



*How can designers  
influence the development of  
addictive mobile services?*

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A Master Thesis

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## Preface

This master thesis marks the end of five remarkable years at The Institute of Design, NTNU. It has been a challenging, but ultimately rewarding and educational experience to write it. It would not have been possible without the aid, support and guidance of a variety of people. First and foremost, I would like to thank my supervisors Marikken Høiseith and Ida Nilstad Pettersen for your advice and support throughout this process, and for grounding a wide and fuzzy problem definition. I would also like to thank everyone who participated in the interviews, the design probes, the workshop and user tests. Your input and thoughts have been most appreciated, and most helpful.

Finally, I would like to thank my friends, classmates and my family. Your support and friendship have made these five years a memorable experience, which I will cherish onward.

## Abstract

In recent years, smartphone addiction has become a topic in the public debate. Critics claim that companies like Facebook, YouTube and Snapchat design services that are meant to “hook” users – making them spend as much time as possible on their phones. The companies have accomplished this through several means, for instance by utilizing behavioural psychology, exploiting human cognitive biases and using big data algorithms to predict what content to deliver to the user. This imposes an ethical dilemma for designers. After all, it is with their know-how that companies design these potentially addictive apps. This master thesis aims to explore what designers can do, and what they should do about this issue.

Critical design is a design philosophy that has guided this master thesis. This form of design does not seek to solve problems, but rather invoke a discussion using design as a trigger. To gain an understanding of the issue, interviews and a design probe were used as research methods. The participants of these methods were designers, smartphone users of different kinds, and a professor of sociology. These qualitative research methods led to several findings regarding design ethics, smartphone user habits, and other subjects.

One of the findings from the interviews was that knowledge was important for designers to effectively participate in ethical debates. Work therefore started on a literature review regarding how smartphones affect their users. The literature review gives an overview of the research field and explains some of the effects caused by smartphone addiction and compulsive smartphone use. This master thesis also resulted in a critical design artefact – the game Appmaker Inc. This is a game where the player takes the role of a social media entrepreneur and is instructed to make an app that is as addictive as possible. The game is designed to give the player an overview of an ethically questionable industry and make them reflect on the morality of it. The target group is primarily designers and other tech industry professionals, but ordinary smartphone users can also benefit from playing the game.

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part 1:

# Introduction

The Introduction for this Master Thesis will cover the background, design process and the framework behind it

- Page 10** **Motivation.** My reasons for choosing this assignment
- Page 12** **Background.** Explaining the public discourse on addictive smartphone apps.
- Page 14** **Critical design.** The main philosophy for this master thesis
- Page 16** **Methods and Process.** An overview of the main framework and methods of this master thesis
- Page 20** **Mind Maps.** The tool that helped stake out the direction of this master thesis

## Motivation

Each year, students at Industrial design organizes the conference Design Expo. In 2019, the theme for the Expo was “Mind the Mind”. It explored the different connections between psychology and design, and an important subtheme was addictive smartphone apps. One of the most memorable happenings at the conference was a discussion on the different ways a smartphone user could protect themselves from addiction, by for instance monitoring their usage, and putting time limitations on their app use. One of the questions that came to my mind was: “What are we as designers supposed to do about this?” If these apps were being designed to get people to use them as much as possible, it felt wrong to put all the responsibilities on the user. For that reason, I decided to explore the subject further in this master thesis. It especially felt like the right decision since I soon would be exchanging studies for steady work, an arena where I might not have the freedom to explore a purely ethical issue such as this one.

The document to the right shows how the thesis started out in Mid-February. One of the biggest departures from the initial course set was to use Critical Design as a framework, rather than focusing on concrete solutions, like the two last points of the list presume.

### Masteroppgave for student Jørgen Molaug

#### Hvordan kan designere påvirke utviklingen av avhengighetsskapende mobiltjenester

*How can designers influence the development of addictive mobile services?*

Smartphones have established themselves as an integral part of our contemporary society. There are many examples of their usefulness, but in later years critics have questioned their effect on people's ability to concentrate and use their time efficiently. Companies like Facebook, Google, and Snapchat have implemented various features that are meant to keep the users' attention on their services. There are many apps available that give users the ability to restrict their own mobile usage, but what should designers do to make sure the services they make do not waste their users' time?

This Master Thesis will examine the responsibilities, and possibilities, of designers who wish to make services that do not needlessly spend their users' time. It will answer the following research question: How can designers influence the development of addictive mobile services?

This Master Thesis will include:

- A literature review regarding, amongst other things, behavioral psychology and the usage of mobile devices.
- An overview of the different strategies contemporary companies employ to influence their customers to keep using their apps.
- Qualitative methods to gain insights on the viewpoints of both designers and different kinds of users regarding their experiences with time consuming apps and mobile websites.
- Exploratory methods to discover new ideas, methods and guidelines that enable users to spend their time more constructively according to their own values and goals.
- Recommendations for designers, aided by a relevant medium.

Oppgaven utføres etter ”Retningslinjer for masteroppgaver i Industriell design”.

Ansvarlig faglærer: Marikken Høiseith

Biveileder: Ida Nilstad Pettersen

Utleveringsdato:

Innleveringsfrist:

Trondheim, NTNU, dato 15.2.19

Marikken Høiseith  
Ansvarlig faglærer



Ole Andreas Alsos  
Instituttleder



## Background

Since its nascent years in the early 2000s, smartphones have become an integral part of our society. In 2012, 57% of Norwegians had access to a smartphone, but that number has increased every year, rising to 95% in 2018 (Schiro, 2018). A high usage rate like this is typical for a developed country like Norway, and in developing and emerging economies the smartphone ownership rates have risen sharply in the later years as well (Poushter, 2016). Smartphones provides their users with a smorgasbord of tools, entertainment- and social services. Although smartphones are useful in many ways, smartphone use has been criticized by organizations like the “digital wellness movement” (Pardes, 2018), claiming that smartphones are wasting peoples time and having various negative effects on their users (“Ledger of harms,” 2018). The face of the movement, Tristan Harris, claims that digital companies are in an “arms race” against each other for our attention (Harris, 2018). Harris further claims that the companies capture our attention so successfully because they are utilizing behavioural psychology methods that cater to our most basic needs.

Among the influx of behavioural psychology in the tech industry, one of the most known resources is the 2014 book *Hooked* by Nir Eyal. In this book, the Silicon Valley consultant explains how to make habit-forming products, using the *Hook Model*. This model explains how to get users to incorporate products into their daily routine using dopamine driven loops (Eyal, 2014). While Silicon Valley has embraced models and techniques described by Eyal, there are many examples of how tech professionals restrict use of devices in a private setting. The Waldorf school in Silicon Valley is a private school where 3 out of 4 students have parents who work in the tech industry. The school is popular among the tech professionals, partly because it has a completely digital free teaching environment (Moreira, 2018). Steve Jobs is another example, in a 2010 interview with New York Times he explained that his kids had never used an Ipad, and that they had limits on how much technology their kids used at home (Alter, 2017). The former Facebook executive Chamath Palihapitiya also restricts social media for his children. In a 2017 interview he professed “a tremendous guilt” over how the company he

had helped build was “ripping apart the social fabric of how society works” (Palihapitiya, 2017). He is not the only former Facebook official that has publicly regretted their involvement with the company, former president Sean Parker came forth in 2017 saying that the company was built around how to grab as much attention and time of their users as possible, and that the site has accomplished that by exploiting human psychological vulnerabilities (Ong, 2017).

Tristan Harris and other critics of the tech industry refer to how addictive apps are designed to be addictive (Harris, 2018; Vox, 2018), but how are designers reacting to these accusations? A google search for the phrase “Addictive UX design” returns a divided result. Some links lead to articles that problematize the issue and discuss solutions for it (Nussbaum, 2018), while others lead to articles explaining how to exploit addictive UX design, with titles such as “How to build an App That’s as Addictive as Coffee” (Emami-an, 2015). There seems to be an emerging discussion in the design milieu about addictive smartphone apps, but there does not seem to be a consensus regarding the morality of it. The subject of addictive app design has also reached the public discourse through the mainstream media in the latter years. Articles discuss smartphone addiction, and often come with advice on how to use their smartphones less, such as making their phones use grayscale, self-restricting access to certain apps, or undergoing a “Digital Detox”: a process where the user separates themselves from their phones entirely for an extended period of time. (Ghaffary, 2019). Some have criticized the media coverage for being sensational and extreme, and that they use scientific studies to perpetuate an unfounded fear of smartphones (Lanette & Mazmanian, 2018).

## Critical Design

Critical Design is a design field that differs from “traditional design” in several ways. While traditional design makes products for consumption, critical design uses design methodology to criticise and speculate about different trends and movements. Traditional design strives to solve problems, to make products and services user friendly and to provide answers. Critical design strives to find problems, to be provocative, and to ask questions (Dunne & Raby, 2013, p. vi). It has roots in several radical and critical design movements, but it is notably connected with British designers Anthony Dunne and Fiona Raby. The pair were also the first to use the term “Critical Design” in 1999 with their book *Hertzian Tales* (Johannessen, 2017). It does not have its own specific set of methods, but uses design methodology to create artefacts, sometimes referred to as “props”. Format-wise there are no restrictions on what a critical design artefact should look like or consist of (Johannessen, 2017). The purpose of the artefact is to engage audiences and spark debates regarding the topic explored by the designer (Malpass, 2017, p. 41). Critical design is often described in conjuncture with its sub-field – Speculative Design. Speculative design shares the same goals and mindset as critical design, but focuses on issues and technologies that are further into the future (Malpass, 2017, p. 100).

### A: Traditional design

Affirmative  
 Problem solving  
 Provides answers  
 Design for production  
 Design as solution  
 In the service of industry  
 Fictional functions  
 For how the world is  
 Change the world to suit us  
 Science fiction  
 Futures  
 The “real” real  
 Narratives of production  
 Applications  
 Fun  
 Innovation  
 Concept design  
 Consumer  
 Makes us buy  
 Ergonomics  
 User-friendliness  
 Process

### B: Critical design

Critical  
 Problem finding  
 Asks questions  
 Design for debate  
 Design as medium  
 In the service of society  
 Functional fictions  
 For how the world could be  
 Change us to suit the world  
 Social fiction  
 Parallel worlds  
 The “unreal” real  
 Narratives of consumption  
 Implications  
 Humor  
 Provocation  
 Conceptual design  
 Citizen  
 Makes us think  
 Rhetoric  
 Ethics  
 Authorship

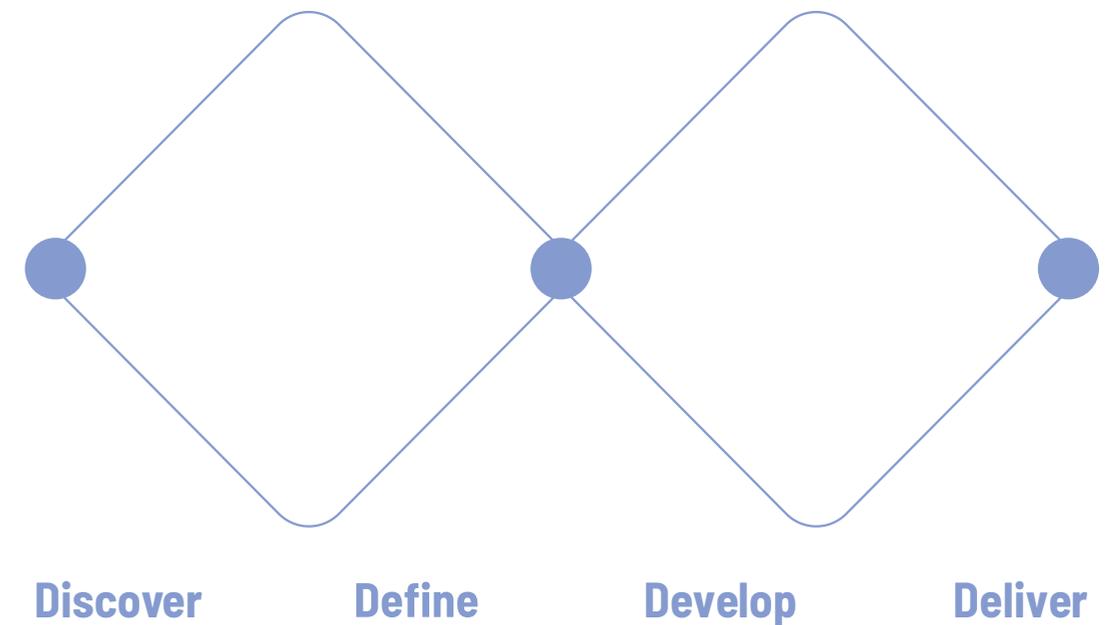
The list above stems from the A/B-manifesto of Dunne and Raby, and shows how they separate traditional design and critical design as opposites of each other (Dunne & Raby, 2013, p. vii).

