1.0 Introduction

It all started in the spring of 2017. I had read a lot about environmental problems in the news, and I had already chosen not to eat meat and to recycle as much as possible. I felt like I was doing my part. In the Easter holiday, I travelled to our family's cottage by the sea. I had heard talk about the problems with large amounts of plastic in the ocean, and so I thought it would be nice to take a walk and inspect the environment of our little island in Øygarden on the Western coast of Norway.

What I found can only be described as a life changing experience. I saw thrash everywhere. We spent the entire day collecting plastic bottles, containers, candy wrapper, plastic bags and other things. After many hours, I started to see the wonderful change as the bigger pieces of plastic disappeared from the area, and I felt great. However, in the process of removing an old fishing net that was partially buried, we realized that all the cleaning we had done was only the tip of the iceberg, or should I say: the tip of the landfill. When trying to remove the fishing net, it exposed the soil beneath, and it was full of microplastic.
Microplastic is defined as pieces of plastic that is 5 millimeters or smaller (Kaufman, 2018), and are tiny pieces of plastic that often crumbles into even smaller pieces if you touch it. It covers an entire layer of soil, everywhere you see, and it is almost impossible to get rid of it, as it is so fragile and small.

I was aghast. I wanted to give up. How is it possible to fix this immense problem, on an island containing only eleven cabins? I also knew that the problem is not just here on this small island. It is everywhere on this planet, some places worse than others. Plastics in world oceans is only one of thousands of problems we have surrounding the environment.
At that moment I understood that to solve the problems the humans have created; we must all work together. I felt it was my duty to find a way to educate and spread information to as many human beings as possible.

1.1 Theme of the thesis

This project was developed in collaboration with fellow student Malin Fjell Olsen. Our mission was to develop an app with focused on the environment. This thesis is an analytical review of the developed app, and although the app is a collaboration project, this thesis is a solo project.
Together, Fjell Olsen and I developed an application (app) for smartphones called *Humble Bumble*. This app is made to motivate and inform people about environmentally friendly changes they can do in their everyday life to gradually help our planet.

Humble Bumble is a virtual representation of the real world. This virtual world is in the beginning filled with trash, pollution and no growing trees or plants. The goal is to make this virtual world a better place, by removing the trash and growing trees and plants to remove the pollution.
In order to transform the virtual world, the user must do environmentally friendly actions in the real world, for example ride a bike instead of driving a car to work. The user then reports these real-world actions into *Humble Bumble* and is given rewards in the form of seeds. The seeds are used to grow plants and remove trash.

Most of the things you can report to the app are small actions that everyone can do, but which many people are either not aware are environmentally friendly or which can be irksome or

strenuous in a busy daily life. By reporting these actions into an app, the user will hopefully get a sensation of achievement that the person normally would not get when carrying out environmentally friendly actions.
Also, it can be difficult to see the changes that comes from environmentally friendly actions, and so *Humble Bumble* visualizes these changes in a way that gives the user a sense of purpose.

The goal in *Humble Bumble* is to use gamification to make tasks more fun and rewarding. Gamification can be described as a way of using elements from games in something that is not a game, to make the non-game into something more engaging and fun. Deterding et al. (2011) defines gamification as "the use of game design elements in non-game context".
This means that we use *Humble Bumble* to explore different gamification elements such as rewards and achievement systems, to examine how gamification can be used as a motivating factor in order to get people to do more environmentally friendly actions.

1.1.2 Why the environment?

According to NASA, in the span of the last century the global temperature has increased with 0,9 degrees Celsius (NASA, 2017), and the sea level has risen 3,2 millimeters per year (NASA, 2018). It may not sound like a lot, but the Norwegian Broadcasting Corporation (NRK) has published a reportage about the impacts of the climate changes that are apparent in Norway today (Søstad and Sæther, 2019). They explain that in Norway the temperature has increased 1 degree Celsius the last 115 years, and that the consequences are evident through a changing landscape, more kelp in the seabed, more rainfall with the consequence of flooding, and the summer of 2018 was affected by heat waves and drought.

This situation is not unique to Norway. Cook and colleagues examined around 11 000 scientific studies about global warming between 1991 and 2001, which showed that 91,1% agreed that humans are causing global warming (Cook et al, 2013, p.3).
On this background, it is only right that we humans try to solve the problems we have created. The Paris Agreement is an international agreement, it's goal being to limit the global warming that is taking place, where every country in the world must make a plan of how they will reduce their emissions, and from 2023 they must report their reduction plan every five years (FN-sambandet, 2018).
Even though different countries are trying to make a difference by making long term plans for the environment such as banning single use plastic or making agreements to reduce emissions, the issue exists on all levels of society, and individuals can contribute to solve this by changing their habits.

The purpose of this thesis is to explore how technology can be used to solve a global problem, and how it can be used to involve, engage, inform and educate individuals. By developing *Humble Bumble*, we are aiming to engage and inform the users about how they can take environmentally friendly actions in their everyday lives, thereby contributing to solving the impending climate crisis. By including game-elements in the app, we intend to increase the motivation to make habitual changes by making them more like entertainment than a routine task or duty.

1.1.3 Cooperation project

Humble Bumble was developed in partnership with Malin Fjell Olsen. We divided the project according to our academic interests, where Fjell Olsen focused on user-centered design, and

took all major decisions concerning usability, accessibility and legibility, whilst I focused on gamification and motivation, and made the decisions concerning those themes. This division meant that we could divide the developing process in a natural and equal manner. Other decisions were made in collaboration.

This thesis is independently written, and although I have written some about user-centered design, my focus is gamification, self-determination theory and users' motivation.

1.2 Research question

> **RQ: How can gamification be used in order to motivate people into changing their habits related to environmentally friendly behavior?**

In this project we have developed a prototype of an app where the goal is to get the users to perform environmentally friendly actions.
The purpose of this study is to look closely into how gamification affects the users and to examine if gamification can be utilized as a mechanism to motivate people. We will also explore phycological theories in order to understand what motivation is and how it impacts people.

1.3 Humble Bumble prototype

In this project we created a high-fidelity prototype of an app called *Humble Bumble.* This prototype was developed in Adobe Experience Design (Adobe XD). The prototype can be accessed by the link below and no software is needed. We will look closer at the functionality of the prototype in the thesis.

Link to the prototype:
https://xd.adobe.com/view/f6659deb-0eaf-4158-6cb4-8189063147ba-8054/

For more explanation on how to access, open and use the prototype, see appendix A.

2.0 Theory

It is not only important to involve the user during the development of a system, but also to look closer at the psychology that lies behind the choices that the user takes. In this project one of the goals was to use gamification in order to motivate the users, and thus we needed to understand not only what gamification is, but also the psychology behind motivation.

2.2 Self-determination theory

When developing an app that has the main goal of changing people habits, we need to take a closer look at the psychology behind the mechanisms in a human mind that triggers the inclination to change. When using gamification in order to motivate the users, it is important to understand the theory behind motivation. Tondello (2016, p15) explains that most gamification researchers have used self-determination theory in order to understand user motivation in gamification.

Phycologists Richard Ryan and Edward L. Deci (2008, p. 182, 2000, p. 54-55) describes self-determination theory as an empirically based theory of human motivation, development and

wellness, and the theory focuses on different types of motivation, with a distinction between intrinsic and extrinsic motivation.

Intrinsic motivation is defined by Ryan and Deci (2000, p. 56) as "performing an activity for its inherent satisfactions rather than for some separable outcome" and explains that when a person is intrinsically motivated they will do an activity for the fun or challenge that the activity gives, instead of being motivated by external factors such as another person nagging or telling the person to perform the activity. Intrinsic motivation can be defined as an internal emotion, meaning that a person wants to do something without the influence of others, and the reward is the activity itself.
Ryan and Deci (2000, p.70) explain that this type of motivation is a fundamental tendency where humans seek out novelty and challenges, to extend and exercise one's capacities in order to explore and to learn.

Another factor of intrinsic motivation is that people need to feel like their behavior is self-determined in order to be intrinsically motivated. They further explain that "in order for a high level of intrinsic motivation people must experience satisfaction of the needs both for competence and autonomy" (Ryan and Deci, 2000, p.59).
This means that intrinsic motivation must be experienced as something a person decides for themselves, and that external forces can lessen the feeling of motivation.

It is also important to note that various people experience their level of self-determination differently. Dahlstrøm (n.d., p.3) explains that people differ in the extent to which they experience their actions as self-determined, and this influence whether they perceive feedback as informational or controlling. This means that some persons can perceive feedback as controlling, and this decreases their intrinsic motivation. On the other hand, there are people that perceive feedback as informational and their intrinsic motivation is then being increased.

Ryan and Deci (2000, p. 60) explain that intrinsic motivation is an important type of motivation, but that people's actions are mostly not intrinsically motivated, but are motivated in order to attain some separable outcome.
The contrasting motivation, extrinsic motivation, is defined by Ryan and Deci (2000, p. 60) as a construct that is given when an activity is done in order to attain some separable outcome. This means that the motivation would be facilitated by external factors such as rewards or praise. Another important factor is that extrinsic motivation can vary in the degree to which it is autonomous, meaning that the person would feel like they have been given a choice of performing an action for their own gain, in contrast to feeling that they must to an action based on external factors. When extrinsic motivation is autonomous, the person will have a greater feeling of persistence, more positive self-perceptions and better quality of engagement (Ryan and Deci, 2000, p. 61). An example of this could be a worker given a task and feeling that they are free to do this task because they want to, and not because they are forced to do it. The task would still be extrinsically motivated, as the worker would do the task in order to receive praise or money for their work.

What we can take from this, is that it seems like people prefer to feel like they are being motivated from within, if the motivation is intrinsic and gives the person enjoyment just for performing an activity in and of itself. Or if the motivation is extrinsic, people like to feel like they personally made the choice to perform a task.

These factors of self-determination theory are important to remember when developing a system using gamification as motivation, in order to understand where the motivation of the user comes from. Dahlstrøm (n.d., p.4) explains that the aim of gamification is to facilitate intrinsic motivation, but as Matallaoui et al (2017, p.12) points out, extrinsic motivation often involves external rewards such as trophies, money, social recognition or praise.

What we need to understand in the case of *Humble Bumble* and gamification in general is how the gamification will affect the user of a system. We need to ask what types of motivation exist in such a gamified system, and if intrinsic or extrinsic motivation is the best types of motivators in such a system. But first we need to dig deeper into understanding what a gamified system is.

2.2 Gamification

The term gamification first appeared as a widespread word in late 2011. Sebastian Deterding et al (2011a) proposed to use the definition of gamification as "the use of game design elements in non-game contexts". The definition of gamification is somewhat general, but it indicates that gamification is an extra layer of elements on top of an existing system. This system would perform well on its own but is enhanced by design elements from games. According to the gamification consultant company Bunchball.com (2018), gamification is not about creating something new, but to amplify the effect of an existing experience by applying motivational techniques that makes games engaging.

Gamification is an approach in marketing and interaction design that focuses on integrating principles from game design in non-game context, with the aim of making products and services more enjoyable to use (Deterding et al, 2011b). Gamification is based on the idea that making a product more "game-like" will increase the users' engagement with the product. Examples of gamification are the inclusion of point systems found in frequent flyer programs and other loyalty programs, and leaderboards and badges found in health and fitness apps.

With the focus on the user engagement and motivation, gamification is related to user experience (UX) design, that stresses the importance of a design process where creating meaningful and relevant experiences for users are central to the design process. For this reason, user experience design goes far beyond interface design by stressing that the user's needs must be at the forefront at all stages in the design process. In this sense, designing for user experiences is not restricted to usability, but focuses on the overall experience that a user has with a system (Tondello 2017, p. 15).

To fully understand gamification, we need to look at the difference between gamification and games. We have seen that the definition of gamification is to use game-elements in a non-game context (Deterding, 2011a). Katie Salen and Eric Zimmerman define a game as "a system in which players engage in artificial conflict, defined by rules, that result in a quantifiable outcome", and explains that rules are a crucial part of games and provide a structure which is delaminating what the player can and cannot do.
This means that games are based on rules and have a path that the player must follow, with a structure where there's most likely an end to the game. In gamification, there are not such a clear path for the person to follow, and there is no end to the gamified system. The goal is not to win, but to perform actions that leads to feedback from the system.

Since gamification and games are not the same, I have chosen not to call the people using *Humble Bumble* gamers or players, but rather users.

2.2.1 Mechanics, dynamics and aesthetics (MDA)

In order to understand gamification, we must look at the elements used to gamify a system. Gabe Zichermann and Christopher Cunningham, the authors of *Gamification by Design,* explain that one of the most frequently used frameworks of game design is the MDA framework, which stands for mechanics, dynamics and aesthetics.
This framework was originally developed for game design by Hunicke, LeBlanc and Zubek (2004), but can also be used to understand the interaction between game elements and to apply them outside of games (2011, p. 35-36).

Game mechanics make up the functioning components of a game or a gamified system. This is the tools that will lead to a meaningful response from the user (Zichermann & Cunningham, 2011, p. 36). Game mechanics can be compared to the cards used when playing poker or the rollercoaster in a theme park, it is the item that allows a person to feel something.
In a gamified system, these game mechanics would be elements such as point systems, levels, badges, and challenges.

Game dynamics is the interaction the user has with the game mechanics and determines what the user is doing in response to the mechanics (Zichermann and Cunningham 2011, p. 36).
If we take a game mechanic such as the badges, we want this element to generate an action in the user, such as repeating the action in order to receive more badges.

Aesthetics describes the desirable emotional responses evoked in the player when interacting with a system (Hunicke et al, 2004), thus in *Humble Bumble* the desired emotional responses would be positive emotions that would increase the user's motivation to be environmentally friendly.

We will take a closer look at game elements and their dynamics and aesthetics in relation to *Humble Bumble* later.