## Methods and Process

Addictive apps have become a topic of public debate, and there are many articles and apps on the market that aim to help smartphone users regulate their phone time. These methods may very well be effective, but it does seem unfair to put all responsibilities on the user, when the addictive apps are designed with the intent to capture the users' attention (Harris, 2018). This master thesis will therefore focus on influencing the designers, rather than making a solution for the users. And for that purpose, critical design is a suitable mindset. Additionally, the use of humour, satire, and speculation in critical design was something that appealed to me personally.

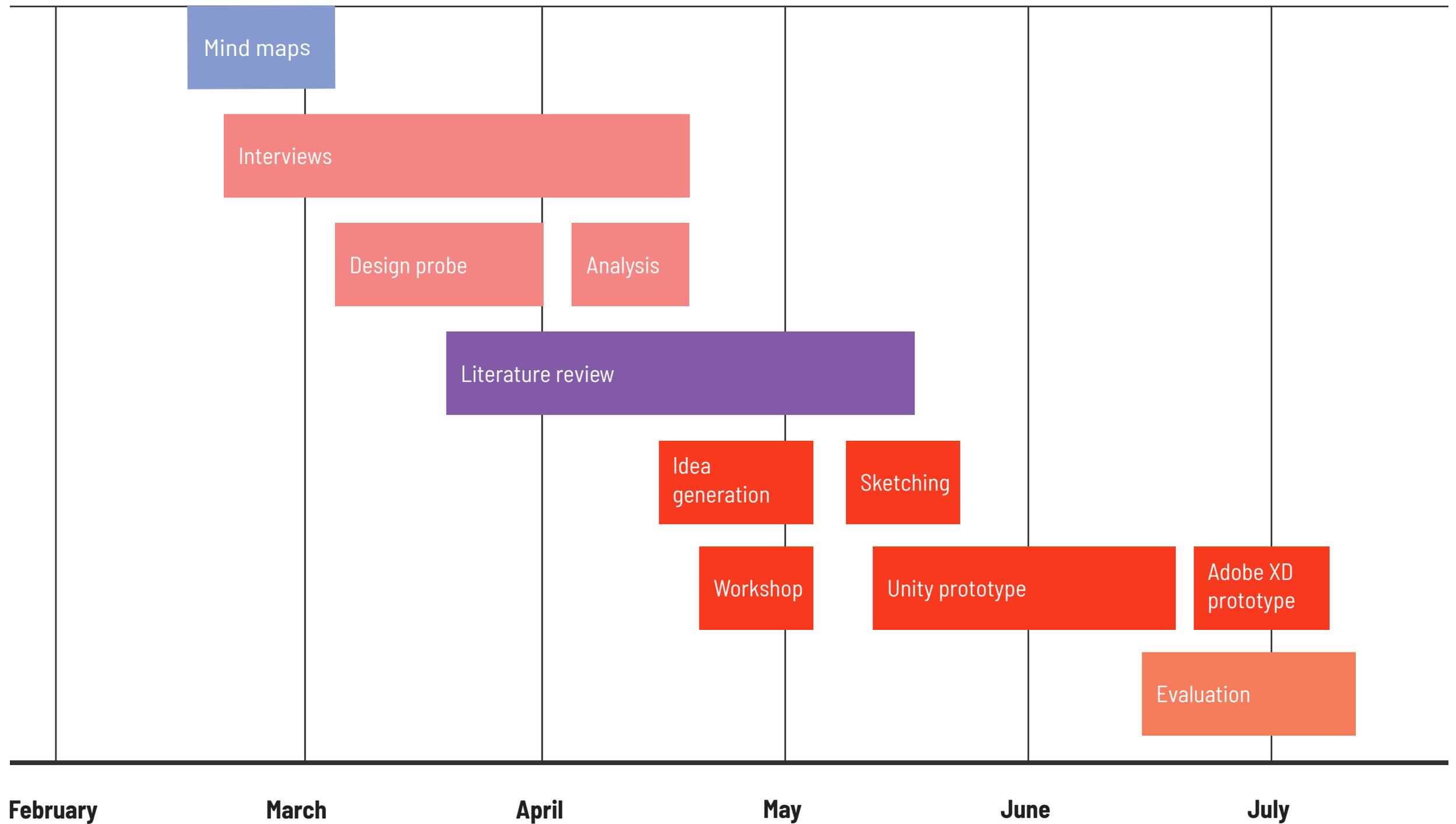
Critical design has been an umbrella that has enveloped the design process from the beginning. As a mindset, critical design does not necessarily rely on gathered data and information, focusing rather on enabling reflection in the user. However, gathering insight can help the designer empathise with the users. When trying to start a discussion it can also be beneficial to ground the discussion in observed data. Hence, this master thesis was conducted using traditional design methods to gather insights and understand the problem, but where the result encourages reflection rather than trying to solve the problem directly.

The process has followed the structure of the Double Diamond process as described by the UK Design Council ("The Design Process: What is the Double Diamond?," 2019). The diamonds refer to processes of creative divergence and convergence. The first diamond is concerned with finding the correct problem definition, while the second diamond is concerned with finding the most suitable solution. In this framework, several methods have been used, including Design probe, Interviews, Prototyping & Testing, Literature Review and Workshop. My use of the methods will be described more closely throughout in the report.



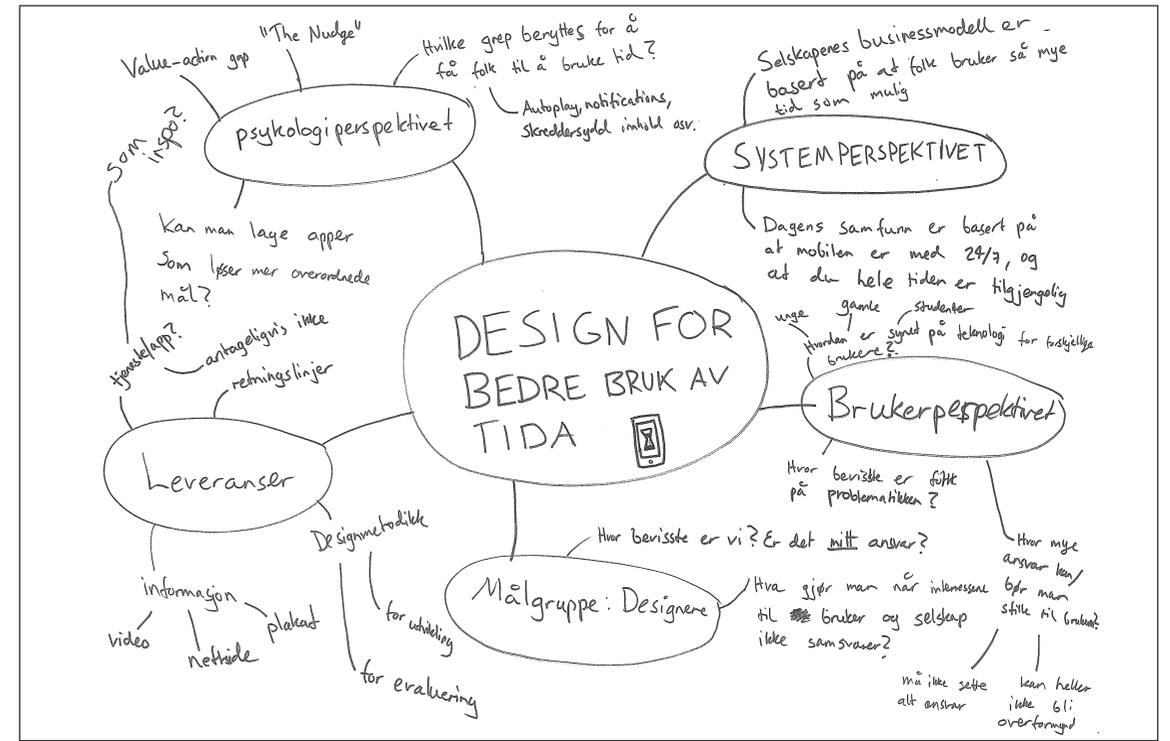
The four phases of the Double Diamond Method of design, as described by the UK Design Council ("The Design Process: What is the Double Diamond?," 2019).

## An overview of the design process



# Mind Maps

Without a collaboration partner, there was no client to give directions or requirements for this master thesis. This afforded unparalleled freedom to pursue any direction, but such freedom can also be paralyzing. To help stake out a course, mind maps proved to be a valuable tool in many ways. First, they uncovered some of the different directions to explore, which fields of study to research for relevant theory, and which target groups to pursue. Second, the mind maps provided a useful foundation to plan the insight work from. Third, the mind maps were useful to get all preconceptions of the subject "out there" before starting to research it more thoroughly. When the researcher is aware of these preconceptions, they can make efforts to not influence their research subjects with their own bias unconsciously.



part 2:

# Insight

To get a better understanding of the problem, several insight methods were used. The data was then analyzed using grounded theory.

- Page 24** **Interviews.** An overview of which participants were included, and why they were included.
- Page 28** **Design probe.** An overview of design probe as a method.
- Page 32** **Analysis Method.** Explaining grounded theory.
- Page 34** **Analysis Findings**

## Interviews

“What designers should do about addictive smartphone applications” is a relatively wide definition for a Master thesis. Thus, it was necessary to use a wide scope in the insight phase. To enhance this, the insight work was based on an inductive approach. The main user group, designers, were of course important. It was also important to include other professional fields and different kinds of smartphone users, to get some alternative views and perspectives on the topic of addictive smartphones.

### Interviews with designers.

The main focus of this Master thesis is to explore the relationship between potentially addictive apps and designers. Semi-structured interviews were deemed a suitable method to gain insights about this relationship. However, most of the digital industry that creates potentially addictive apps is based in Silicon Valley, USA, and in other parts of the world. It was difficult to reach designers with experience in creating such apps directly, and the interviews were therefore themed more towards design ethics in general. The main part of the interviews investigated the designers’ relationship with design ethics, their opinions about the ethical conundrum regarding designing potentially addictive apps, and if they had experienced conflicts of interest between users and their own client or employers.

### Designers and their own smartphones

Designers, or at least most of them, are both creators and consumers of smartphone apps. The interview with the designers contained several questions regarding their own smartphone use. Namely, how they used their phones, if they were aware of how much time they spent on it, and if they used any strategies to regulate their own use. This data is interesting in its own right, but it was especially interesting for me to explore if designers had differing relationships to their smartphones compared to other smartphone users.

### Interviews with critical designers

Critical design is suitable for influencing viewpoints and for making a statement, and such was an interesting topic to explore. Two of the designers were specifically invited to the interviews because they had experience with this design field. Their interviews covered practical tips and general discussion of critical design as a subject.

### Interview with a professor of sociology

Different sources, such as Tristan Harris of the Time Well spent Movement, argue that addictive smartphone apps make their phones more addictive by catering to primal needs, often termed “The reptile brain” (Harris, 2018). To learn more about smartphone addiction, a professor in sociology was invited to an interview. This person had done some research that was relevant to the subject, and therefore the interview was mainly geared towards the observations made in this study.

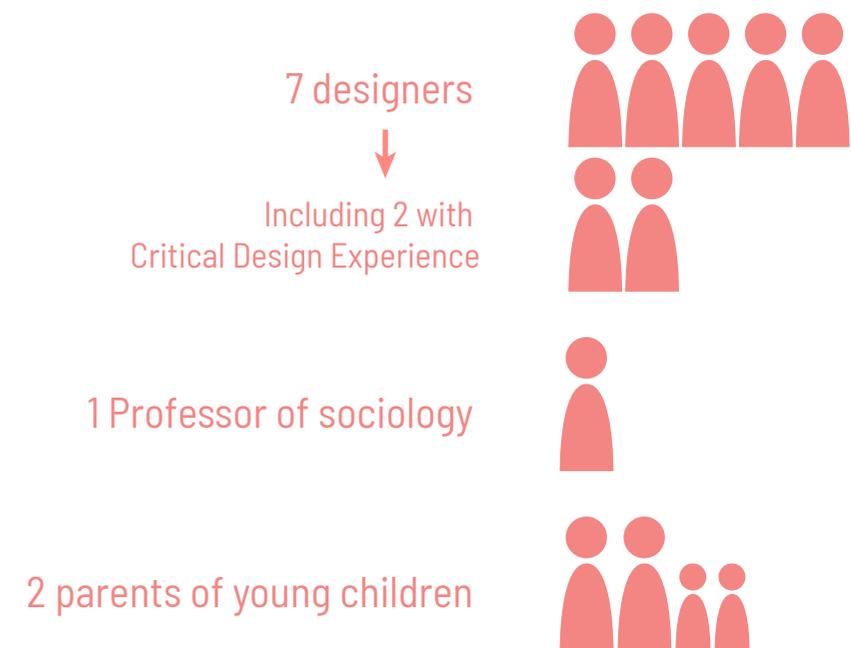
### Interview with parents of young children

Critics of potentially addictive smartphone apps are especially concerned about the effects that smartphones have on young children (Spitzer, 2014). Today’s youth are perhaps the first generation that is growing up in a society where smartphones and tablets are ubiquitous. To learn more about how it is to raise children in this milieu, two parents with children of five and eight years old were invited for a group interview.

### Practical information

The interviews were conducted with N=7 designers, whereas 2 of the subjects had experience with critical design. The interview subjects were anonymous, and no personal information was gathered. Before the interview they received an info letter explaining how the data was handled, a standardized version of this is added as an attachment to this thesis. The interview subjects received some information on the topic for the interview as well, to sensitize and prepare the subjects in advance. Interviews were semi-structured, with several questions as a foundation, but conducted with the liberty to diverge from it and to delve deeper into interesting topics with follow-up questions. They were conducted with a few “warm up” questions first, such as: “How many years have you been a designer?” before more challenging questions about design ethics followed. The designers were picked out based on my personal network, and because they had interesting viewpoints to share. The selection may therefore have certain biases, and the results should not be interpreted as representative for the design community at large.

## Interviews



## Design Probe

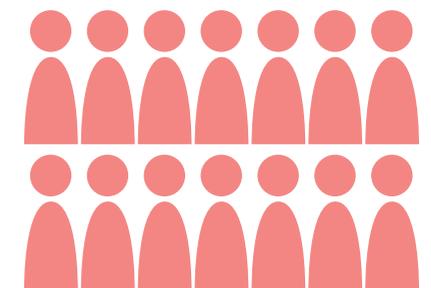
A design probe is a collection of assignments that are distributed to participants. They are very flexible format-wise, and may consist of various materials such as diaries, postcards, disposable cameras, and stickers. Probes often have an open-ended approach to information gathering, and are suitable for exploratory design research (Mattelmäki, 2005). Design probes were a promising method for the design research for multiple reasons. Firstly, some people are self-conscious about their own smartphone usage, and thus a more anonymous approach might help these in sharing their experience. Secondly, many people use their smartphones continually in short increments throughout the day, and thus it can be hard to evaluate their smartphone usage when asked on a short notice in an interview setting. A design probe, where the participant reflects over a longer period, may alleviate such difficulties. Thirdly, an exploratory method was suitable for such a wide problem definition.

Two different classes at Røros Videregående skole (Røros Upper Secondary School) were recruited for the design probe. The reasons why they were recruited were twofold. Firstly, the designers that had been contacted through the interviews gave the impression that they were relatively conscious about their own smartphone use, and it would be interesting to see if other user groups showed similar levels of consciousness. Secondly, students at an Upper Class Secondary school might have a different experience with smartphones than people of my age or older, since they would have grown up in a period where smartphones were more common. The probes were designed in the form of pamphlets, and the participants were supposed to do an assignment each day. The assignments were not meant to take more than 10 minutes to finish. 25 pamphlets were delivered, and 14 returned. They ranged from more straightforward questions about smartphone use, to more experimental ones – for instance making a comic strip. The pamphlets were designed to be visually pleasing, taking inspiration from the shape of the smartphone itself. The goal was to make the pamphlets different than more official looking questionnaires. This can cause participants to appreciate the probe more, and may encourage a higher degree of comp-

pletion of the probes (Gaver, Dunne, & Pacenti, 1999). The original plan was to recruit some of the participants for a group interview afterwards, to gain additional insights and to gain feedback on the probe itself. Unfortunately, this was not possible due to practical reasons. The probe in its entirety can be found in the attachment section of this master thesis.