2.2.2 Critique of gamification

Professor and author Ian Bogost thinks that gamification is "primarily a practice of marketers and consultants who seek to construct and exploit an opportunity for benefit" (2014) and suggest changing the name gamification to *exploitationware* (2011).
He claims that businesses feel like games are an excellent way of attracting people, but the businesses does not want to use the time and money to develop games, and so they use the term gamification in order to entice the customers.

Bogost's opinions are quite harsh, yet it could be said that he has some points. Gamification could be used as a way of attracting users, and even though it is a defined concept, companies could use gamification without knowing how it effect the users of a system. Gamification could perhaps be called a hyped term, an inspirational and possibly manipulative type of publicity or marketing, where a product is exaggerated and creates high expectations for people (Pihl, 2018).

It is important to understand all aspects when using gamification in a system, and to not use gamification in order to draw attention to a product. Gamification should be used as a way of enhancing a product and not as an exploitation of the users.

2.3 Related work

In the design and development of *Humble Bumble* we have studied and taken inspiration from other apps or systems which either promote environmentally friendly behavior or use design principles that are significant to our work. Below is a description of relevant apps and how they relate to *Humble Bumble*.

2.3.1 *JouleBug* (Cleanbit Systems, Inc., 2011)

JouleBug is an important app to mention in this project, as we have been greatly inspired by this app. It has many similarities to *Humble Bumble*, however there are some important differences.

Like *Humble Bumble*, *JouleBug* is also an app where the users report environmentally friendly actions. When a user reports an action, it is called to "buzz". Users can choose actions amongst many different categories, such as habits, energy, transportation, food and drink. Each of these categories gives the users a list of different actions they can buzz, such as recycling bottles, walking instead of driving, saving water, and much more. When the user "buzzes" an action, they can choose to post a picture of the action they've been performing. The action is posted in a feed, like the feed on Facebook or Instagram. Other users can see both their friends' actions, and other users' actions. For each action the user gets points, depending on what type of action that is performed. The amount of points is calculated on how much impact the action has on the environment. In the profile page of the user they can see how many points they have gathered. They also get an overview of impact totals, which is how much CO_2 that has been saved, how many kilograms of waste diverted, and how many liters of water is saved by the total of the user's actions that has been reported.

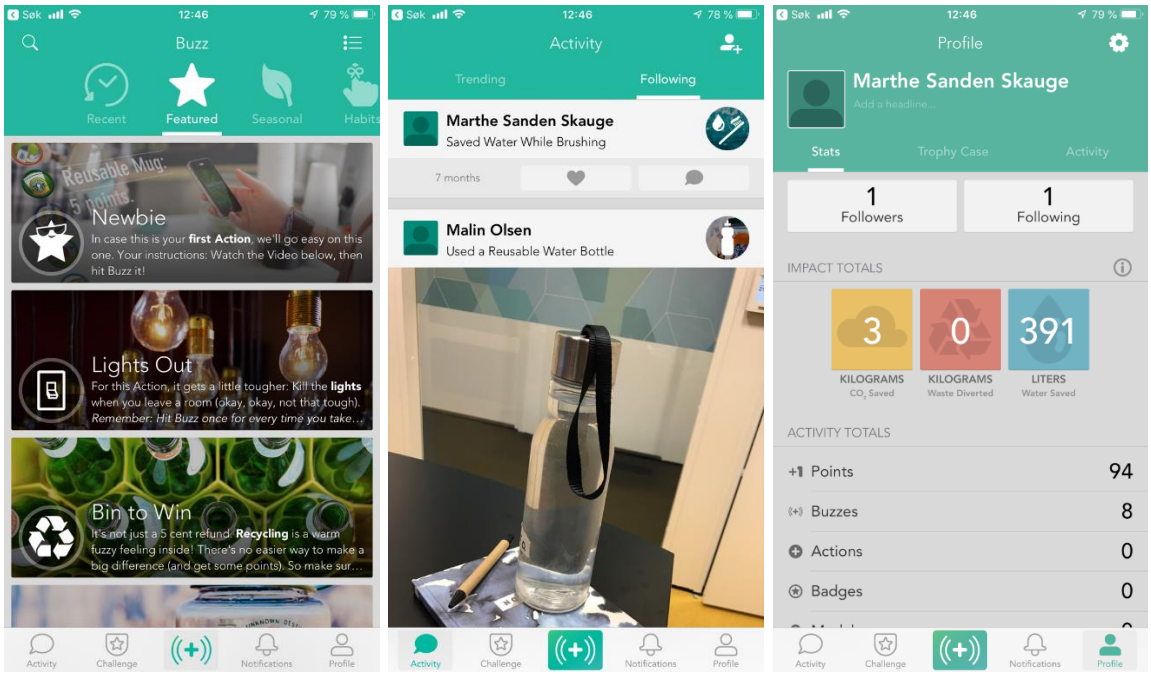

Figure 1: Left: Some of the actions the user can buzz.
Middle: The feed where the users can see their own and other people's actions.
Right: The profile where the users can see points, badges and impact totals.

As seen in figure 1, *JouleBug* resembles *Humble Bumble.* We decided that we liked a lot of the aspects of the app, and have borrowed some of their ideas, like the layout of the actions-menu (image on the left in figure 1) and the layout of the profile with the summary of total saved and achievements (image to the right in figure 1). There are however some major problems we found with *JouleBug.* The app makes it quite unclear why it is positive to do the actions suggested, with little explanation about why and how the user would receive a reward. There are fewer gamification elements. They only use a point system that is difficult to understand and have no usage in the app, badges and a list of totals saved of CO_2, waste and water.

The most notable difference between the two apps is that *JouleBug* is very focused on the social aspect. Every single action is shared with friends and followers, preferably with an image of the user performing the action. We concluded that the sharing aspect of this app is excessive. We found it a bit extreme to share with our friends that we had saved water by not flushing the toilet, where the user also can choose to take a picture of the action. In theory you could end up seeing a picture of an unflushed toilet in the feed of this app.

2.3.2 EcoIsland (Liu et al, 2011)

A study examining gamification and sustainability was performed by Liu et al in 2011. They designed a system that was installed in the homes of the users. The system was called *EcoIsland a*nd was a virtual island where the goal was to persuade individuals and families to engage in more environmentally friendly activities, using gamification as a way of making the users interested and motivated. The users would self-report their data, and the system would calculate their approximate CO_2 emissions. If the CO_2 goals were not met, the water around the island would rise. The users would also receive virtual currency that could be used to decorate the island.

Figure 2: Screenshot of EcoIsland, from the article Gamifying intelligent environments (2011)

The two systems are quite similar in their ideas, functions and goals, but the main difference of the systems is that *EcoIsland* is a system installed fixed in a house focusing on activities one does at home, with the target group being families or other groups of people living together, whereas *Humble Bumble* has a target group of individual people. In *EcoIsland* it seems like a goal of the system is to make the family work together, whereas in *Humble Bumble* a goal is to perform well as an individual user and to try to reach individual goals, and also to compete with family and friends as well as other users of the app by sharing your individual performances.

As *EcoIsland* is not a released system, it is unfortunately challenging to analyze the differences between this system and *Humble Bumble* only based on short descriptions and the images shown in figure 2.

2.3.3 *Forest* (SEEKRTECH CO., LTD, 2014)

Forest is an app where the goal is to stay focused and be present by putting away your phone for a set amount of time. The users will choose a time between 10 and 120 minutes. During this time the phone cannot be used. To visualize this, the app use plants. If the user chooses to not use their phone in 10 minutes, they will be rewarded with a bush that is planted on the users' lot. The longer time the user avoids their phone, the more the plant will grow. If the user interrupts the growth process by accessing their phone, the plant will die.

Like *Humble Bumble*, this app visualizes an action that is done in real life. The actions done in the two apps are very different, but it gave us the idea of translating something that is done in real life into an app.

Figure 3: Left: The virtual plot in Forest
Right: Example of design inspiration of the plants

Forest was also a great inspiration regarding using nature and plants as a reward in *Humble Bumble.* We also took the inspiration to visualize the levels in the form of plots. In the very early stages of developing *Humble Bumble* the design was also quite like *Forest*, but this

changed during the process. We have however kept the flat design that is used in *Forest*, such as the design of the trees and plants, as seen in figure 3.

3.0 Methods

We will now look at different methods used in the project. The chapter is split into three parts, where the first part contains development methods used in the making of *Humble Bumble*. These methods are focused around the planning and execution from start to end when developing *Humble Bumble*.

The second part of this chapter contains a step by step progress of how we developed *Humble Bumble*, and how we used quantitative and qualitative methods throughout the project in order to keep the users in focus at all stages of the project.

The third part is a presentation of the finished prototype of *Humble Bumble* and the gamified elements that was used in this project, examining what each element does and how it affects the users.

3.1 Development methods

When developing a project such as *Humble Bumble*, it is important to have a developing method to make the progress more manageable and straightforward. We chose to follow an agile developing method where there is a freedom to change elements of the project in every step of development, instead of being a rigid step by step process. This provides the opportunity to be flexible and regularly evaluate and adapt the project during the development phase (Deuff & Cosquer, 2013, p. 6).

Specifically, we chose the Kanban developing method for the development process. Kanban is an agile project management methodology for software development where the focus is to accurately state the work that needs to be done, and when it needs to be done. The method makes it simpler to visualize and prioritize tasks, in order to reduce risk of an incomplete task. The method also allows flexibility amongst all the tasks in the project (Lei et al, 2015, p. 61).

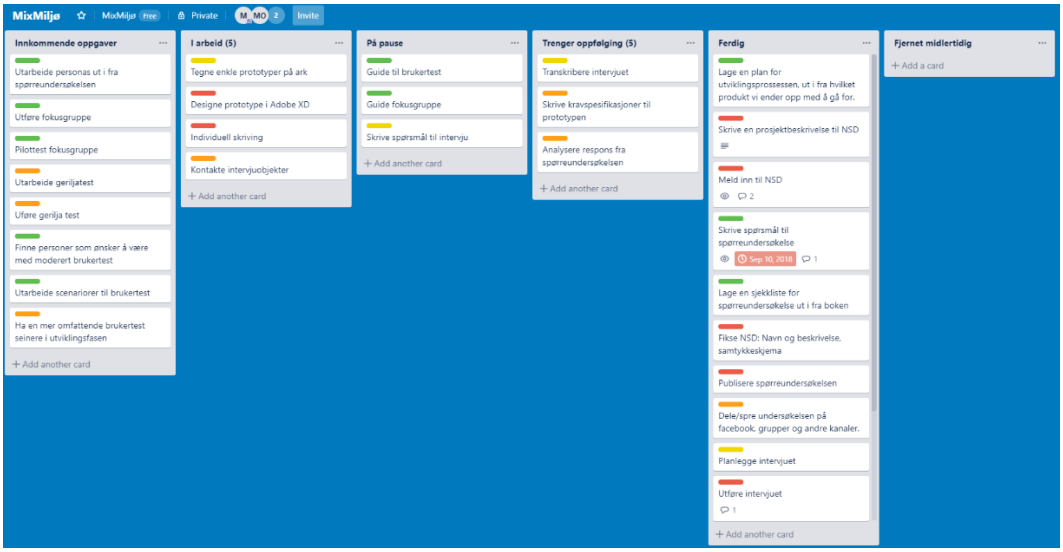

Figure 4: Kanban board to the Humble Bumble project

To visualize the work that needed to be done, we created a Kanban Board. According to project manager Max Rehkopf (n.d.) a Kanban board consists of several components: 1) Visual cards with one task per card, 2) columns that represent a specific activity that together compose a workflow, 3) work in progress (WIP) limits, which are the maximum number of cards that can be placed in each column, in order to maximize flow, 4) delivery point, which is a column where finished tasks are placed. This approach of organizing a Kanban board is well-known characteristics of Kanban, however the Kanban-author Jim Benson states that the only rules to Kanban is to visualize work and limit work-in-progress, and that Kanban can be molded into the suited shape or form for a project (Benson, n.d.). The traditional Kanban board suited this project well, and we followed the method quite closely.

The goal when using a Kanban board is to take cards from the point of commitment into the delivery point as fast as possible (Rehkopf, n.d.). We chose to set the maximum limit of work in progress to five tasks, as this was a manageable number of tasks to do simultaneously. As opposed to the Scrum method, where teams commit to intervals of working called sprints, the tasks in Kanban are not split into sprints, although we set due dates on some of the more important tasks. Kanban can be combined with other methods such as Scrum, however we chose not to as we felt that the Kanban board was a clear and concise method to follow in and of itself.

It can be discussed if Kanban is a development method or a management tool, as it could be compared to an advanced to-do list. Kanban could be used in different areas than project development, however the goal of Kanban is to produce or finish a task. Thus, I would consider Kanban to be both a management tool and a development method.

In this project the intention behind using the Kanban board, was to create a straightforward list of tasks, so that it would minimize confusion between me and Fjell Olsen. We used the board to visualize the tasks at hand, moving the tasks between the appropriate column as the project developed. It gave us the visualization of not only what needed to be done, but also an overview of what the other team member was working on at any given time of the project, eliminating redundant work.

3.2 User-centered design

We will look at what user-centered design is, and how we used this approach when developing *Humble Bumble.* I will not go into depth about the subject, as this was the subject and focus for my partner, Fjell Olsen, who mostly managed the main factors involving the user-centered design approach, such as overall design management when developing *Humble Bumble.*

During the *Humble Bumble* project, it has been important for us to develop the app with the users in focus. We chose the product development approach called user-centered design (UCD) with the philosophy that the product should suit the user, rather than making the user suit the product (Baxter et al, 2015, p.7). According to Senior UX-designer and author Travis Lowdermilk (2013, p.6), user-centered design (UCD) emerged from human-computer interaction (HCI) and is a software design methodology for developers and designers that ensures that an application maintains good usability.