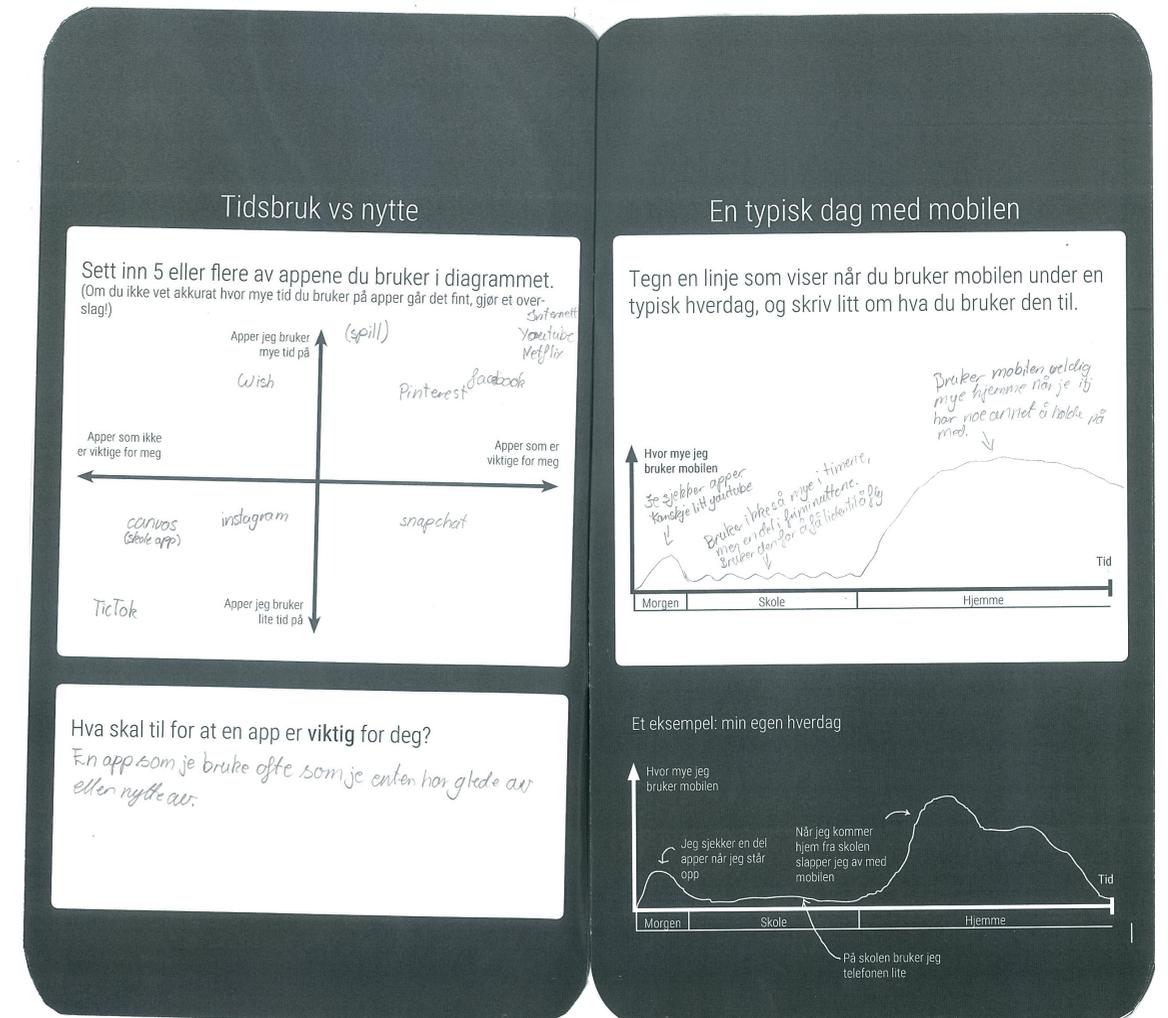
## Design Probe

14 Upper High School students





The front page of the design probe pamphlet



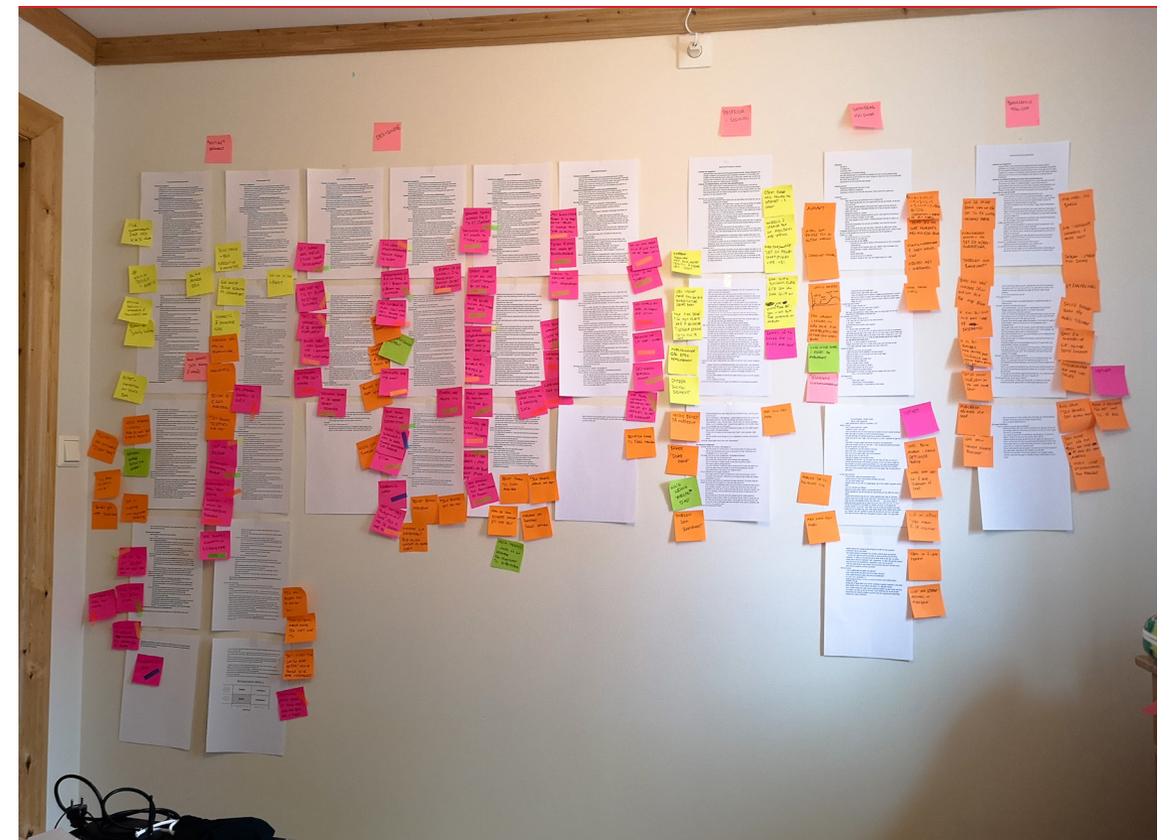
The pamphlet contained a number of different tasks, such as a mapping of the participants most used apps, and a task where the participants made a timeline out of their smartphone use through a typical day.

## Analysis Method

Inspired by Visser et. Al, the analysis was based on a Grounded Theory approach (Visser, Stappers, Van der Lugt, & Sanders, 2005). In grounded theory, the researcher takes an inductive approach, and strives to keep the theories that they develop grounded in empirical data. The grounded theory has many guidelines (Corbin & Strauss, 1990), but for this master thesis it was more suitable to use it as inspiration rather than a strict guideline.

After hanging up the materials from the interviews and the probe on the wall, the analysis commenced with identifying some overarching categories: Personal Mobile Use, Critical design, and Design ethics. The sources were systematically investigated, and points of interest were noted in the correct category – separated by colour coding. It was especially important to write down recurring points, and to record observable patterns in multiple data sources. The category of design ethics was so prevalent that three subcategories were made: Personal ethical choices, smartphone ethics, and knowledge about design ethics.

Grounded theory emphasizes that a researcher should continually test their findings while gathering data. If a finding cannot be supported by new observations, it should be reformulated or discarded (Corbin & Strauss, 1990). In accordance with this, one of the interviews was held after the initial analysis, with the specific goal of reviewing the findings from the analysis. The findings in general held up and were not significantly adjusted or refuted.



The colour of the post-its divided the different findings. Yellow was related to critical design, pink to design ethics and orange to smartphone use.

## Analysis Findings

Following is a summary of the most important findings:

### Designers

Designers wish to make the world better. Many have refused to work with certain companies for ethical reasons, for instance arms manufacturers. Designers have varying knowledges of design ethics, and how to apply this in practise. Several of the designers emphasise the importance of having ethical discussions in their work environments, but this is only the norm for some of the designers. Several of the designers think that an ideal designer should be “the users’ advocate”. However, enforcing this is somewhat difficult – designers do not want others to perceive them as “naive” or “emotional” if they argue to preserve the needs of the user over the need for profitability. When it comes to smartphone use and addictive apps, the designers agree that the responsibility of misuse is shared between the designer, the company, and the user themselves. Several interview subjects also pointed out that lawmakers have a responsibility to regulate and make laws that hinders predatory business models.

Regarding ethical discussions, knowledge seems to be an important factor. Firstly, to take a standpoint about an issue, one needs to have factual understanding of the problem. Several of the interview subjects, designers and otherwise, questioned whether smartphone overuse is different than earlier generations’ obsessions over newspapers, or watching television. This article has the opinion that smartphones can be more disturbing to the daily life than those media, for several reasons, which will be explained further in the literature. Secondly, designers that want to contribute in ethical discussions, but do not want to be perceived as “naive” or “emotional” can benefit from having rational, research-based arguments. Possible ways to broadcast this knowledge include having more ethical discussions and debates about the effects of smartphones on the populace and make the findings from smartphone research more visible. Further, many of the designers expressed a desire for more knowledge about ethical design methods. This could be accomplished by developing ethical design methods

and toolboxes or giving ethical discussions a more important role in design education.

### Smartphone use

Smartphones are ubiquitous in today’s society. They are used in many different situations as both a tool and for entertainment, and for many it is an essential artefact in their daily lives. It is particularly popular when the user is bored, insecure, or uncomfortable. Smartphones are a relatively recent commodity, and there does not seem to be a common set of norms of how to use them in the company of others. Smartphone users generally express that they wish to reduce their smartphone usage, but many seem powerless to do so. This persisted in all user groups, even amongst the highly educated designers. Kids are especially vulnerable to smartphone overuse and cannot in a good way determine how much smartphone use that is appropriate. It is also difficult for the parents to regulate the smartphone use of their children. They might wish to maintain a restrictive smartphone policy, but they cannot control the children of the others. If they completely restrict their children from smartphones, their children could be alienated from important social arenas amongst their peers. Some of the participants pointed out that “Instagram perfection” – the need to appear as an ideal version of oneself, is a source of stress in their daily lives.

In general, the highly educated designers seemed to be more aware of their own smartphone use in comparison to the other information sources. Thus, a designer making digital services that are meant to capture the users’ attention cannot assume that the user has the same capabilities as them to self-regulate and not spend an excessive amount of time on it.

### Critical design

Critical design has some drawbacks. The designs are often misinterpreted as art and held to the same standards as art, even though it is a different field – with different goals. Some critical design projects appeal only to a narrow set of design professionals, and such have a small impact. Both interview subjects mentioned projects like *Black Mirror* – a TV-series that sheds technological innovation in a critical view. They argued that these projects reached a broader audience quite successfully, aided by their engaging storytelling and realistic visualisations. In critical design a designer has an important job in communicating and broadcasting their work, in addition to the design job itself. Both had experienced that it can be difficult being “controversial” enough while working on critical design projects. The consequences of a project not being “controversial” enough is that it might not invoke a strong enough reaction in the public, which stifles the discussion the designers want to happen.

### Other findings

The design probe had a varying degree of completion, and especially the more experimental tasks were in large degree not completed. Some people seemed uninterested in the subject, while it was an important topic for others. Design probes are prone to not being completed fully by the participants for different reasons, perhaps one of the most important being a lack of motivation (Gaver et al., 1999). Another reason could be that the assignments were unclear or confusing.

The professor in sociology conducted experiments in 2012 and 2014, where participants voluntarily refrained from using internet for three weeks. The participants had some issues with daily routines, for instance by not being able to check bus schedules online. However, many felt that the inability to “waste” time on the internet enabled them to spend more time on things that were important to them – like exercising, reading books, and hanging out with friends. After the experiment many of the participants wanted to

reduce their smartphone usage, but none managed to do it, even though they had a positive experience of “living offline”. Before the experiments, the sociologist had a hypothesis that a feeling of community was an important factor in why we use our smartphones so much, but after conducting the experiment were more of the opinion that the smartphones try to cater to our “lizard brains”, i.e. basic human needs.

The smartphone is a part of a bigger ecosystem of digital devices, and several participants in the interviews and probes mentioned how they sometimes substituted smartphones with other devices under certain circumstances. This Master Thesis focuses on smartphones, but it acknowledges that smartphones are a part of bigger problem. The reasons for using different devices at different device can be relatively complicated and subjective (Rooksby, Asadzadeh, Rost, Morrison, & Chalmers, 2016), and therefore it is outside the scope of this thesis.

part 3:

# Literature Review

The literature review covers the various effects smartphones have on its users.

**Page 40** Background

**Page 41** The research field

**Page 43** General effects of smartphones

**Page 47** Smartphone Addiciton

**Page 51** Summary

## Background

The literature review was originally started in the early insight phase of the project. However, the analysis revealed a need for knowledge among designers about how smartphones affect us. The work was therefore extended, and a more thorough literature review will be part of the delivery for this assignment.

This literature review will give an overview of the research on smartphone usage, and if there is a scientific basis in the claims that smartphone usage might be harmful to people. The sources informing it has been found through keywords searches through channels like google scholar. The keywords selected combine words like “smartphone”, “mobile” and “mobile device” with phrases like “addiction”, “usage”, “distraction”, “benefit”, “positive effects”, and “impact”. The selected keywords relate to both positive and negative aspects of smartphones, to not get a biased selection of sources. Some sources were also found through the “Ledger of Harms” page made by the Centre for Humane Technology (“Ledger of harms,” 2018). Although this organization has an outspoken negative view on smartphones and technology, it clearly marks which of their sources are peer-reviewed.

## The Research Field

### An Overview

The smartphone is a fairly recent invention and accordingly the research field is not that large, especially research that concentrates on the overall effects smartphones have on their users. There are quite a few research papers that focus on individual apps and their efficiency. Some fields have made considerable contributions to the research field, first and foremost researchers within addiction psychology. These researchers typically use quantitative methods like questionnaires to examine the relationships between smartphone addiction and other phenomenon, like anxiety (K. E. Lee et al., 2016), depression (Demirci, Akgönül, & Akpınar, 2015), and stress (Samaha & Hawi, 2016). Social science researchers have also focused on the subject of smartphone use, by for instance examining the effects mobile use have on social capital (Park, Han, & Kaid, 2013), and political discourse (Park et al., 2013; Wei, 2014; Yamamoto, Kushin, & Dalisay, 2015). As seen in table 1, many of the studies focus on university students. A common reason why researchers select this group is that young people generally have a high smartphone ownership rate and usage rate.

### Research Challenges

People who wish to interpret the findings of smartphone research face several challenges. First, the Mobile Addiction field is closely related to other research areas, like Internet Addiction and Gaming Addiction. If a person is addicted to playing online games through their phone, for instance, all three addiction types might be fitting, but which of them would fit best? And could the person have several of these addictions at once? There have yet to be conducted much research on these types of questions, albeit some studies have been made, for instance by Kim et. Al regarding the interplay between PC and smartphone in problematic internet use (D. Kim, Nam, Oh, & Kang, 2016).

Second, the literature focuses on how smartphone addiction effects other conditions, but there does not exist an official definition what of what smartphone addiction is (Demirci et al., 2015). Some researchers might be stricter than others in defining what smartphone addiction is, and that makes it harder to compare the results fairly. A minority of researchers even refute the term smartphone addiction, and describe problematic smartphone use as an “annoyance” rather than addiction (Oulasvirta, Rattenbury, Ma, Raita, & Computing, 2012). Similar to most of the research field, this article will use “smartphone addiction” as a term, and will define it as “the overuse of media to the extent that it disturbs the user’s daily life” (Demirci et al., 2015).