In the development of *Humble Bumble*, we wanted to include the end users in every step of the process, receiving feedback and making changes according to the requests of the users.

Inclusion of the user in every step of development is one of three key principles of UCD. The second principles are to perform usability testing of prototypes during the development process, and to collect empirical data about issues in the product and improve these before release of the product. The final principle is to use iterative design. This approach allows for changes of the product at all stages of development (Baxter et al, 2015, p.8-9).

3.2.1 User-centered design principles

Another important part of user-centered design is the design principles. The principles are made in order to guide the users to experience, interpret and understand the system in the best possible way as the creator intended it to be, using visibility, accessibility, legibility and language as guidance for the users. In *Humble Bumble* we used fonts in different sizes and fonts in order to draw attention to parts of the app, such as larger fonts so the user can read without difficulty. Travis Lowdermilk (2013, p.65) explains that this visibility principle is called typeface, and that by enlarging different elements, called visual prominence, the larger elements will bring greater visibility than smaller objects, drawing the eyes to the larger object first. Lowdermilk also illustrates how opacity, colors and contrast can be used as a way of drawing attention to or from an object.
In *Humble Bumble* we used these elements in for example buttons, where we used blue, white, gray and red, and different fonts in order to devise different actions and to differentiate the interactions with the buttons, as seen in figure 5.
These design principles can be used as a way of giving the user feedback. It is important to notify the user that an interaction has occurred, and without feedback the user can get confused (Lowdermilk, 2013, p.66).

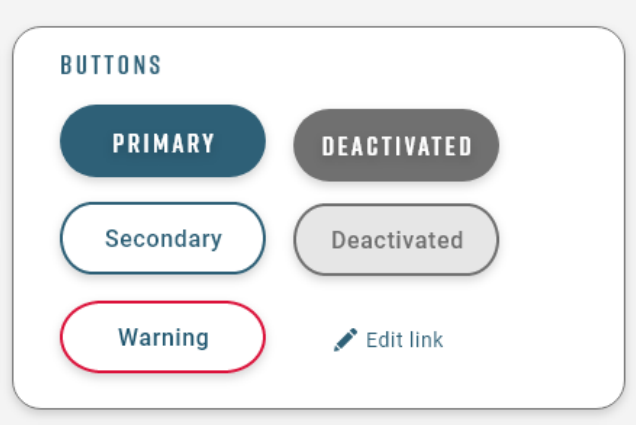

Figure 5: Different colors and fonts in order to differentiate between different actions
Image taken from the Humble Bumble style guide

The app is made with flat design, using sharp edges, few shadows and repeated colors. This is to eliminate elements that can be distracting to the users, such as overloading an app with lots of images, shapes or colors. The colors used in *Humble Bumble* is inspired by nature.
Tom May (2018) describes flat design as a minimalistic approach that emphasizes usability, with clean open spaces, crisp edges and two-dimensional illustrations. Flat design contains visual clues such as recognizable icons, so that the user both have images and text to guide the user through the experience. This type of design is popular and is seen in for example the interface in Windows 10, or in apps such as Instagram. We chose this design because of its simplicity. The flat design approach is both simple to design and easy to use.

Another factor we found important when developing *Humble Bumble*, was accessibility by trying to make the app usable for as many people as possible, for example people with visual impairment or color blindness. We used an online color contrast checker, WebAIM (n.d), when selecting colors, especially colors used in areas where there was important information. We also tested the final prototype on a person with color blindness that reported that he could see all the elements clearly.
We have not completely covered accessibility for all types of users, as there are many disabilities and different challenges to cover. I do however believe it is a step in the right direction in order to facilitate to all the existing challenges, and with some changes *Humble Bumble* could be made into an app covering most accessibility principles.

When designing an app, it is important to use elements that people recognize from other apps and real life. Lowdermilk (2013, p.76) explains that using iconography, language and other metaphors that people can connect from their real-world to the computing world, is to use existing knowledge that the user will understand. In *Humble Bumble* this is reflected by icons and using shadows only on clickable elements, that is recognizable from many other apps.

Defining requirements

Requirements are a part of the UCD methodology. It is a statement given about what or how a product should perform. Requirements are split into two categories, where functional requirements define what the system should do, and the non-functional requirements define what constraints there are on the system and its development (Preece et al, 2015, p 353). When developing *Humble Bumble*, we made the list of requirements at an early stage in the process and used the list in order to see if we had reached the goals throughout the process of development.

Functional requirements:
Lowdermilk (2013, p.32-33) writes that functional requirements are one of the most important parts of UCD. It is a way of listing the users' needs in a system and ensures that one have correctly understood the user's needs. We made a list that contained important information of the needs of the users of *Humble Bumble.*

- The user should have the possibility to create a personal account in the application
- The user should have the possibility to add their sustainable activities
- The user should be able to see their history of activities
- The user should get facts about how much $C0_2$, water and money they are saving by doing the activities added in the app
- The user should receive statistics of how much water, CO_2, and money they have saved in total.
- The user should have the possibility to connect with friends
- The user should be able to change the settings for: language, measurements, privacy and notifications

Functional gamification requirements:
I also wanted to sort out the functional requirements for the gamification elements in an individual list, as this is a separate focus in the work with *Humble Bumble.*

- The users should have the possibility to grow plants on their planet using the point system
- The user should get visible rewards for their actions in the app
- The user should be given a precise explanation of why the reward was given

- The user should be given a precise explanation of what they can use the rewards for
- The users should be able to locate their rewards easily at a later point in time

Non-Functional Requirements:
We also created a list of non-functional requirements, that according to Lowdermilk (2013, p. 33) is the technical specifications of a project, as a list of what the app needs in order to meet the user's requests.

- The application should be easy to use for both technical and non-technical people
- The application should be easy to learn and to remember how to use
- The application should be efficient to use
- The application should respond in the way the user expects it to do
- The application should be responsive and work on different types of smartphones
- The application should be accessible
- The users' data should be stored in a safe way

3.3 Ethics when working with users

When working with subjects, it is important to take ethics into consideration. As a researcher, one has the responsibility to protect the participants' physical and phycological well-being, as the participants has volunteered to share their time, experience and expertise (Baxter et al, 2015, p. 67). The project has been disclosed with the Norwegian Centre for Research Data (NSD), that examines what types of data the project will collect, how the data will be collected and stored, and they evaluate if the consent form is appropriate for the project. The data collection did not start until NSD approved the project.

3.3.1 Data collection

All the participants signed a consent form that included information about the project, what types of data that would be collected and how the data would be stored. The participants got a copy of the consent form, which also included contact information in case the participants would want to withdraw from the project. All personal information will be deleted by the end of the project, and all information will be anonymized before publishing of the project. This applied to all the data collecting methods we performed in this project. We decided that all our participants would be over the age of 18. The only personal data we collected, was age, gender, first name and occupation. The only information that would not be anonymized would be the age and gender. The participants had to give us their permission to use this information.

The rights of the participants were:

- Gain access to personal information that is registered
- Correct wrong personal information
- Get the personal information deleted if wanted
- Get a copy of personal information collected
- Send a complaint to the right instances if they were wrongly treated

These rights ensure the privacy of the participants in the project, and it is paramount that the participants are informed of their rights. This also establishes trust between the participants and the persons executing the user research.

3.3.2 Working with subjects

When working with subjects in user research such as usability testing, it is important to consider the comfort and ease of the subject. This would not apply to the online survey, as it

is not performed face-to-face. To participate in user research can be a stressful situation, as most of the participants have not partook in a situation like this before. The subjects would also not know the people conducting the research, as this would affect the bias of the subject. The situation can therefore be quite uneasy.
In order to make the situation simpler for the participants, we informed them of the procedure as soon as possible. We also emphasized that there would not be an incorrect answer. If some of the tasks were difficult or confusing, we explained that it was our fault as developers rather than their fault.
During the usability testing, we served the participants coffee and water, and we started the test with simple questions about the participants, such as age and occupation. This was done in order to make the participants feel more at ease.

When collecting data from participants under the age of 18, one must get the consent from the subjects' parents in order to store the data. Participants over the age of 15 can give consent if the data collected is not sensitive.
In the user guerrilla testing, where the tests were performed on the streets, we asked all the participants for their age. However, in two instances we forgot to ask at the beginning of the testing and waited until the participants had answered the questions before we asked their age. In these two instances we ended up collecting data from two persons at the age of 15. The data collected was just containing their responses to the low-fidelity prototype of *Humble Bumble* and the only personal information we gathered was their first names and their ages. We discussed if we should exclude the results given from them but concluded that there was no collecting of sensitive data, so these results could be kept.

3.4 Development of the prototype

During the development of the project, we had four major iterations. By splitting the project into iterations, we had the opportunity to make changes during the development period. The flexibility to make both big and small changes is important in a project like *Humble Bumble*, as the result of the project may be unclear from time to time. An example of this flexibility occurred in the beginning of the project, where we only had a general idea that we wanted to make something related to the environment, but we had not yet examined the different possibilities, types of user preferences, or the similar apps that already existed. If we had just went for an idea, developed it and done no iterations, the project could have resulted in an app that nobody wanted or needed. It is therefore vital to iterate on the concept and always be prepared to make some changes along the way of development.

The project was split into four iterations with defined goals for each iteration. We also decided to add secondary tasks that would be performed during the iteration. The secondary tasks were used to examine the progress of the project, both by evaluating the users and the app itself.

	Goal	Secondary task
First iteration	Define concept	Requirement analysis • Survey • Expert interview • Personas
Second iteration	Create low-fidelity prototype	Define gamification-elements Evaluate prototype with a concept test
Third iteration	Create mid-fidelity prototype	Define visual design requirements
Fourth iteration	Create high-fidelity prototype	Evaluate prototype with a usability test

3.4.1 First iteration – defining the concept

In the beginning, Fjell Olsen and I did not plan on cooperating on this project. We had different ideas but started with the same motivation to make a prototype that could help people to be more environmentally friendly in their day to day lives. Since we had the same motivation, we decided to discuss our ideas together in order to help each other to define our concepts. In the progress of discussing, we concluded that our ideas were so similar that we could join forces instead of making two very similar prototypes.

The ideas we discussed in the early stage of the project, were 1) making a social media platform for people with interest in the environment, 2) make an augmented reality game or a virtual world where the goal for the users is to collect and use geo-location to map their area and 3) using gamification as a motivator in the app.

We decided to use elements from the different ideas and merge them together, resulting in an app focused around a virtual world with gamification as motivators, and a social aspect where the users can add friends and compare their virtual world with others.

During this stage of the development, we also found it important to do a requirement analysis as the secondary task. A requirement analysis is a detailed overview of which functions and general performance the system should have in order to ensure that the users' needs are met in terms of functionality, performance and ease of use (Rolstadås and Liseter, 2018).
We did not know what the users would think of this type of app, and so in order to gain insights about the users and their environmental engagement and how to best match the target group's needs and motivation, we chose to triangulate methods by combining qualitative with quantitative methods. According to Preece et al. (2015, p.230), methodological triangulation is to employ different data gathering techniques in order to validate results. So, we used both quantitative and qualitative methods in this project in order to get a larger perspective and to endorse assumptions made during conduction of the different methods. Qualitative and quantitative methods have their strengths and weaknesses, and by performing several methods we minimize the weaknesses of the methods used.

Quantitative survey

The first method we used was an online survey. A survey is often quantitative, where answers are provided in a measurable and countable manner. A query can be an effective way to

gather information from a larger sample in a relatively short period of time. It can be helpful to identify the target user population, find opportunities that our app can fulfil and to find out how the users is currently accomplishing their tasks (Baxter et al, 2015, p.226).
The objective of the survey was to identify a target group and to map the potential user's media habits. We also wanted to examine the correlation between media habits and environment interests. It was important that the query was published at an early stage in order to gain these insights before important commitments where made. We distributed the survey in social media channels, mainly in Facebook groups for example different groups for university students. We wanted however to try and collect data from a wider group of people, and so we also distributed the survey in a group where one can ask for favors. This was the Facebook group that provided the largest portions of entries and had the largest variation in demography and answers. We did not distribute the survey in social media channels that are dedicated to sustainability, because we wanted to avoid bias answers that would affect the query's questions about the theme, giving us more positive answers than the average population. We felt that using social media channels was an acceptable platform, as the query contained questions about media habits.

We obtained 136 entries in the age-range of 18-73 years of age, including 80 women and 51 men.

The results of the query showed that about 40% of the participants rarely or never share, publish or comment on content on social media platforms. This told us that the focus of *Humble Bumble* would not be for the users to create or share their own content.

We also saw that 36% of the participants played games on their phones once a month or more. About 75% of the participants used one or more app during the last year that encourage habit changes, and so we concluded that the users would be interested in an app with elements used in habit changing apps, such as gamification that encourage the users to perform an action. The participants reported that their main interests related to the environment, was cleaning trash from nature, reduce plastic waste and production, protecting the nature and sustainable development.

With these results we concluded that we would 1) create a mobile application that is engaging and informative, 2) use gamification as a mechanism to encourage and inform, and that 3) the objective of the app would be to inspire the users to become more environmentally friendly in their day to day lives.

Personas

Personas are a method used in order to create a user profile of what would be a typical user for that specific project. The personas represent a model of the end users, and the benefit of using personas is to have a collective goal of what the end users would look like, instead of having a vague and possibly changing target group, the team always have personas to refer to (Baxter et al, 2015, p. 41).

We created two personas, Hilde Hipster (see figure 6) and Kim Kind (see figure 7). The two personas represented two age groups of the participants in the survey, 18-24 years and 25-34 years. We did not include older or younger personas, as our target group was in the range of 18-35.

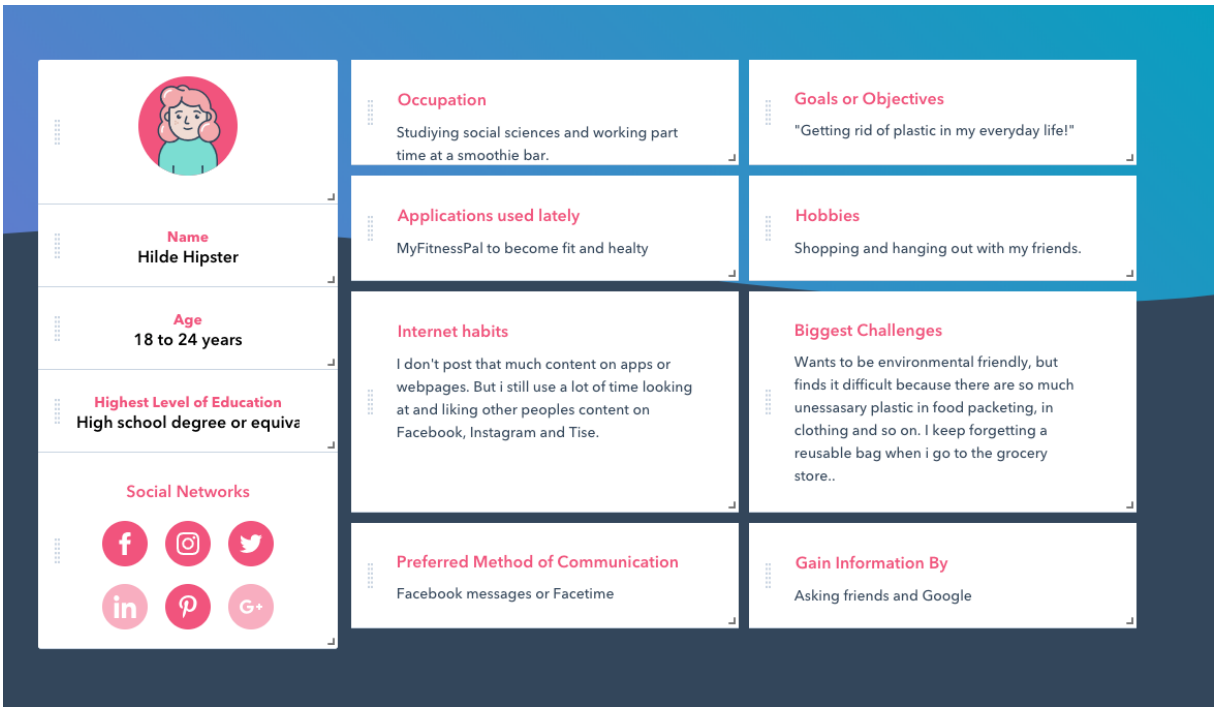

Figure 6: Hilde Hipster, a persona representing end users in the age group of 18-24 years

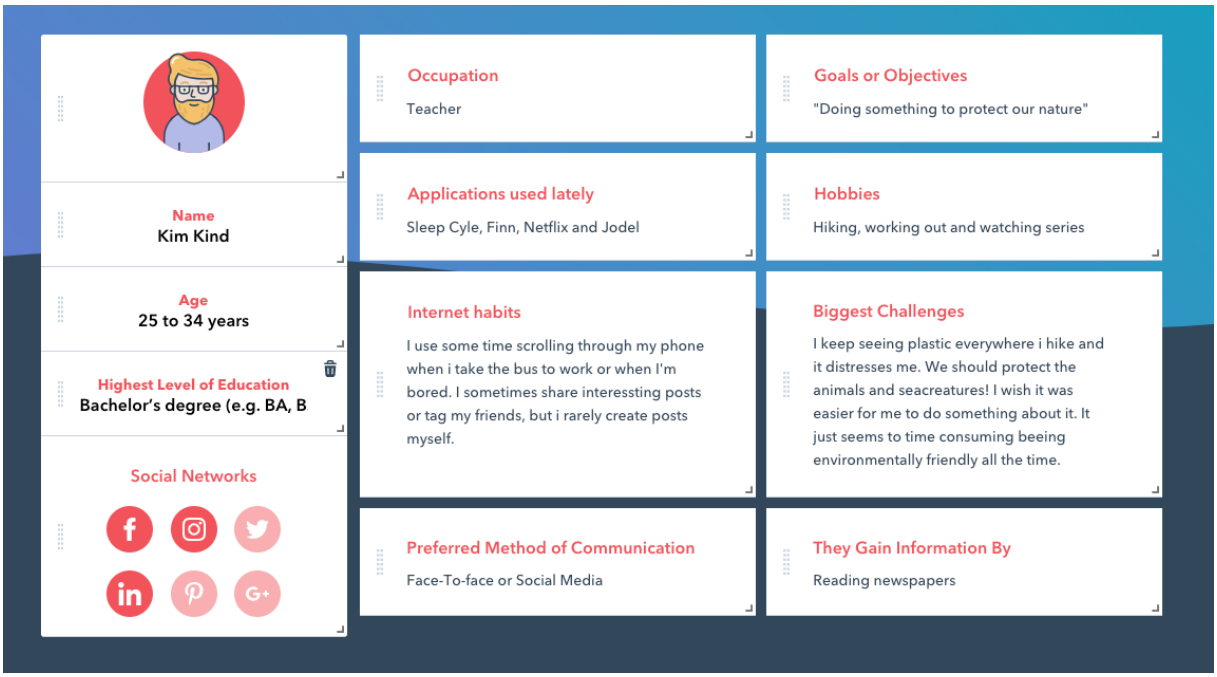

Figure 7: Kim Kind, a persona representing end users in the age group of 25-34 years

The personas were mostly based on data collected in the quantitative online survey, using the results that was most often answered by the participants and formulating them into sentences that gave the personas an identity.

Personas can be a useful tool when working on big projects, especially if the project involves several people with different backgrounds and opinions. In this project however, personas were not extremely useful compared to the time it took to create them. The reason for this is possible the fact that we were only two people working on the project and we had very similar ideas about how the target group for *Humble Bumble* would be like. Perhaps it would have

been more useful if we had disagreements or if something was unclear to us during development.

Expert interview

The next step of the process was to gather information about the environmental problems. Fjell Olsen and I are both interested in environmental issues, but we are far from experts on the subject. We therefore decided to perform an expert interview with a local leader of one of Norway's biggest environment and solidarity organizations. The objective of the interview was to gain a better understanding of what actions people can do in their everyday lives, and to get an insight into how a specialist organization encourages people to act.

During the interview we gave the interviewee a list of environmentally friendly actions that we had compiled from the initial survey, and a copy of rough sketches that we had made for *Humble Bumble*. The interviewee was given a pen and could draw, write ideas or correct and add information to our list. This method is called participatory design and is a tool to include the users in the design process (Moyers, 2018). The subject wrote down ideas that we could include, and suggested ideas for future development of *Humble Bumble.*

Although we got some beneficial answers during the interview, we decided not to recruit more experts as we concluded that the experts did not necessarily belong in our main user group. We were also confident that with the data collected during the query, the interview and the personas would give us enough information to proceed to the next iteration and start to develop prototypes of *Humble Bumble*, where we could perform usability testing that would be more beneficial for our collection of data for the project.

Target group

Before we started the development of the prototype, we made some assumptions on the target group of *Humble Bumble.* These assumptions were made based on the results of the survey and feedback from the expert interview.

The assumed target group would be:

- Age range of 18-35
- Persons with some interests in the environmental crisis
- Persons with interests or experience using self-reporting apps in order to change habits
- People using their smartphones actively

Assumptions made about the target group at this stage in the development, were not fully analyzed as we wanted to determine the final target group after collecting data that would affirm or contradict our assumptions.

3.4.2 Second iteration – low-fidelity prototype

The goal of the second iteration was to create a low-fidelity prototype, which, according to developer Nick Babich (2017), is a translation of high-level design concepts into tangible and testable artifacts, where only some of the elements of the finished product is presented, such as visual design and content. We could say that a low-fidelity prototype is a sketch of what the designers or developers visualize the finished product to be.

The first version of *Humble Bumble* was drawn on paper, a technique called paper prototyping The benefits of paper prototyping are that it is a quick progress, as opposed to developing a

prototype using software, and it is an excellent, low commitment way of performing concept tests (Babich, 2018). The negatives of paper prototyping were that it can be a challenge during the testing of the low-fidelity prototype to convey some of the actions that would transpire when the user for example clicks a button.

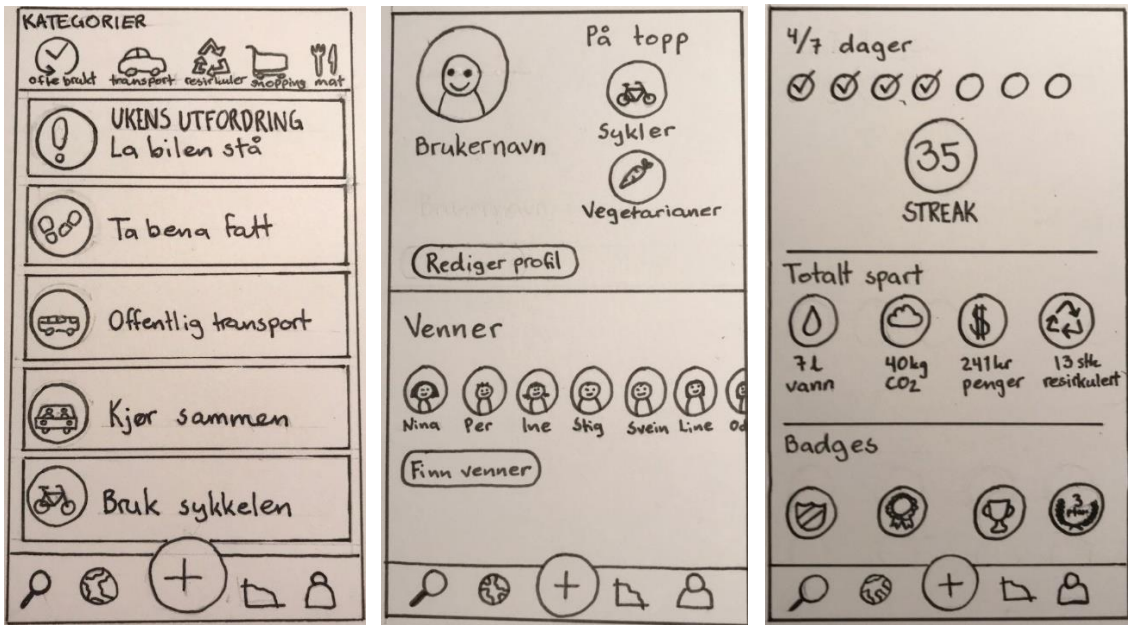

Figure 8: The first low-fidelity prototype of Humble Bumble

The design-choices where made based on user-centered design principles and feedback collected during the data collection of the first iteration. We made the low-fidelity prototype simple in design but included most of the navigation elements. We made the choice to design the low-fidelity prototype that would be resembling a finished prototype in order to perform a concept test on the idea.

Defining the gamification in *Humble Bumble*

At this point in the development process, the inclusion of gamification in *Humble Bumble* started to take form. The elements included were based on knowledge from the MDA-model and our own assumptions based upon our experience with other apps such as previously mentioned *JouleBug* and apps we use regularly such as Workout on iWatch.

Our hypothesis was that a regular self-reporting app without gamification would be uninteresting to the user and they would not feel inclined to use the app repeatedly. Gamification would give the user a sense of accomplishment and an urge for continuous use of *Humble Bumble.*

We made a list of the gamification elements that we wanted to include in *Humble Bumble:*

- Point system (honey and water)
- Challenges (activities)
- Badges
- Streaks
- Levels (plots/areas for growing plants)
- Total saved (water, CO_2, waste and money)
- Sharing (with followers and friends)

- Onboarding

As we had only made assumptions about the users' responses to the gamification elements, we wanted to consult potential users at this stage in order to get responses that could support or contradict our assumptions. With the responses from early testing, it was also an opportunity to change the gamification elements, either by refining the existing elements or by changing them into better suited elements. In order to receive feedback, we performed a concept test on the low-fidelity prototype.

Concept testing

Concept testing, often called Proof of Concept or POC, is a method to demonstrate the functionality, and to verify a certain concept or a theory (Singaram and Jain, 2018). We wanted to perform this test in order to examine whether potential users understood our idea, how the app could work and if they understood the different elements that we had included so far in *Humble Bumble.*

To perform the concept test, we made the low-fidelity paper prototype into an interactive prototype on a phone, using an app called POP – Prototyping on Paper (Marvel Prototyping LTD, n.d.). This app allows one to take pictures of the paper prototype, map out where the buttons are placed and link together the different pages, so when testing the prototype, the participants can click trough and get a first impression of how the finished product will look.

We decided that we would perform a guerilla concept testing, which according to Elizabeth Chesters (2017) is a method where one takes the prototype out in the public and ask passersby for their thoughts. It is a quick and low-cost method that allows for random sampling. There are some limitations, as it is not thorough, and it can be hard for the people you meet on the streets to discover faults or issues that may arise later. However, in this project, a guerilla concept test would be an acceptable method to test the concept, get feedback or discover simple flaws.

We recruited 6 participants for the concept test, following the recommendations from usability testing to use a smaller amount of people to test, and optionally perform several rounds of testing after adjustment in the prototype.
The participants were in the age range of 15-38.
The tests were performed by approaching random individuals in the street, where the participants were handed a phone with the prototype ready to use. They tested the prototype for five to ten minutes and then they were asked some questions relating to their experience when testing the prototype.