Third, a lot of the studies on mobile addiction rely on self-filled questionnaires. This might be a problem, since smartphone use might lead to time distortion, making it hard to estimate how much time people spend on their phones (Gower & Moreno, 2018; Lin et al., 2015). Other studies have shown that some people that exhibits problematic smartphone behavior actually worry less about their own smartphone use than people that use their smartphones in a less harmful manner (Lapointe, Boudreau-Pinsonneault, & Vaghefi, 2013). A possible way to mitigate self-report bias would be to measure smartphone usage with an app, although this is a novel and relatively untested approach (Gower & Moreno, 2018).

## General effects of smartphones

### Sleep disturbance

Smartphones and other handheld media devices have deleterious consequences to our sleep cycle. An American literature review examining 17 other studies found that handheld media device usage before bedtime negatively affected both sleep quantity and sleep quality, and increased daytime sleepiness of children and adolescents (Carter, Rees, Hale, Bhattacharjee, & Paradkar, 2016). In addition to displacing sleep on a time usage level, mobile devices also lower the sleep quality by delivering psychological stimulating content and emitting light that affects the sleep-wake cycle. Reduced sleep quality and quantity of young children can lead to detrimental health effects like mental health issues, obesity, stunted growth, and many others. Sleep deficiency is a relatively prominent issue, as 75% of youth between 17-18 in the US have some degree of it, which is consistent with numbers from other developed countries. (Carter et al., 2016). Much like media device use before bedtime, smartphone addiction is also related to reduced sleep quality (Demirci et al., 2015).

### Presence effects of smartphones

As smartphones have become ubiquitous in our society, their importance to us has increased accordingly. Several studies have shown that the mere presence of a smartphone can affect people in different ways. First, the presence of a smartphone can have detrimental effect on short term memory. A study from 2017 found that the presence of smartphones reduces cognitive capacity, more specifically short-term memory and “fluid intelligence” – the ability of the brain to solve novel problems (A. F. Ward, Duke, Gneezy, & Bos, 2017). Ward et. al. performed tests that measure fluid intelligence and short-term memory and observed that participants that did the test with a smartphone present performed significantly worse than participants who did not. Whether the phone was turned off or on did not affect this outcome (A. F. Ward et al., 2017). A possible explanation for this is that the phone is so important for people that they subconsciously allocate cognitive capacity for supervising the phone, which drains on the limited capacity of the brain to process information on a short-term basis. An American study found that

89% of undergraduate students experience “phantom vibrations” – a false sensation of vibrations coming from your phone (Drouin, Kaiser, & Miller, 2012). Ward et al. argues that this is a symptom of our brains spending cognitive resources on monitoring our phones (A. F. Ward et al., 2017).

Smartphones also affect our abilities to make face-to-face human connections. A British study found that the mere presence of a smartphone placed in the vicinity of two conversation partners reduced the conversation quality, closeness, and connections between them (Przybylski & Weinstein, 2013). This effect was more pronounced when the conversation partners discussed something close and personal, than when they were discussing something trivial. This experiment was done in a laboratory setting, and a later study by Misra et al. replicated the results in a more naturalistic setting – inside a café. Participants who interacted with their phones during the conversation rated the quality of the conversation significantly lower than those who did not. Conversation partners in the absence of phones also rated their conversation partner with a higher level of empathetic concern (Misra, Cheng, Genevie, Yuan, & Behavior, 2016). This study could not infer causality. Thus, it is possible that people took up their phones as a result from an unfulfilling conversation. However, their results were similar to those of Przybylski & Weinstein, which showed a clear cause-affect relationship between the present mobile phones and subsequent negative effects on the conversation (Misra et al., 2016; Przybylski & Weinstein, 2013).

#### Political participation and smartphones

Several studies have found positive relationships between smartphone use and political participation (Y. Kim, Chen, & Wang, 2016; Park et al., 2013; Wei, 2014; Yamamoto et al., 2015). Thus, people who use their smartphones more also participate more often in discussions about politics, especially online discussions. A possible reason for this is that smartphones offer user-friendly ways to read up on political information and share their political views. The most popular services are designed to make the action of uploading content as straightforward as possible. Some Social Network

Services (SNS), like Twitter, specifically encourages short messages by implementing character limits on user-created posts (Eyal, 2014, p. 70).

Although political participation is a necessity in a democracy, the studies cited in the previous paragraph only measured the quantity of political participation – not quality. Many successful SNS use some forms of variable rewards in their design. Variable rewards are the reason why slot machines are so profitable – the uncertainty in the amount of the award, and whether one gets a reward at all, triggers a dopamine release in the brain. This makes a user return to the service time after time (Eyal, 2014, pp. 95-133). Twitter has various forms of variable reward systems, including retweets and likes. An American study examined a large sample of tweets about three divisive political issues and explored how moral-emotional words affected the ability of a tweet to get retweeted. The study found that a tweet increased its retweet rate with 20% for each moral-emotional word included. The study also found that moral-emotional words mostly caused the tweets to spread within the “in-group” – the political group the tweeter belongs to (Brady, Wills, Jost, Tucker, & Van Bavel, 2017). Thus, Twitter is a SNS that indirectly rewards users for releasing moral-emotional tweets. Brady et. al suggest that this might increase political polarization (Brady et al., 2017). More research is needed to establish if the effects of moral-emotional words are replicable on other SNS.

Table 1: Sample tweets with moral-emotional words

Topic	Mean ideology of retweeters	Twitter message
Gun control	Conservative	America needs to Arm itself. Stand and <b>Fight</b> for Your Second Amendment Rights. We are literally in a <b>War</b> Zone. Carry and get Trained.
	Liberal	Thanks to <b>greed</b> , the republication leadership & the #NRA - No one is <b>safe</b> #SanBernadino #gunsense #guns #morningjoe
Same-sex marriage	Conservative	Gay marriage is a diabolical, <b>evil</b> lie aimed at <b>destroying</b> our nation #o4a #news #marriage
	Liberal	New Mormon Policy Bans Children Of Same-Sex Parents-this church wants to <b>punish</b> children? Are you kidding me?!? <b>Shame</b>
Climate change	Conservative	Leftists take 'global warming' based on <b>bad</b> science as <b>faith</b> and act on it, but proven voter fraud is just racism #tcot #teaparty
	Liberal	<b>Fighting</b> #climatechange is <b>fighting</b> hunger. Put your #eyesonParis for a fair climate deal.

The moral-emotional words outlined in purple in Table 1 make tweets more likely to be retweeted, but only among people with the same political alignment as the tweeter (Brady, Wills, Jost, Tucker, & Van Bavel, 2017).

## Smartphone Addiction

### What makes phones addictive

Smartphones have a multitude of services and tools that may be used. When comparing which types of contents people get addicted to the most, SNS (Social network services), i.e. social media services like Facebook, Twitter and Snapchat, are more addictive than entertainment services and mobile games (Jeong, Kim, Yum, & Hwang, 2016). The larger the network size, for instance how many friends one has on Facebook, and the higher the intensity – the more addictive SNS become (Salehan & Negahban, 2013). Gender also have a mediating effect on smartphone addiction. Some researchers found that women are more dependent on their smartphones than men, and others have found that women have higher addiction rates for smartphones (K. E. Lee et al., 2016).

Smartphone addicts certainly use their phones for extensive amounts of time, but some studies have found that the frequency of the usage is more connected to addiction than the total amount of time spent on the phone (Lin et al., 2015). As described by Oulasvirta et al., smartphones have a considerable “habit-forming” potential, making people check their phones often during the day within a variety of locations and contexts (Oulasvirta et al., 2012). Making a habit of checking your phone everywhere can lead to dangerous situations, for instance while driving. The usage of phones while driving increases the risk of accidents (Klauer et al., 2014).

While there are numerous studies that have examined the relationships of smartphone addiction to different psychological traits, the keyword search conducted for this literature review hardly discovered any studies that examine the relationship between potentially addictive smartphone apps and concrete design techniques or methods. One exception was the study conducted by Oulasvirta et. al, that concluded that smartphone apps that emphasized habit-creation could increase the use rate of smartphones (Oulasvirta et al., 2012).

### Prevalence

The majority on the research on smartphone addiction focuses on how smartphone addiction affects users in different ways, and how different factors may lead to smartphone addiction. Different research papers use different ways to measure mobile addiction, and thus their findings might not be comparable. Factors like gender (Jeong et al., 2016; Park et al., 2013; Salehan & Negahban, 2013) also affect the addiction percentage. Some studies, found that around 40% of the respondents to be addicted to smartphones, including Lapointe et Al. (41%) and Lin et Al (39%) (Lapointe et al., 2013; Lin et al., 2015). Another study found that 53% of their respondents were at high risk for smartphone addiction (Samaha & Hawi, 2016). All these studies focused on university students. However, a Korean study focusing on elementary students classifies only 2.4% of their respondents as smartphone addicted (Kim, Nam, Oh, & Kang, 2016). The fact that studies used different ways of classifying mobile addiction might have caused this discrepancy. Many other studies do not select a certain point where they classify people as addicts (Demirci et al., 2015; Y.-K. Lee, Chang, Lin, & Cheng, 2014; Lin et al., 2014; Salehan & Negahban, 2013). Considering that the studies do not have a common definition of mobile addiction, it is difficult to determine how prevalent it is among the populace, and therefore it is also difficult to determine the effects that mobile addiction has on the population as a whole.

### Factors related to smartphone addiction

Elhai et. Al, who did a literature review of 24 peer-reviewed research papers, found that smartphone use have significant correlations with depression and anxiety, the former a somewhat stronger than the latter (Elhai, Dvorak, Levine, & Hall, 2017). In other words, people who are depressed and have anxiety, also tend to compulsively use their smartphones more. Many of the studies in the literature review of Elhai et. Al were correlational, making it difficult to infer the causality of this relationship – whether the psychopathological issues lead to smartphone addiction, or smartphone addiction leads to the psychopathological issues. Some of the studies examined the

relationships over time and could therefore infer causality. There were both studies that found that smartphone addiction lead to psychopathological issues, studies that had the opposite cause-effect relation, and furthermore studies that found the relationship to be like a “vicious cycle” of depressive symptoms leading to more smartphone use, which then lead to an increase in depressive symptoms (Elhai et al., 2017). Individual studies have found other factors that correlates to mobile addiction, and these include:

**An external locus of control.** People with an external locus of control generally thinks that their lives are governed by forced outside of their control. People who have an internal locus of control, believing that they are more in control of their actions, are generally less addicted to smartphones (Y.-K. Lee, Chang, Lin, & Cheng, 2014).

**Social interaction anxiety.** People with a higher social interaction anxiety tend to be more addicted to smartphones (Y.-K. Lee et al., 2014).

**Materialism.** People who are more materialistic tend to place more value in their smartphones and are generally more addicted to it (Y.-K. Lee et al., 2014).

**The need for touch.** People who are more dependent on the need for touch are generally more addicted to their phones (Y.-K. Lee et al., 2014).

**Stress.** Those who are more stressed are more likely to be addicted to smartphones (Jeong et al., 2016).

**Self-control.** Those with a lower degree of self-control are more likely to be addicted to smartphones (Jeong et al., 2016).