We made two scenarios. In the first scenario, the persons had to test the prototype with no explanation of the theme or contents of the prototype. The participants were only asked to test the prototype and to answer a few questions. We used this scenario to discover if the participants understood the theme and the contents of the prototype. Four out of six of the participants were tested using the first scenario.
In the second scenario, we explained the concept of *Humble Bumble* to the participants. This scenario was used to see if the app met the participants expectations. Two out of six participants were presented with this scenario.

The results of the concept testing showed that the four of the participants presented with the first scenario were able to understand that the theme of *Humble Bumble* is the environment,

and four out of four understood that the app visualizes the consequence of own actions.
All six participants managed to navigate the app using the menu-bar. Three of the participants expressed that they appreciated the ability to see statistics of their use in *Humble Bumble.*

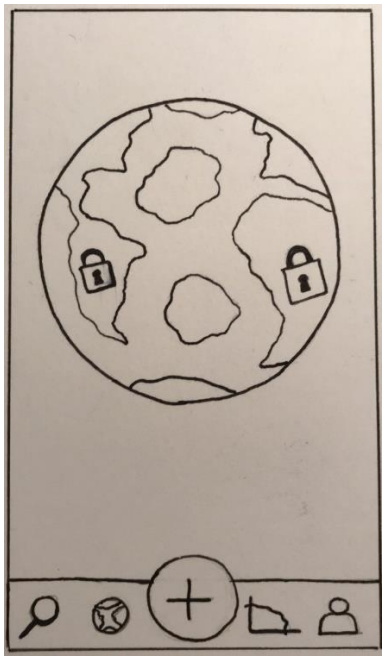

Figure 9: An early version of Humble Bumble contained a planet to visualize levels

At this point in time, we also had included a planet in the app, see figure 9. This planet was supposed to visualize the different levels the user could unlock when using the app. However, after receiving feedback that 2 out of 6 did not understand what the planet was used for, we decided to drop this element.

The two scenarios did gather some different data and both approaches had strengths and weaknesses. In the first scenario, in which the participants did not get any explanation, the data that emerged was more based on first impression and design of the prototype, but not as much thoughts around the idea and concept.
In the second scenario, in which the prototype was explained, the participants did not talk as much about their first impression but more about their thoughts around what this app should contain.

After the concept test, we felt confident that we could proceed to the next stage in the development of *Humble Bumble,* as the combined information that where gathered from the start and our assumptions would be adequate data in order to start the process of making a higher fidelity prototype that would be equivalent to the finished version of *Humble Bumble.*

3.4.3 Third iteration – defining the visual design requirements

At this stage in the development of *Humble Bumble,* we decided to translate our low-fidelity prototype into a digital prototype developed using the Adobe Experience Design software (Adobe XD). This software allows for a higher level of interaction with the prototype, such as scrolling and some animation of objects. We determined that we would not perform a test of the mid-fidelity prototype, as this version was similar to the low-fidelity prototype only translated into software rather than drawn on paper, and we made the assumption that a test of the mid-fidelity prototype would result in similar results as previous testing.

Defining the visual design requirements

The secondary task during this iteration was to define the visual design requirements. We chose to divide this task between us, where I focused on the visual design of the gamification elements such as badges, streaks, point system and the plot for growing plants. Fjell Olsen focused on the overall visual design and took the position of lead management, as visual design is related to user-centered design and design principles, which was her focus in this project. We chose to split the project in this way so that it would fit our academic interests and give a clear separation between tasks to do and create less confusion.
The task of defining the visual design was however mostly done in collaboration, where we sat together and discussed the visual elements.

We created a style guide with elements of the app that would be the same or similar in both the menus and the virtual world, such as buttons, padding and spacing, colors and so on. This style guide made it possible to work on the prototype even if we did not sit in the same room together, and still create a coherent design.

This task was done in several iterations, and we used the user-centered design principles in order to create the app. The finished visual design requirements were compiled into a design style guide (see figure 10).

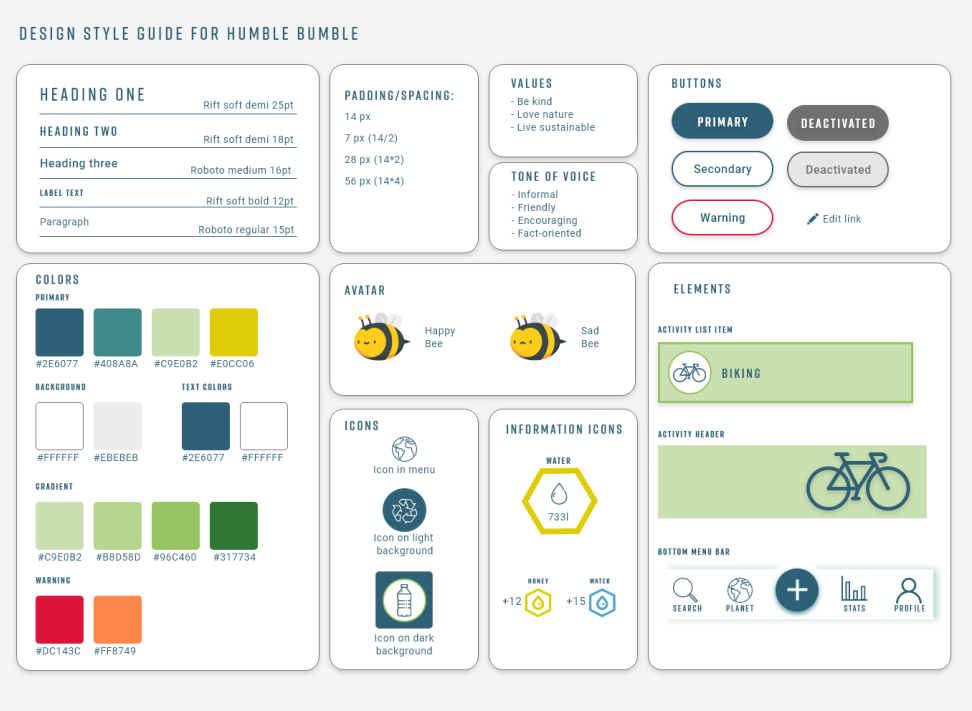

Figure 10: The style guide for Humble Bumble

The style guide was made and displayed in Adobe XD, alongside the prototype of *Humble Bumble* in order to get easy access to elements, get inspiration and be consistent when developing the high-fidelity prototype.

When we had defined the visual design requirements, we felt that we could move on to the next stage of development in order to complete an in-depth usability test of the app.

3.4.4 Fourth iteration – testing the final prototype

The goal of the fourth and last iteration was to make a high-fidelity prototype that would resemble a complete app that is ready to use, so that the persons testing the prototype would be given a genuine experience. The goal at this stage of development of a prototype is that all the data collected in combination with the prototype after the usability testing would only prompt small changes before the next phase in app-development, which would be to program the prototype and finalize the project. The high-fidelity prototype contained not only the main features of an app, but also background information such as error-messages, onboarding, settings etc.

The high-fidelity prototype was also developed in Adobe XD. This software only allows one person to manage a file at the time. Thus, we continued to work at the parts of the project that we had divided at a previous point in time. This meant that I continued to develop the gamification-features, while Fjell Olsen developed the main menu and the self-reporting features of the app. When one section of our work was done, we gathered all the parts together.

Usability testing

When the final prototype was finalized, our secondary task was to perform a usability test. A usability test is defined by Baxter et al (2015, p. 436) as a systematic observation of end users attempting to complete a task in order to identify as many usability issues as possible.

The objective of this usability testing was to get opinions from the users about their thoughts and impressions of *Humble Bumble.*
We performed the test on four participants. Baxter et al (2015, p. 436) explain that the number of participants needed for reliable usability testing is debated, and refers to a study done by Nielsen and Landauer in 1993 that state that it is better to perform multiple rounds of testing with a smaller amount of test subjects. We decided that we would perform the usability test on 4 people, and then reevaluate. When performing the usability testing, we found that we would get the same answers from each person and concluded that by having more subjects would most likely result in redundant feedback.

The persons performing the test were given a phone with the prototype, and we explained that *Humble Bumble* is an app that will help people to get more environmentally friendly. We aimed at giving the testers restricted information as we wanted the participants to form their own opinions without our influence. We then asked them to complete different tasks that we presented. We asked the participants to explain their thoughts and logic as they performed a task, a process called think aloud where one can get an understanding of the users acts during the test (Baxter et al, 2015, p.170).
We observed and listened to how the participants completed the tasks and took notes when there were tasks that where particularly difficult or easy to complete, or if the participants mentioned something of importance. After each task we asked the participants questions relating to how they experienced the actions they had done. We also asked the participants to explain what the purpose of the app was, what they expected of the app, or an element within the app. At the end we asked the participants to elaborate on challenging tasks, what they would want to change about the app and all in all what their thoughts were on *Humble Bumble.*

We also wanted feedback on the self-reporting aspect of the app, as we had some concerns that users would find it inconvenient and laborious. Only one of the four participants mentioned the hassle of *Humble Bumble* being a self-reporting app. We can assume that the other three subjects that did not mention this, did not think of the consequences of the app being a self-reporting app, as the tests only lasted for approximately 45 minutes. To examine the hypotheses, it would have been an idea to preform longer lasting tests on a finished version of *Humble Bumble*, and not just on the prototype.

Another detail three out of four participants pointed out, was the fact that it would be easy to cheat in a self-reporting app in order to gain the rewards. This was considered and discussed during the development phase, and we made the same conclusion as one of the participants did; It is possible to cheat, but why bother?
Another participant also stated the fact of cheating, but also asked the question "is the rewards given good enough to cheat for?".
The rewards that the users of *Humble Bumble* would receive, is perhaps profitable in the case of users sharing their progress with others and using their cheats in order to gain admiration from others. If the in-app rewards could be exchangeable to real-life rewards, such as getting a free cup of coffee after reaching level 15, we would have to reevaluate the self-reporting aspect of *Humble Bumble.* We have concluded that the gain of cheating is small, and we should therefore simply trust the users and ignore the few people that would cheat.

The usability test gave us an assortment of good answers, with both positive results and suggestions for changes in the app. We saw that some of the elements did not work as intended, and we were given ideas that we had not even thought of. The feedback given during usability testing was extremely useful for further development of *Humble Bumble.*

More results from the usability testing will be discussed later, particularly the feedback given to the gamification elements in the app.

3.5 Presenting the final prototype of *Humble Bumble*

Using all the data collected previously in the project, we made the high-fidelity prototype of *Humble Bumble.* This is our answer to how a gamified app that is designed in order to encourage people into becoming more environmentally friendly, would look like.

When entering *Humble Bumble* for the first time, one of the first things the user see is a plot with no trees or flowers, a bumblebee in the top left corner, points in the top right corner and the menu covering the bottom part of the app. The user could either press the menu and navigate across the app that way or click the plot where they would receive a message that they can plant a seed. If they plant a seed, it appears in the plot. To evolve the seed, the user must click it and use their points in order to evolve the plant. They could also plant a new seed. Trash can also suddenly appear on the plot, prompting the user to report a new act in order to remove it.

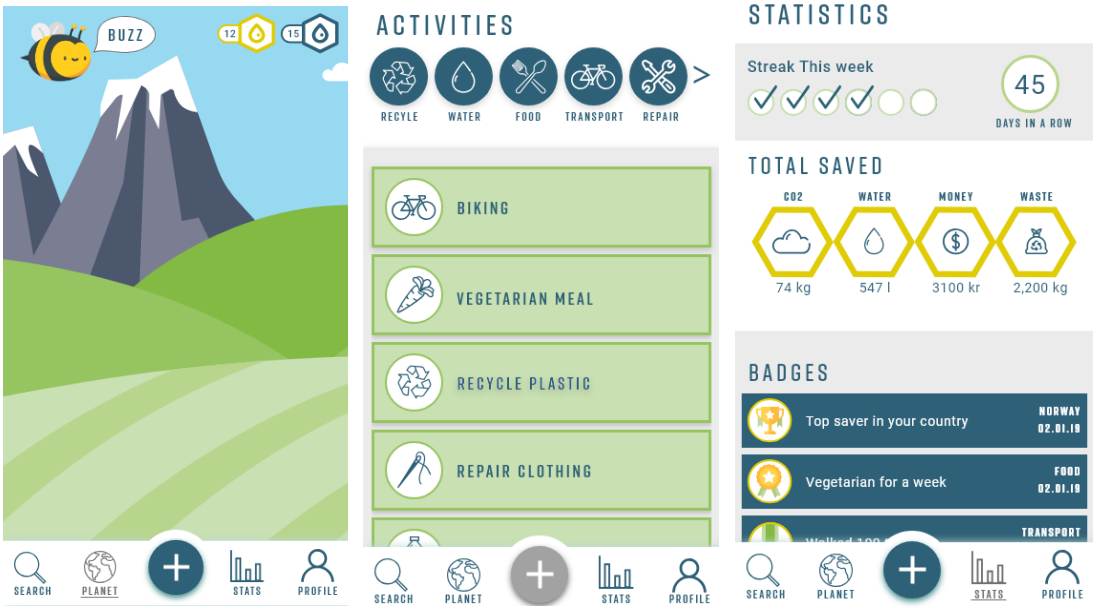

Figure 11: Screenshots from Humble Bumble
Left: The plot.
Middle: Add activities.
Right: Statistics and badges.

To gain more points, the user must add an activity. This is done by clicking the plus sign on the menu bar. This takes the user into the activities, where they can choose from an abundant list of environmentally friendly activities.
The user can also see their stats, which is compiled of streaks that show how many times the user has logged an activity during the week, and how many days in a row they have used the app. The statistic also displays how much the user has saved the planet, in terms of CO_2, water and waste, through their activities in the app. It also gives an estimate of how much money the user has saved. In the prototype, these numbers are calculated loosely based on numbers found online. In the finished product, these numbers would certainly need to be more precisely calculated.
The search button takes the users to a search bar where they can search for activities or other things concerning the app, such as finding friends or to get information about the app.
The profile shows the profile of the user, with a profile picture and a list of the user's friends. In the profile the user can also adjust the settings in the app, such as language, units, currency, notifications and so on, in order to make the app function with all the different users' preferences.