**Age.** Generally, the younger a person is the higher the risks are for the person to develop smartphone addiction. Especially young chil-

dren are vulnerable to smartphone addiction, because they lack the capability for evaluating the consequences of their own actions (Cho & Lee, 2017).

**Interruptions.** Smartphone use increases the amount of interruptions during work and study, decreasing productivity (Duke & Montag, 2017).

### Countermeasures

Smartphone addiction is a relatively new issue. While addiction psychology has covered related factors to smartphone addiction, it does not focus much on countermeasures to smartphone overuse and smartphone addiction. In recent years smartphone producers like Google and Apple have implemented “digital wellbeing” features to their operating systems (Google, 2019; Solon, 2018). These features track the number of “unlocks” each day, and the time spent on the smartphones’ applications. The user may also utilize self-imposed regulations for certain apps, and certain times through the day which the phone cannot be used. Smartphone addiction is related to time distortion – people who use smartphones the most underestimate how much time they spend on their phones (Lapointe et al., 2013; Lin et al., 2015). Thus, time measurement apps have the potential to make heavy users realize how much time they are spending on their phones.

In the recent years, various HCI studies have explored how non-use apps have the potential to help users limit their smartphone use (Hiniker, Hong, Kohno, & Kientz, 2016; Ko, Choi, Yatani, & Lee, 2016; Ko et al., 2015). The study of KO et al. also found that a social app, where users could compare their own time usage with their friends’, was more successful than a solitary app (Ko et al., 2015). Another study found that users would like to use time-measurement apps to reduce their own smartphone usage (Rooksby et al., 2016).

## Summary

Research on how smartphones affect its users is a relatively new field. It struggles with a lack of common methods and standards on how to interpret its results. This is especially true for determining the prevalence of smartphone addiction and its effects on people. Many studies have determined a correlation between various negative consequences and compulsive smartphone use, but few studies have confirmed a causal relationship using longitudinal studies. Nonetheless, the main body of research points to the fact that smartphone addiction exists, and that it can have various deleterious effects on humans, affecting mental health, work, and physical wellbeing.

It cannot be refuted that many studies have found some troubling discoveries concerning smartphones and how they affect people. This includes smartphones having negative consequences for our ability to connect with people, negative consequences for sleep and mental health, and potentially polarizing effects on public discourse. Unfortunately, there are not many studies that have investigated the effects of concrete design choices in apps and their relationship with addiction and other effects. This could benefit designers by showing what kind of features and techniques that should be avoided to not harm the users, and perhaps also bring to light features and techniques that are beneficial to the user.

part 4:

# Concept

This part of the master thesis covers the ideation process that eventually led to a critical game concept.

**Page 54**   **Idea generation**

**Page 56**   **Chosen solutions**

**Page 58**   **The Design Process**

**Page 60**   **Workshop**

**Page 64**   **Inspiration**

**Page 68**   **Hand Sketching**

**Page 70**   **Unity prototype**

**Page 72**   **Adobe XD prototype**

**Page 76**   **The Game Concept**

**Page 88**   **Further Development**

**Page 91**   **Outreach**

## Idea Generation

Following the insight phase, an idea generation took place to determine the way forward, where different ideas of both traditional and critical design were evaluated. One of the insights revealed in the insight phase was that television series like Black Mirror can be very effective in their criticism. Critical designers Dunne and Raby have also praised literary works like Margaret Atwoods' 2003 novel *Oryx and Crake*, they consider it as a gold standard for speculative fiction (Dunne & Raby, 2013, p. 78). However, I'm neither a novelist nor a filmmaker and would thus not be able to achieve similar results to these works. Other critical design solutions were more feasible, like for instance to design a critical social media app. This social media app would be developed with the following question in mind: What happens when one makes a social media service while completely disregarding human decency? This could result in a dystopian version of a smartphone app, which could provoke the viewer and make them reflect on the apps they use on their own smartphones. Though, it would be hard for a viewer to imagine the long term effects of using such an app. It is also unclear whether this would appeal to more than a particularly interested minority, i.e. those who are already invested in the debate about potentially addictive apps.

In the insight phase of this thesis it was revealed that designers could use a broader array of tools and methods to make sure that their designs do not lead to negative consequences for the users and society as a whole in the long run. There are already methods available for this, like the "Tarot cards of Tech" by the artefact group ("Tarot Cards of Tech," 2017), which encourages designers and creators to ask critical questions about their own products and solutions. While this a potentially viable solution, it would require additional insight into what tech designers are experiencing, insight that I do not have. As for the solutions that would help the user, many of them have potential, and they aren't bad ideas. However, they are only necessary because these apps are being made in the first place, and therefore it was considered more important to comment and criticize the addictive apps themselves, rather than designing solutions for diminishing their negative effects.

### Traditional design ideas

*For designers:*  
 Literature review on how smartphones effect their users  
 Website with info  
 Developing ethical design methods or toolboxes

*For Users*  
 Self-help app  
 Mobile free day  
 Mobile free zones  
 Developing more ethical, non-addictive smartphone services

### Critical design ideas

A dystopian social media app  
 Making a critical game  
 Film  
 Novella

## Chosen solutions

### Literature review

The insight phase revealed that some participants were unsure whether smartphones were really that detrimental to users, and if they were: how specifically. This points out the need for reliable information about the effects that smartphones have on users. Therefore, a literature review that synthesizes the research on smartphones and their effects could prove a valuable resource for designers. Furthermore, a source of reliable information could also be a tool for designers in ethical discussions. The work of gathering research-based sources had already started in the insight phase, so this would be a natural continuation of that work.

### A Critical Game

Educational researchers Shaffer et. al. Propose that games can support “learning by doing” by putting the player in a simulated world and guiding them through the challenges presented by the game (Shaffer, Squire, Halverson, & Gee, 2005). In their 2005 paper, they write: “We suggest that video games matter because they present players with simulated worlds — worlds that, if well constructed, are not just about facts or isolated skills but embody particular social practices. And we argue that video games thus make it possible for players to participate in valued communities of practice and so develop the ways of thinking that organize those practices.” (Shaffer et al., 2005). If a game can give a good overview of how the tech industry works, it could also illuminate the arguably manipulative and unethical conducts of this industry. With a game as a format, a complex system like the tech industry can be simplified to fit into the game mechanics. By using in-game goals and instructions the game can make the player follow the logic of the tech industry, that it is important to make the user spend a lot of time on their phones. The game can then show the player that these goals have negative consequences for the users and society. A game has the potential to deliver an engaging and rewarding experience, in a much higher degree than for instance making a Critical smartphone application. In a game setting which simulates the App design process, the player takes a more active role on deciding a course of action, which may help in getting the player to reflect on

their position as a designer (Ferri & Simulations, 2013). Developing a game is also achievable in a practical sense and can be done relatively incrementally. Most of the tech companies that make potentially addictive apps are based in the Silicon Valley, or other parts of the world. Thus, to influence the people that are making these apps, it is beneficial if the solution is not location-based, but can be shared and used freely online. An online game is a suitable format for meeting such requirements.

## The Design Process

The design process started with inspiration gathering by looking at relevant games and noting what makes them work. A more detailed review of this can be found below. After the inspiration gathering, a phase of hand sketching followed. This was important to get a starting point for a digital prototype, and to figure out what variables were essential to include in the game.

After the hand sketching the development continued in Unity. The goal was to create a playable prototype of the game. This was considered important, because playtesting is a good way to get feedback about the game concept. It is also essential for creating a balanced game, that is not too difficult nor too easy for the player. The development work proved more time-consuming than anticipated, but nevertheless a prototype was developed to gather some initial insights through some simple user tests.

As the Unity prototype proved too time-consuming to develop, the work continued with a prototype using Adobe XD. While such a prototype could not mimic a true game experience, the freedom of not having to code everything meant that more work could be done on the design work itself, leading to a prototype that could better show the concept of the game.



## Workshop

The interviews with the critical designers revealed that it can be difficult to be provocative enough working alone on a critical design project. To counteract this, an idea generation workshop was held with four participants, all design students. It was ideal that the participants had this background, since the main goal of the workshop was to generate content ideas for the game. A secondary goal was to discuss the game concept itself and how to adapt it to the target group. A tertiary goal was to gain inspiration for the visual elements of the game, but unfortunately there was not enough time for this.

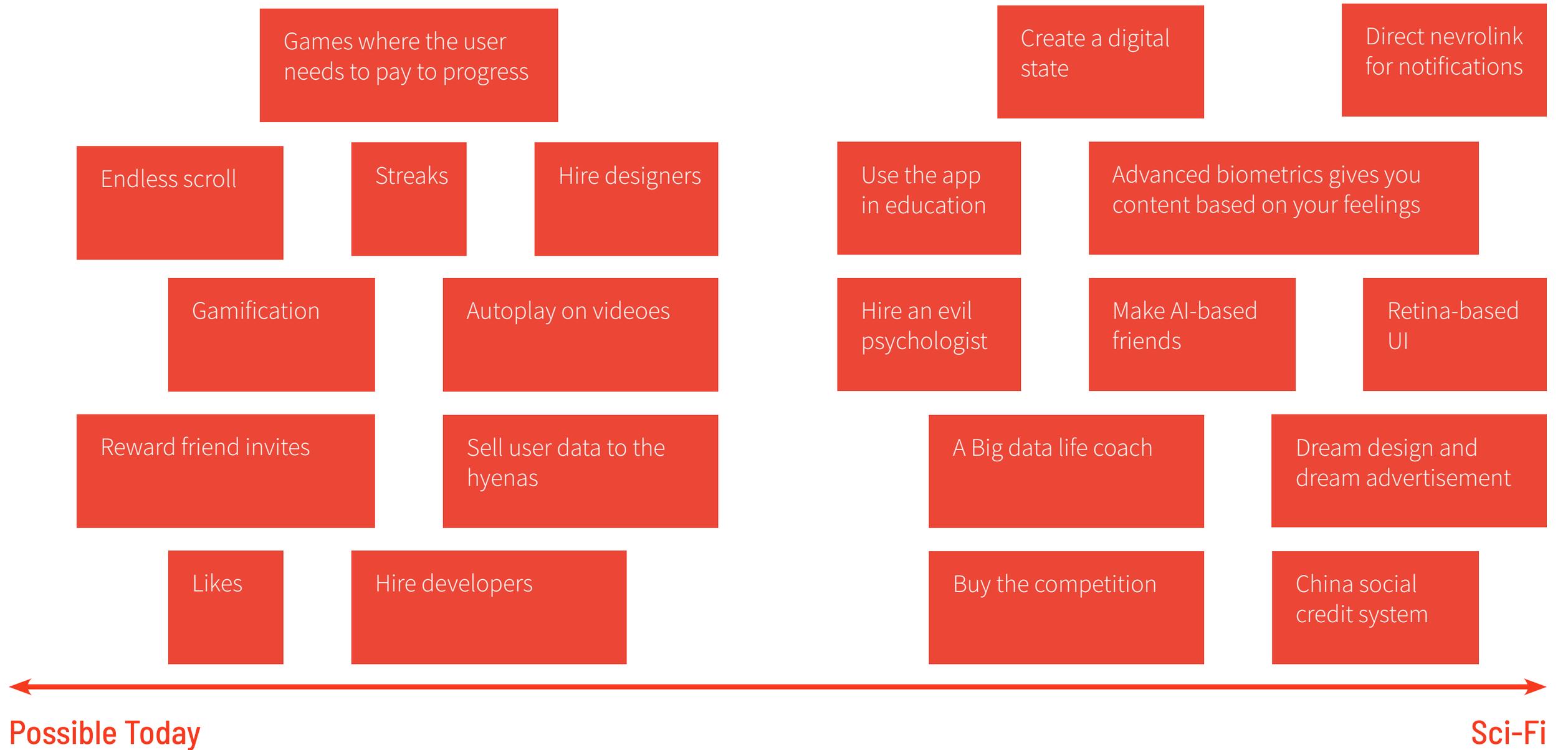
The workshop contained a warmup, an individual session with writing ideas for features, presentation of the features and marking the ideas on a timeline and a discussion regarding the concept itself. Most of the time was allotted to the feature idea generation, and the presentation of these. Some of the ideas are shown on page 62-63, sorted from the categories “Possible today” to “Sci-fi”.

During the discussion of the concept, some of the participants found the game approach appealing. Others would probably like other approaches more and advised that I should explore other formats as well. For instance, one could follow the history and development of a fictional social media app through a blog or similar means. The participants preferred the concrete and realistic features better than the more speculative and Science-fiction-like features. The latter have a higher potential for “shock value” and are more provocative, but they lack some of the reality that more grounded features have. It may also be a good idea to clearly label what is based on speculation and what is based on real-life observations that are implemented today. In the game, there should be some “ethically correct” choices that will give you a negative impact in the game. There also needs to be a decision towards the morality and the message of the game. Should the message be that social media apps and the business model they adhere to are inherently bad? Or should the message be that emphasizing a more “humane” approach will make the company flourish in the long run? It is also important to not “moralize” the player in a too forward way, as this might work against the games’ intention.



From the idea generation workshop. The participants wrote down ideas individually before presenting them on a scale of “possible today” to “Sci-Fi”.

A selection of the ideas made in the workshop



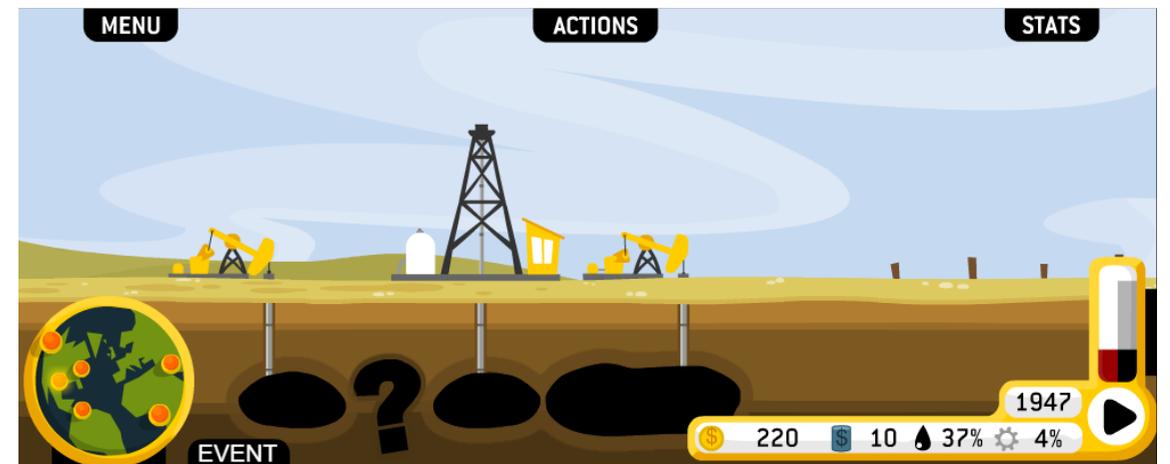
## Inspiration

The game developing project la Molleindustria is one of the most important inspiration sources for this project. The company makes radical and critical games that criticize a variety of different topics – most notably capitalist and consumer culture. Following the release of the project in 2003 Molleindustria released a Manifesto, where the groups’ mission was characterized as following: “Molleindustria advocates for the independence of games from the market’s domain and its radical transformation in media objects able to criticize the status quo” (Pedercini, 2003). The games are mostly browser- or app based casual games with a short playtime.

Oiligarchy is a browser game where the player controls the oil industry from the 50’s and following years. The objective of the player is to get as much profit as possible, at all costs, primarily by extracting oil around the world. By following the instructions of the game, the player will experience that sooner or later the oil resources will be depleted, and society reaches a crisis because it has become too dependent on this oil. Molleindustria delivers a political message about the oil industry, and making the player realize this through gameplay is a powerful rhetoric tool, which could not have been reproduced by publishing the same material in a more straightforward written format (Ferri & Simulations, 2013).

Molleindustria released a game about smartphones, A Phone Story, in 2011. This game critiques the production process of smartphones. The game consists of four mini-games, while a narrator explains why different parts of the production chain are unethical. The game reached international headlines when Apple banned it from its’ App store (Dredge, 2011). This shows that relatively simple games have the potential to reach a large audience.

Another important inspiration has been the 2012 game Plague Inc. The premise of the game is that the player attempts to infect and kill the entire world population with a disease. The player receives points for infecting more people and can use these points to evolve the disease into a better, more lethal version. The University of Derby, UK, have used the game as a method to teach students how pandemic diseases spread (Robinson, Turner, & Sweet, 2018). This demonstrates how relatively simple game mechanics can be used to illustrate a more complex system.



The Molleindustria game "Oiligarchy" lets the player step into as the role as an oil baron, extracting petroleum and wrecking environmental havoc around the globe (retrieved from: <http://www.molleindustria.org/en/oiligarchy/>)



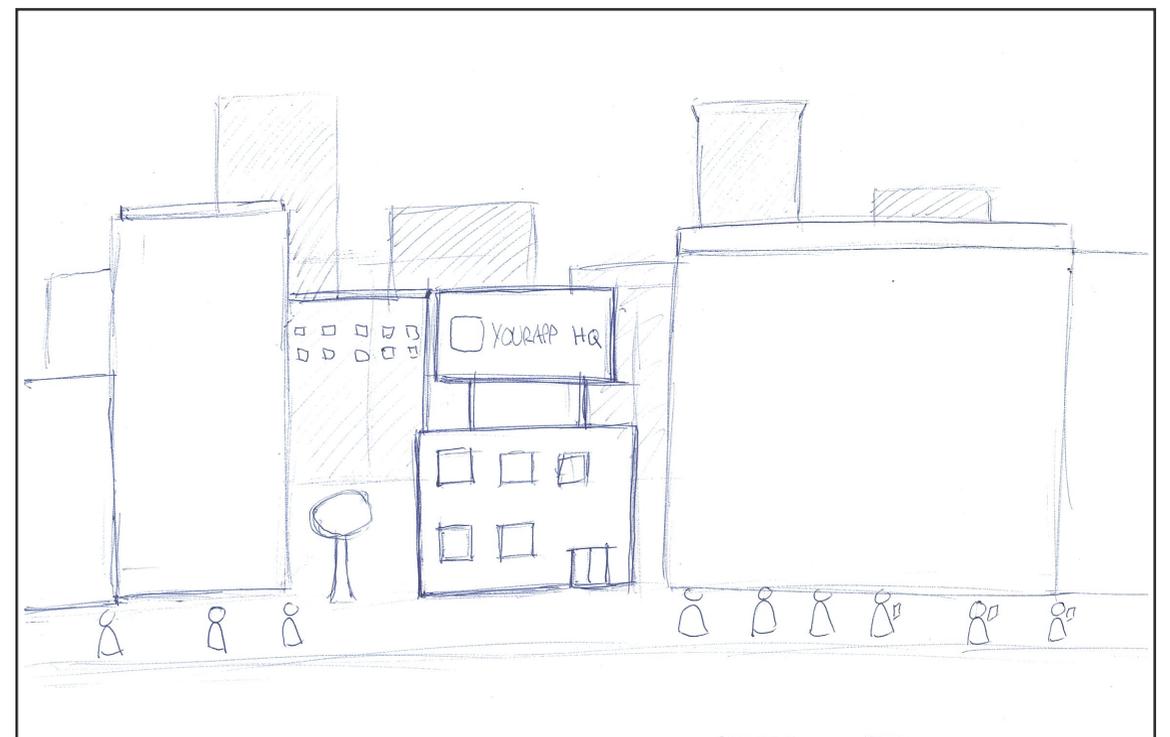
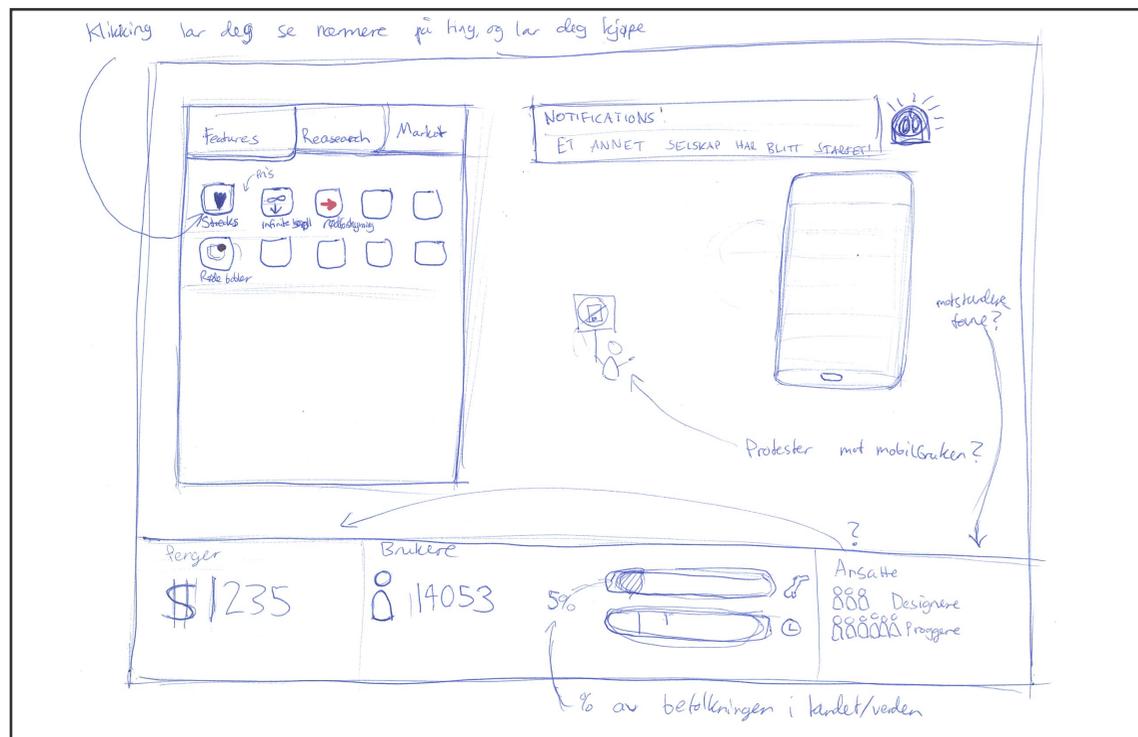
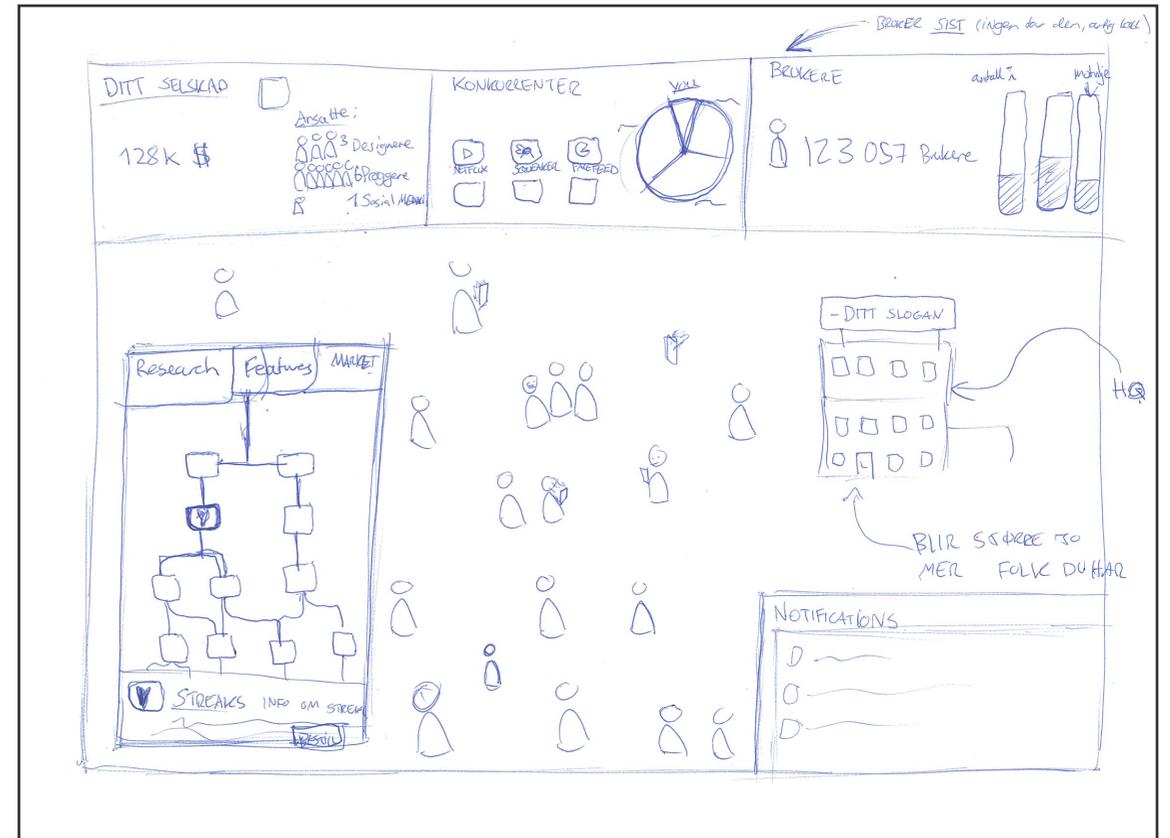
In the game "Plague Inc" your goal is to infect the world with a deadly disease. (retrieved from: <https://www.ndemiccreations.com/en/25-plague-inc-evolved>)