3.5.1 Gamification in the final prototype of *Humble Bumble*

We will now take a closer look at the MDA framework that is used in order to gamify *Humble Bumble*, with explanations of what each mechanism does and how it affects the user's choices and emotional responses.

Point system: In *Humble Bumble* the point system used is a redeemable point system, which is described by Zichermann and Cunningham (2011, p. 38) as a point system that fluctuate, and the users can exchange the points in things. This can be highly motivating for the users, and it allows for the developer to track the users progress. The user's reaction to a point system, is to do actions in order to gain more points, meaning that the emotional response of the user is to feel motivated to gain more points.

Point systems comes in many forms, and in *Humble Bumble* the redeemable point system is used. This point system allows the users to exchange points with virtual items.
In *Humble Bumble* there is a point system where the users will be given points in the form of water and honey that they can use to buy flowers and trees for their virtual plot. The user will acquire these points when they report an action. Different actions will give a different amount of honey and water. Honey is only used when buying a seed, but water is used both for buying new seeds and for evolving the seeds into flowers or trees. The user will therefore receive less honey than water when reporting an action, making the honey a more exclusive commodity. Different seeds will acquire different amounts of honey and water when the user first buy the plant. The more expensive plants will also cost a higher amount of water to evolve further. All the planted seeds must be fully evolved for the user to advance into the next level.
Feedback from the participants in the usability test told us that it was confusing to both have honey and water as points, and so this would be changed in the future so that it would only contain either honey or water as points.

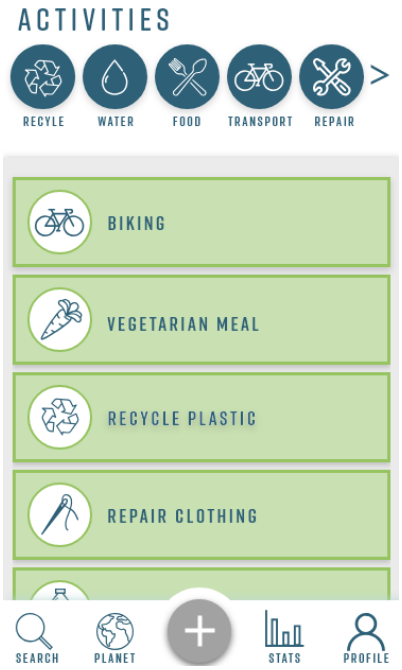

Figure 12: Challenges or actions that the user must perform in order to gain points

Challenges: Challenges gives players direction for what to do inside the world of the gamified experience. Challenges would ensure that the users of the system always have the experience of something substantial to accomplish (Zichermann and Cunningham 2011, p.64-65).
In *Humble Bumble* we can differentiate between two types of challenges. The first type of challenge is actions that the user will self-report in the app. These actions will not be changing and is compiled of actions that people can do every day, for example recycling bottles or walking instead of driving.
The other type of challenges is also self-reporting actions that the user reports to the app, but the difference is that these challenges are not permanent, and will be given once a week or once a month, depending on the challenge. These challenges will encourage the users to make a bigger effort, and therefore the user will receive extra badges or earn larger amounts of points than given in the regular challenges. These challenges will be for the user to take part

in special actions such as Earth Hour challenge, to join a protest for the environment or to join in on the beach cleaning challenge (Strandryddeuka).
The user will be notified of these special challenges by notification, and it is possible to join several challenges at once if they overlap.

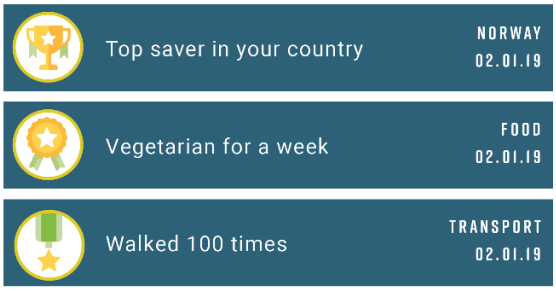

Figure 13: Example of badges used in Humble Bumble

Badges: Badges are visual elements that mark a completion of challenges or goals (Zichermann and Cunningham, 2011, p. 55-56). A badge can be visualized as an icon that appear often together with a praising message in the system.
In *Humble Bumble* the user receives different badges for completed activities and challenges. Some of the badges are given for repeated actions, for example if the user has registered that they have only been eating vegetarian for a week. Other badges will be rewarded when the user compares their results to other users of the app, for example a badge given for *"Top saver in your country"*. Badges can be a powerful drive for users, as the user can get a rush of surprise or pleasure when an unexpected badge appears, or the user gets gratification by collecting the badges. Badges mark the completion of goals and the steady progress within an app, such as *Humble Bumble* (Zichermann and Cunningham 2011, p.55).
The badges that the user have received, is viewed in a list that the user can revisit at any point in time.

Streaks: A streak is the process of doing an activity repeatedly in order to gain something. Streaks used in apps can be compared to a point system, where the user will feel motivated to keep the streak going in order to get a higher number on their streak history, but without being able to use the streak-points for anything. A study done by Huynh and Iida (2017, p.28) concludes that streaks are motivating, and a higher number gained in the streak becomes more precious for the user, as they do not want to lose the high streak-number.
Streaks seem to be highly motivating, especially if the user can share the streak with other followers or friends.

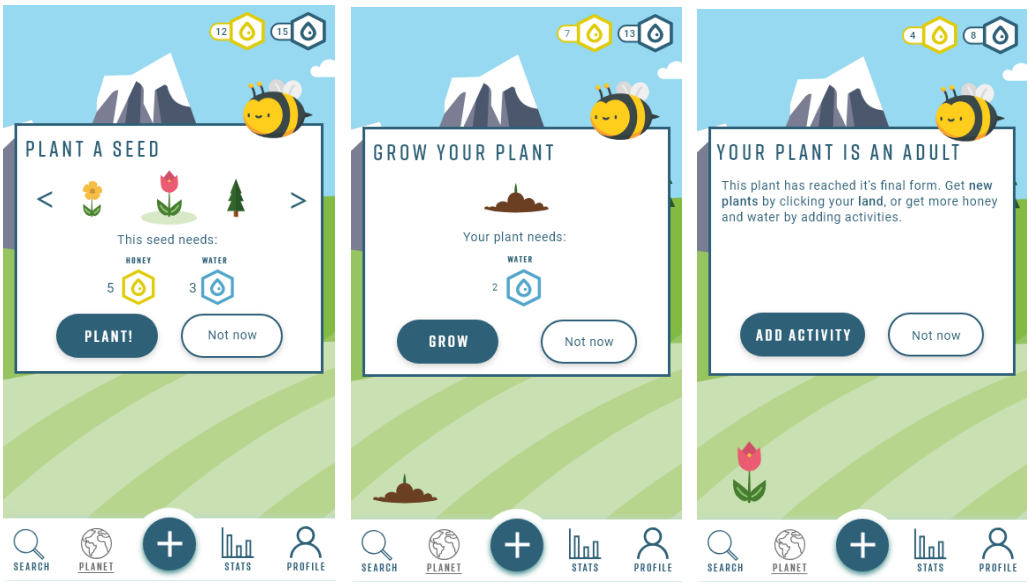

Figure 14: Part of the process from buying a seed into a fully-grown flower.

Levels: Levels indicate progress and is a way of visualizing effort and the positive effects of the user's actions. (Zichermann and Cunningham, 2011, p. 45).
At this stage of development of *Humble Bumble*, we have not yet created several levels, however the idea is that the user will unlock new levels when one area or plot is fully evolved. The new area is a new environment, for example a desert, where the user will plant cacti instead of flowers, or under the sea where the user will plant seaweed and anemones. By introducing different levels with different environments, *Humble Bumble* makes the users curious and exited to see the next level.

Total saved: Total saved is a feature in *Humble Bumble* where the users can see how much they have saved the environment from CO_2, water and waste, and how much money the user have saved by being more environmentally friendly. These numbers are based on calculations for each action the user has done. The goal is for the user to be motivated by seeing the numbers, as they reflect how the actions affects the planet.

Onboarding: Zichermann and Cunningham (2011, p. 59) explain that onboarding is the act of introducing a novice into a system and is a way of making a guide with explanations as to what the user should do in order to operate the system. When developing *Humble Bumble*, we discovered that there are several ways of designing onboarding. Method A is to make a tutorial in the beginning of the system that is displayed before the user enters the system, with images and text explaining what the user is expected to do. Method B is to incorporate the onboarding into the system the first times the user clicks a button or get a new interaction. An example is that the user of *Humble Bumble* receives a welcome message explaining what to do next in order to proceed.
We used both methods in *Humble Bumble* but concluded that method B was the preferred onboarding method as all the participants seemed to be more guided into what the next step would be.

Sharing: An important factor of gamification is to be able to share progress and rewards with others. According to Zichermann and Cunningham (2011, p.10) this gives the ability for users to gain status in a social group by comparing and competing with others.
In *Humble Bumble* we realized to late that this factor is highly motivating for the users. We

have only implemented a feature where the users can visit other users' plots, for them to see what level they are on. In the future there will be more features that the users can share with others.

6.0 Discussion

In this research we have found some interesting factors that can affect how gamification should be used as a motivator, why it is important to consider other factors when developing a system and how gamification can affect the users relating to environmentally friendly behavior. In this section we will discuss the findings of the *Humble Bumble* study.

6.1 Understanding the target group of *Humble Bumble*

In the beginning of development of *Humble Bumble,* we discussed what the target group would be for the app. We originally wanted to develop a system that would both target people with no interests in the environmental issues, as well as people with some or substantial interest in the subject. However, we swiftly concluded that it would be difficult to include all the different groups of people into one app.

Even though gamification can possibly be used as a motivator in order to change people's habits, we believe that some sort of existing motivation must be the basis behind the persons reasoning to change. It would have been difficult to consider a target group that included people with no interest in the subject of the app. For example; would you download an app such as Runkeeper that is encouraging you to take up running as a hobby, when you have no intentions to start running?
The same goes for *Humble Bumble;* there is no point in trying to get people with no interests in the environmental issues to download an app that goes against their interests. The effect could indeed be the opposite for some people, where they could feel that an app such as *Humble Bumble* only would confirm their non-existing interest and feel as the environmental issues is forced upon them, possibly resulting in irritation and frustration.

This is the reasoning for only including people with some or substantial interest in the environment. This group already have an existing motivation where we can use *Humble Bumble* to facilitate these motivations.

6.2 Motivation in relation to gamification

When this project started, our hypothesis was that gamification could only be positive and motivating, without any thoughts of it being negative, damaging or bothersome for the users. Over the course of this research, I have however become more skeptical of the usage of gamification, whereas the research is not giving enough answers into how it affects the users. Also, it has been a displeasing task to explore a such widely spread concept as gamification, with so limited phycological explanation of how such a concept truly affects people.

6.2.1 Critique of gamification research

It is quite difficult to measure the impact of a gamified system, as feelings in general can be difficult to measure, let alone to differentiate between intrinsic and extrinsic feelings. I have found that most of the research on gamification draws the connection to self-determination theory and intrinsic and extrinsic motivation, and often refers to the work of phycologists Richard Ryan and Edward L. Deci, which is a natural connection to make. However, I feel it can present a problem when a significant number of scientists draws the conclusion that gamification and self-determination theory goes hand in hand, and that the persons using a

gamified system is either intrinsically or extrinsically motivated.
I must emphasize that I do understand the connection, and that most developers want their gamified system to be as intrinsically motivating for a user as a child playing with toys for the pure enjoyment of it.
This is important since the difference between extrinsic and intrinsic motivation is not always the most important question in gamification research, and perhaps many scientists have a preconceived perception about motivation and gamification because of the established connection between Ryan and Deci's self-determination theory and gamification. It is quite possible that this preconception does not harm research into motivation and gamification, but it is conceivable that this research could have advanced if the focus had been different, for example by concentrating the research on the levels of motivation of the user, and to compare the levels before and after they have used the gamified system.
I am left with question of how valuable it truly is to distinguish between intrinsic and extrinsic motivation. Zichermann and Cunningham answers this in their book Gamification by Design (2011, p.28) by saying that we should accept the users motivation states as they are, and try to help them to get to where they like to go, as well as where we like them to be.

Despite this critique, I will continue to consider intrinsic and extrinsic motivation in this thesis, as this is such an established construct in previous research.

3.2.2 Importance of autonomy

We have seen that Ryan and Deci (2000, p.60) defines extrinsic motivation as a construct that is given when an activity is done in order to attain some separable outcome, so we would define gamification as an extrinsic motivation. But as we have seen, people like to think that they are in control of their own actions, meaning that the goal of extrinsic motivation is to make it feel like it is an intrinsic motivation. And so, the goal of using gamification is to make the user feel like they have been motivated on their own accord. This statement is backed by Dahlstrøm (n.d., p.4) that writes that the aim of gamification is to facilitate intrinsic motivation. One of the most important factors is what Ryan and Deci describes as autonomy, meaning that the person feels like their actions are their own choice, and that they have belief in that they can change opinion at every moment.

The problem with *Humble Bumble* and other similar apps is that the gamification elements such as badges, rewards and other types of feedback could be perceived as intrusive and annoying, reminding the users that they are not in fact making their own choices, but following directions given by an app. This factor is especially important to notice in *Humble Bumble,* as the app not only gives directions that the user must follow in the app, but also directions on actions that the user must perform in the real life. For example, the user will not only be told to register that they have recycled bottles in the app, they are told to in fact do the action in real life as well. If this is not done well, the app could become more like a nagging mum than a helping motivator. Dahlstrøm (n.d., p.3) points out that people differ into which extent they feel that their actions are self-determined, and that this can influence if they feel that feedback is controlling or informational. People that perceive the feedback as controlling, will feel a lower level of motivation than the people that perceives the feedback as informational. In *Humble Bumble*, there are many elements that can be perceived as controlling, for instance the fact that the user must perform an action in order to gain more points in order to advance further in the app. In these instances, it is important to show the user that the action will be fulfilling and meaningful, by hinting at giving the user extra points

or showing the user that the next level is not far away.
We have also tried to counteract the elements that can be perceived as controlling by using a specific way of formulating words and messages, called tone of voice. Tone of voice is a part of UX-design, often called UX-writing, and UX-specialist Kate Moran (2016) describe tone of voice as a way of communicating personality, and that it reflects the way a creator feels about the message which will again influence how the user feels about a message. Thus, we have tried to make the tone of voice in *Humble Bumble* into a funny, formal and enthusiastic messages. The point being that one should not only consider the gamification elements when gamifying a system. One must consider how to formulate messages, create images or logos that appeal to the user, and overall give the user a good experience. I feel this is important to connect to gamification, because it is the entire experience of a system that would provide the user the motivation needed, and if this experience is poor it would affect how the user feels about the gamification elements. I would describe a good gamified system as a personal bubble for the user, where the user would have the feeling of them being in control over their own actions, giving them a sense of autonomy and control, which again could lead to a perceived feeling of intrinsic motivation, even if the motivating elements are strictly speaking extrinsic.

6.3 Gamification

In the course of this process we have had the goal of using gamification as a motivator in order to make environmentally friendly activities more fun and engaging. We have seen that the reasoning for using gamification is to give the users a feedback for their actions and tapping into playfulness and enjoyment that a person would feel when playing a game, but without the app being a fully-fledged game. We have seen that the critique of gamification is that it is possibly often being used as a way of exploiting or entice the users into using an app. This has not been our opinion, and the intention for using gamification in *Humble Bumble* have always been to use it as an encouragement for the users. It has also it has been a way of learning more about a concept that we see in our everyday lives. It raises questions such as is gamification motivating, and if so, why and how?

Literature suggest that gamification can indeed be used as a motivator, looking at results of studies, for example Melker et al (2017, p.533) that concludes that individual gamification elements such as points, levels and leaderboards seem to be an effective means for promoting performance quality by functioning as extrinsic incentives.
Seaborn and Fels (2014, p.29) made the conclusion in their literature review that empirical work supports the beneficial effects of gamification that it is encouraging user motivation, engagement and enjoyment. The results of the usability testing confirm this, as we were given feedback such as “the badges are motivating, just like on a Fitbit (smartwatch).” and “it is motivating to see the progression, that my actions result in something.”.
I want to point out that even though the results of every tests that we performed was mostly positive, we must take into consideration that the users were testing a prototype, and therefore not receiving the whole experience. The tests were not performed on a larger quantity of people; therefore, it is difficult to conclude anything based on only these tests. However, it is possible to use the results in order to find a hypothesis about the popularity of gamification. The results of the online query showed that 74% of the participants have regularly during the last year used an app that utilizes some sort of gamification in order to change habits (see figure 16).

The results do however only show us some of the apps the participants have used, and it is quite possible that the 25% that have answered that they have not used one of the apps on the list, have used some other gamified app. The problem we found of asking the participants if they have used gamified apps, are that many people have never heard of the term, even if they regularly use gamified apps. We also wanted to focus the query on apps that in some form or another changes behavior of the user, as it is the theme of *Humble Bumble.*

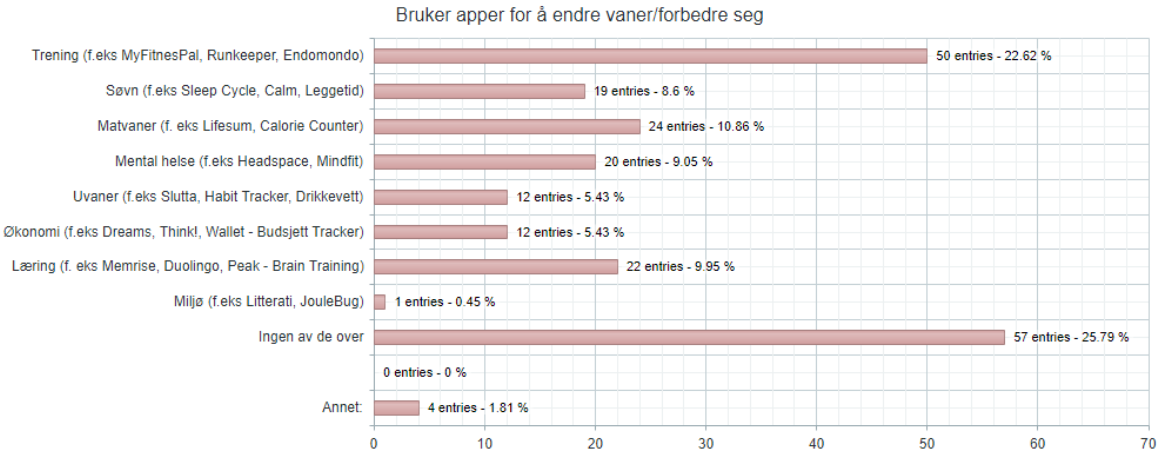

Figure 15: Apps used regularly the last year to change habits

From these results and observations, a likely conclusion is that many people use apps that are gamified, and that gamification is so common that people don't think about its existence or the impact of how the gamification affects people.

When gamifying a system, it is not enough to just incorporate gamification and believe that the user will feel motivated automatically. Based on our studies, three factors need to be present in order to create a successful gamified experience:

1) an already existing motivator, either intrinsic or extrinsic
2) a feeling of self-determination or autonomy, giving the user a feeling of being in control of their actions
3) a fulfilling experience of the gamified system, giving the user praise and feeling of competence without the system being excessively intrusive (which again triggers autonomy)

6.4 Gamification and sustainability

As to the question of whether gamification can be used to motivate people to change their habits related to environmentally friendly behavior, it is difficult to conclude anything based on the research evolving *Humble Bumble,* due to the fact that the study has been short, involving few participants and a fact that we have tried to cover gamification, self-determination theory and user-centered design in the study.
We can however look at other similar studies in order to try to understand how gamification can affect environmentally friendly behavior and use this information in conjunction with the data collected in the *Humble Bumble* project in order to make a conclusion.

Seaborn and Fels (2015, p.25-26) did a literature review, where they looked at three different types of gamified systems relating to environmentally friendly behavior. In all three studies, they found positive results. However, as with *Humble Bumble*, the studies demonstrated shortcomings. The first study was performed by Berengueres et al (2013). They created a

recycling bin with an emotive avatar that gave positive feedback to the users when they recycled a bottle. This study gave positive results, as the recycling rates increased three times. The authors of this study claim this is gamification, however, Seaborn and Fels (2015, p.25) question whether this system is classified as a gamification, a skepticism I would share with them.
In the second study, Gnauk et al (2012) developed a human-controlled energy management system, using points and leaderboards. This system scored high on usability, however, the gamification elements were not commented on by the participants, possibly loosing interesting information that could have been used in the *Humble Bumble* project.
The last study Seaborn and Fels (2015, p.25-26) looked at, was the *EcoIsland* project mentioned earlier, where Liu et al (2011) designed a self-reporting system with a virtual island, similar to *Humble Bumble,* but where the system was integrated into a house and families would work together in order to complete the goals. It is unclear what types of game elements they have used in *EcoIsland*, but they highlight the importance of point systems.

The *EcoIsland* study was unfortunately only a small, short study, there was 20 participants in family groups and the testing period lasted for about a month, with a holiday disturbing the tests during the period.

In this study, Liu et al (2011) emphasize an important point that we also have seen when discussing *Humble Bumble;* Gamification is a way to improve the users engagement of a system, it can however only support the main functionality, meaning gamification should only be an addition that makes an experience more engaging and fun. Liu et al (2011) further explain that it is impossible to change the user's interest by using gamification, for example; users with no interest in the environmental challenges would not be convinced to change only because of gamification elements in a system. This supports the previous statement about the users of such a system needing some sort of motivation or interest prior to use of such a system.

As a result of the study, they found that 17 out of 20 of the participants had changed their attitude, and that they were more conscious of environmental ecology after the experiment than before.

It is disappointing that not more data was published after this experiment, however the study confirms some of our previous assumptions.
In the beginning of development of *Humble Bumble,* we discussed the possibility of the app being downloaded and used for a short amount of time before the users lost interest. This was one of our fears during development, and we hoped that by introducing gamification elements such as new challenges each week or the possibility to advance to other levels, the users would find the app interesting and challenging over a substantial period. We concluded that even though the users would lose interest after a short period of time, we would hopefully have affected their consciousness about the environmental issues, and taught them some valuable information that they would hopefully adopt into their everyday lives, even if they don't use *Humble Bumble* to self-report their actions.

In the *Humble Bumble* usability test we got some positive results about the usage of the app, where three out of four persons said that they would like to use the app, and one person answered that they were unsure whether they would use it or not. One participant explained that they are not particularly an environmental activist, but that perhaps *Humble Bumble* could

make them more motivated to be more environmentally conscious, and that they saw the value of the app.

Another interesting fact to consider was that the online survey showed that only 2,21% of the participants answered that they had none of the environmentally friendly interests we had suggested, see figure 17.

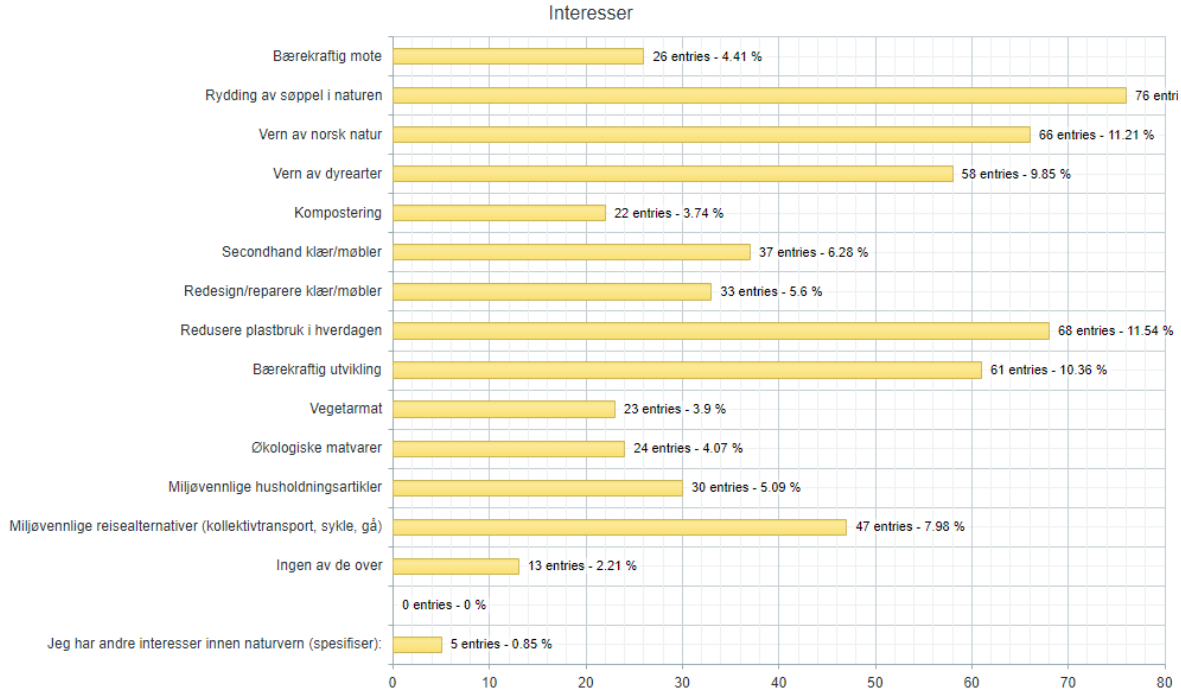

Figure 16: Online survey mapping peoples environmentally friendly interests.

The participants had the option to answer that they had other interests relating to sustainability than what was listed. This can suggest that the participants answering “none of the above”, selected this answer because they have little to none interests in sustainability.
If this is the case, it means that only 2% of the 136 entries we got in this survey, was from people that did not fit into the target group aspect of having interest and preexisting motivation, as we have discussed.

If we combine this with the results of the query showing that 74% of the participants have used one or several apps containing gamified element to change habits, we can conclude that there is a market for apps such as *Humble Bumble.*

6.3 Future work

Although we are very proud of *Humble Bumble* and the insights that we have gained by developing such an app, there is much work that could have been done with both the app and the relating data collection.

It would have been interesting to fully develop *Humble Bumble* as an app that people could have installed on their own phones. This would have helped the project to further investigate how the app would affect the people using it.
With a fully-fledged app, we could have performed diary testing, a method used to collect in situ, longitudinal data over a large sample, that gives data about the users external and internal experiences in their own words (Baxter et al 2015, p. 194). Using this data collection in this

project could have been an interesting source of material, as we could collect information about how the user feels that *Humble Bumble* impacts their environmentally friendly choices and whether or not the gamification elements helps their motivation.
Another positive aspect of launching *Humble Bumble* would be to collect data from the app. For instance, what types of people are downloading the app, how much do they use it and how many of them deletes or stops using the app.

In order to utilize the full potential of *Humble Bumble,* we would like to implement more features to the app before the launch. We think these features would increase the app's potential and make it more rewarding than it is today.

We would like for *Humble Bumble* to become a more automated app, making the app less intrusive and hopefully increase the feeling of self-determination, as the users would go through fewer steps in order to log their actions and would receive rewards for activities without even contemplating that the activities they are doing is in fact environmentally friendly.

To automate parts of *Humble Bumble,* we would collect data that relates to sustainability from other apps of the user's phones. We would like to add activity tracking in order to automatically log information about the movements of the user, giving them rewards for activities such as walking, jogging or biking. We would also like to implement geo-tracking in order to give the users a more personalized experience, giving them challenges that would relate to their locations, such as joining the Fridays for Future march in their area, or notifying that the user is close to a recycling point, asking the user if they have recycled something by giving them a push-notification.
Another idea is to connect *Humble Bumble* to apps such as ticket-apps for public transport, giving the user a reward for using busses or trains instead of using their car.
This idea could also be solved by collecting information about the users purchases from their bank. This would present the opportunity to give the users rewards for a multitude of things, such as buying used items, zero waste products or not buying meat for an entire week.
These features would also be used to calculate the footprint of the user, and by connecting the bank to *Humble Bumble* we could also receive information that would harm their scores in the app, for example if the user buy a plane ticket. However, I think that this would not be beneficial for the user, and that it would harm the overall impression of *Humble Bumble* giving the users a sense of nagging and thereby undermining the felling of self-determination.

In addition to these changes, we would also integrate more opportunities for the users to share their actions and rewards in the app. In the current version of *Humble Bumble,* the only opportunity to share content is to visit other friends and followers' plots, giving little insights into the achievements of the other user. During the development, we managed to overlook feedback from the different tests that said that we should have focused even more on the social elements in *Humble Bumble.* I think we were being fearful of creating an app that was more focused on the social aspects than the gamification. We had also been given feedback in the online query that we performed early in the process, that about 40% of the participants rarely or never share, publish or comment on content on social media platforms, which made us conclude that people was not interested in sharing, a conclusion that I now mean is wrong, looking at literature and feedback from the other tests.

With all these changes to *Humble Bumble*, I think that the app would be a fun, engaging app that would motivate the users to become more environmentally friendly in a new and innovative way.

7.0 Conclusion

In conclusion, gamification seems to have a positive effect on the users of a system, making the experience more fun, interesting and motivating. Based on our study we have partly concluded which factors that need to be present when making a gamified system. The target group needs an already existing motivator in order to be interested in a system. In the case of *Humble Bumble*, we have seen that the users must have an interest and motivation to perform environmentally friendly actions.
The system must accommodate for autonomy, making the user experience a feeling of control. This can be achieved by creating a fulfilling experience of a system by considering not only the gamification, but the entire experience of a system. In *Humble Bumble* we used user-centered design principles in order to formulate our tone of voice, create images and logos and make a coherent and interesting experience for the users.
We have found that it is important to understand motivation when developing a gamified system, as this can have an immense impact on how a user will perceive the system. We have looked closer at extrinsic and intrinsic motivation and learned that the aim of gamification is to facilitate intrinsic motivation (Dahlstrøm, n.d., p.4). We have also discussed the importance, or lack thereof, of distinguishing between intrinsic and extrinsic motivation, or whether the most important thing is in fact autonomy that can affect how the user will feel about the system being informative or intrusive.
We have looked at different gamification elements, analyzed how they work and how they affect the user's actions and emotions. We have concluded that gamification can be used as a motivator, and that there is a market for apps and systems that has a goal of changing people's actions into being more environmentally friendly.
We have seen how development methods can affect the process by including the users in every step of development, having an opportunity to receive important feedback that can facilitate a better end product.

All in all, the findings of this study suggest that the most important factor when using gamification is to analyze the gamified elements and to combine these with other components in order to make a fulfilling experience. A system should be fully functioning without gamified elements and adding gamification should be an extra layer for creating a more fulfilling, engaging and motivating experience for the user.

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Appendix A

How to access and use the *Humble Bumble* prototype

In this project we created a prototype of an app called *Humble Bumble*. This prototype was developed in Adobe Experience Design (Adobe XD). The prototype can be accessed by the link below and no software is needed.

Link to the prototype:
https://xd.adobe.com/view/f6659deb-0eaf-4158-6cb4-8189063147ba-8054/

The prototype is developed for Apple iPhone 7 screen but can be previewed in any screen size. Please keep in mind that the prototype is developed for phones, and so some of the interactions such as drag from left to right, might not work as well on desktop.

Keep in mind that some formatting issues can be seen in the prototype during previews on certain phones, and so we recommend to also preview the prototype on desktop if there are some elements that look strange or out of place. This issue is unfortunately out of our control as we have tried to fix them several times without success. This was not an issue during concept and usability testing as we used files that was locally saved on our phones.

In order to see all artboards when previewing on desktop, 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 can work as guidance when testing the prototype and eliminates uncertainty as which elements are clickable or not.

Appendix B

Approval from Norsk senter for forskningsdata (NSD)

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

Prosjektperiode
30.09.2018 - 01.12.2019

Status
13.09.2019 – Vurdert

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. Lykke til med prosjektet!

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

Appendix C

Consent form

U N I V E R S I T E T E T I B E R G E N

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 skrivet 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 blir 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 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 godkjennelse.
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 øyebevegelsen 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 evnt. 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

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

(deltaker)

(dato)

Appendix D

Online 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/reparere 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 MyFitnesPal, 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

Intervjuguide

Form:
Formen kommer til å være et semistrukturert dybdeintervju. Vi ønsker å rekruttere med noen som har som jobber eller har interesse for miljøvern eller har miljørelatert arbeid. For eksempel: en person fra offentlige instanser Miljødirektoratet), En miljøentusiast (Blogger) og en person som har tilknytning til en natur- og miljøvernorganisasjon.

Før intervjuet
Før intervjuet starter vil vi gi en kort muntlig presentasjon om prosjektet og hva målet er med intervjuet. Deretter kommer vi til å gi de tid til å lese gjennom, signere informasjonsskrivet og stille spørsmål om studiet.

Vi har litt forskjellige spørsmål til deg som handler om hvordan [redacted] *arbeider, for å se om det er noen av deres metoder og perspektiver vi kan bruke i vårt prosjekt. Siden dere er en organisasjon som har en lang historie, tenker vi at dere har utforsket mange forskjellige metoder som er interessant for oss å lære mer om.*
Dersom du føler at du ikke kan svare på spørsmålene, er det viktig for oss å stille de, slik at du eventuelt kan sette oss i kontakt med de som kan svare på det. Du kan også svare på spørsmålene på et mer personlig nivå, dersom du føler at du ikke kan svare for organisasjonen, da det uansett er nyttig for oss å få flere perspektiver og tilbakemeldinger på prosjektet.

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
- Førsteinntrykk
- Drøfte tanker og idéer

Vise listen
- Har han noe å tilføye?
- Eventuelt ta vekk

Avslutning
Vi kommer til å spørre om intervjuobjekter ønsker å tilføye noe til samtalen før vi avslutter, samt om de har noen spørsmål. Vi kommer til å forsikre oss om at de får med seg informasjonsskrivet og kontaktinformasjonen vår dersom de har spørsmål i etterkant.

Appendix F

Manuscript, concept testing

Konsepttest

Hva vi ønsker å lære?

- Hvilken målgruppe reagerer best på applikasjonen?
- Hva er førsteinntrykket?
- Fremstår appen enkel og brukervennlig?
- Hva forventer de at en slik app skal inneholde?
- Tilbakemeldinger på designvalg
- Hva er bra og dårlig med det vi har designet til nå?

Skrevet: 13.03.19
Utført:

- Dette er en app der du kan ta vare på din egen virtuelle jordklode, ved å rapportere de miljøvennlige valgene du gjør i hverdagen.

- Appen skal gjøre det gøy å være bærekraftig. Dine valg i hverdagen vil påvirke en virtuell jordklode. Klarer du å ta vare på den?

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?		
Oppfølgingsspørsmål • **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		
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 er førsteinntrykket?**		
Hva tenker du at en slik app burde inneholde?		
Oppfølgingsspørsmål **- 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		

Appendix G

Manuscript, usability testing

Brukertestplan

Form:
Brukertesten vil bli utført i en konstruert setting. Deltakeren vil få låne en testenhet (datamaskin eller mobil) for å kunne utføre oppgavene. En person vil stille spørsmål og veilede deltakeren gjennom spørsmål og oppgaver. En person vil dokumentere brukertesten ved notater, og lyd/bildeopptak.

Før brukertesten
Før brukertesten starter vil vi gi en kort muntlig presentasjon om prosjektet og hva målet er med undersøkelsen. Deretter kommer vi til å gi de tid til å lese gjennom, signere informasjonsskrivet og stille spørsmål om studiet.

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

- Navn
- Alder
- Yrke
- Hvor engasjert er du for miljøet/Hvilke typer miljøengasjement har du nå?
- Erfaring med teknologi

Utførelse
Under brukertesten vil vi be deltakerne utføre forskjellige oppgaver knyttet til en prototype. Disse oppgavene vil i hovedsak gå ut på at brukeren får fiktive scenario som er knyttet opp til bruken av prototypen. De kommer til å bli spurt om å prøve å utføre relevante oppgaver, slik at vi kan observere hvordan de prøver å løse dem. Vi kommer til å spørre om de kan tenke høyt om de valgene de gjør, og stille oppfølgingsspørsmål dersom det er noe vi føler er uklart.
Siden prototypen ikke er utviklet enda, vet vi heller ikke spesifikt hvilken oppgaver det kommer til å være. Men her er noen eksempler på hvordan spørsmålene kan se ut er:

Spørsmål 1: “Hva er førsteinntrykket av det du ser?”.
Spørsmål 2: “Se for deg at du har ryddet i klesskapet og finner en skjorte du liker mønsteret på, men som ikke passer. Hvordan ville du gått frem på denne nettsiden for å finne et nytt bruksområde?”
Spørsmål 3: “Du ønsker å dele en god måte å oppbevare bananer på slik at de ikke blir fort brune, hvordan ville du gått frem for å dele det på nettsiden?”

Samtale
Etter brukertesten vil vi utføre en semi strukturert samtale hvor vi stiller noen oppfølgingsspørsmål til brukertesten. Det vil være noe lignende disse spørsmålene:

- Hvordan synes du det var å utføre oppgavene?
- Hvordan synes du det var å bruke denne teknologien?
- Var det noe du syntes var utfordrende eller uklart ved å bruke denne teknologien?
- Var det noen funksjoner du savnet med denne teknologien?
- Hva likte du med denne teknologien?
- Hva likte du ikke med denne teknologien?
- Ville du anbefalt denne til en venn?

Avslutning
Vi kommer til å spørre om deltakeren ønsker å tilføye noe til samtalen før vi avslutter, samt om de har noen spørsmål. Vi kommer til å forsikre oss om at de får med seg informasjonsskrivet og kontaktinformasjonen vår dersom de har spørsmål i etterkant.

Bakgrunn

Hvem:
Hva:
Hvor:
Når:
Enhet: Mobil

Into til test:
Hei, vi er masterstudenter i interaksjonsdesign og ønsker å teste designet på en app. Vi vil gi deg noen oppgaver du skal prøve å utføre. Det er veldig fint om du snakket høyt om hva du tenker. Husk at det er designet vi tester og ikke deg, så hvis det er noe så er vanskelig så er det vår feil ikke din.

Høres dette greit ut?

Testperson, alder

#	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	*Du har lastet ned appen Humble Bee som er en app som skal hjelpe deg å bli mer miljøvennlig.* 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	
Konseptet	Onboarding	- Kan du igjen forklare hva du tror denne appen gjør?	Hvilke tanker har de om planeten?	
2.2 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 trykke på? Hva tror du at du har mulighet til å gjøre her?	Finne ut forventninger til denne siden, samt hva de ønsker å trykke på.	
2.3	Forstår de honning/ vann og hvordan man får mer av de.	Hvis de planter en blomst eller trykker på honning/vann spør: - Hva tror du "dette" er? (honning og vann) - Hvordan tror du at du kan skaffe mer honning og vann? (Demonstrer gjerne)	Forståelsen av sammenheng mellom honning/vann og legge til aktiviteter	
3.3	Menyen	Nederst her er det en meny, hva kan tror du kan ligge under disse menypunktene? • Gjerne trykk deg igjennom og forklar hva siden inneholder • Er siden slik du forventet?	Se om menypunktene tilsvarer forventningene	
	Menypunkt Search	• Hva forventer du er under Search • Kan du forklare hva denne siden inneholder?		
	Menypunkt (Legg til aktiviteter)	• Hva forventer du er under (+) • Kan du forklare hva denne siden inneholder?	Forstår de at det er aktiviteter du må gjøre irl?	
	Menypunkt Statistikk	• Hva forventer du er under "Stats" • Kan du forklare hva denne siden inneholder? • Hva er streaks? • Hvordan tror du "total saved" er		

		regnet ut? • Hvordan tror du at du får badges?		
	Menypunkt Profil	• Hva forventer du er under "Profile" • Kan du forklare hva denne siden inneholder?		
	Legge til aktivitet	• Du fikset et hull i favoritt-buksen 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?	Forstår de hvordan de legger til aktivitet? Hva tenker de at de oppnår med det? Forståelse av badge, hvordan man får den og hvor den vises etterpå	
	Aktiviteter	Se for deg at du er vegetarianer. Kan du vise oss hvordan du ville gått frem for å registrere dette i appen? -Var det slik du forventet?	Forståelse av hvordan man legger til gjentagende aktiviteter	
		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?	Forståelse av hva som skjer videre etter gjentagende bruk av appen	
	Utfordringer	Var det noe du syns var vanskelig?		
	Forbedringer	Var det noe du ville gjort annerledes?		
	Hva liker de?	Hva likte du med denne appen?	Er det noe som skiller seg ut? Er det noe de ville brukt igjen?	
		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?	