In the Molleindustria game "Phone Story" you play four minigames that criticize the phone production cycle. It takes up issues like child labour mining metals in Congo, suicidal workers in South East Asia and hazardous recycling of materials. (retrieved from: <https://www.wired.com/2011/09/phone-story/>)

# Hand Sketching

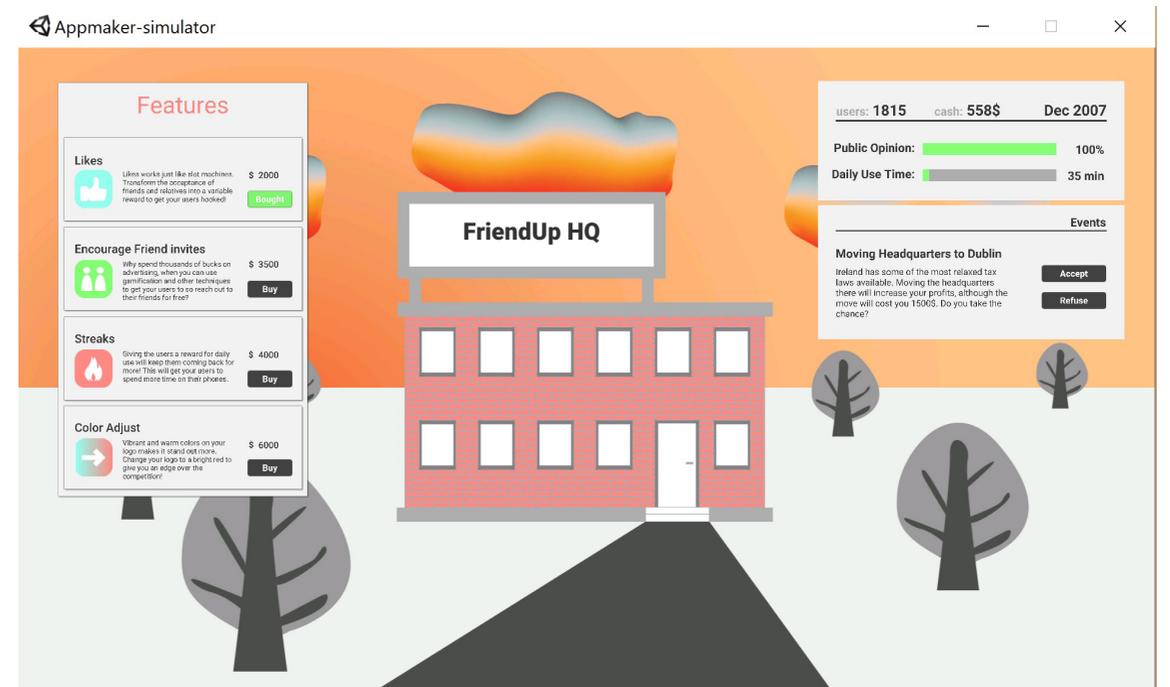
The main purpose of the sketching was to concretize the idea of the game concept, and to develop the content of the game. It was also an arena to explore different ways to visualize the world presented by the game. The sketches presented an overview of possible content and mechanics to include in the game, and this made it easier to determine which content and mechanics that should be a part of the minimum viable product of the next prototype.



# Unity Prototype

The game development engine Unity afforded the possibility to create a playable prototype. This would benefit the project, because a playable prototype would allow for a better emulation of the game experience. The development of the unity prototype proved to be relatively time-consuming, as all the behaviours and in-game variables needed to be scripted. However, the development still resulted in a playable prototype, which could be tested by users.

User tests with four different test users revealed led to several insights. The Unity prototype had four features that could be developed, but they were not engaging enough to interact with. All of the features also provided only benefits for the user, and the test users meant wanted consequences for the players' poor decision making, such as some features being bad for the player, or that developing them in the wrong order should lead to sub-optimal results. The purpose of the game should also be clearer, as some test users failed to see the message of the game. These test users also led to more ideas on how to expand the feature system, for instance that there should be a visualization of the features, and explanations of how they "hook" the users.



A screenshot from the Unity Prototype

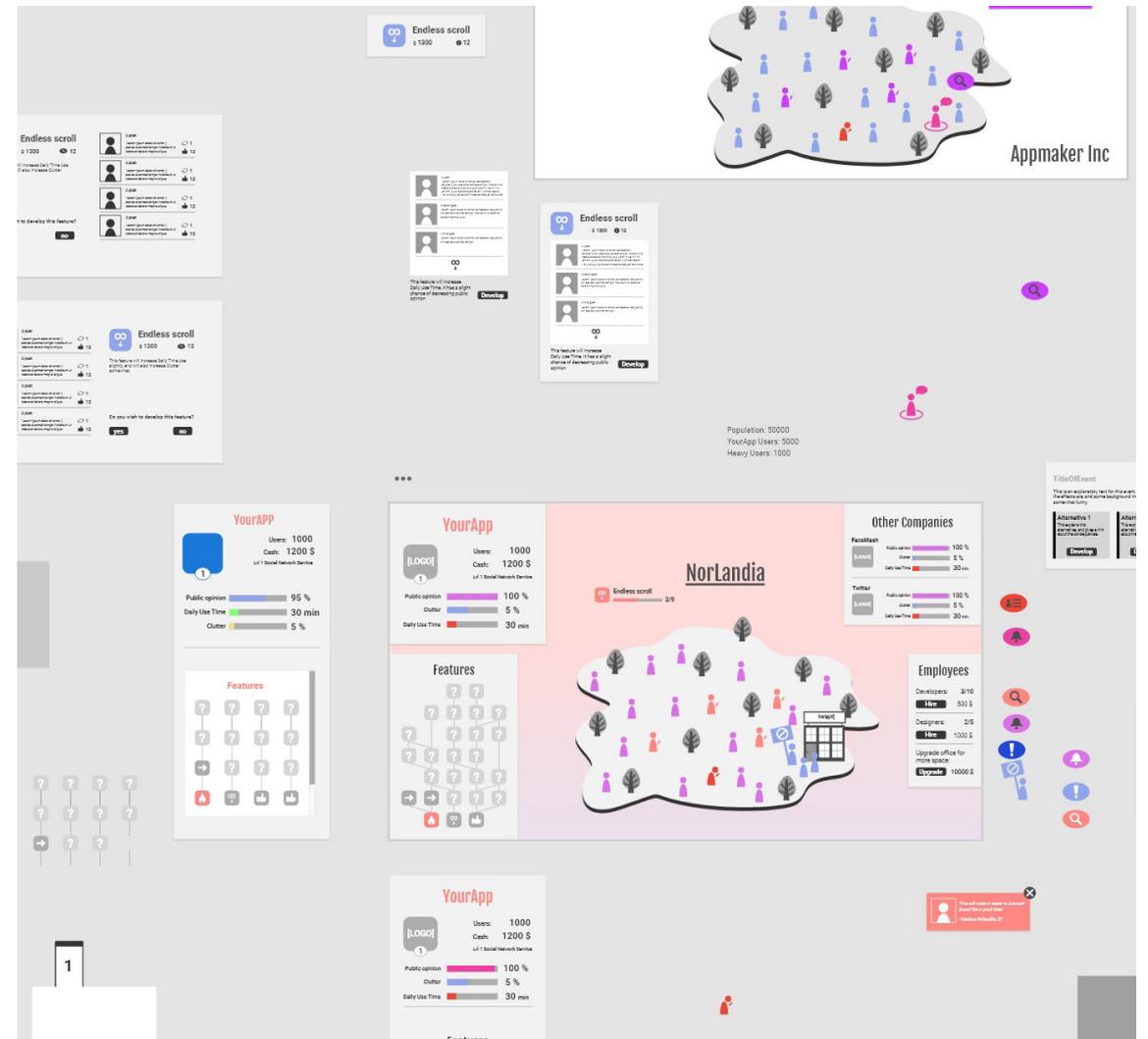
# Adobe XD Prototype

To better visualize the game concept, a decision was made to design a new prototype in Adobe XD. A prototype like this does not allow for the inclusion of sound, or to script complex mechanics like in Unity. However, Adobe XD is much more suitable for designing visual prototypes that allow for limited interaction. It also has the functionality to incorporate simple animations

The prototype was designed like a tutorial. The player is guided through the most important game mechanics. The functionality of Adobe XD restricted the tutorial to being text-based, and these tutorials can feel overwhelming to players. However, the prototype is designed to keep the amount of text to a minimum before the player takes the next step in the tutorial. It also aims to not present more than one game concept at a time.

The entire prototype can be explored using the link provided:

<https://xd.adobe.com/view/358cb233-70d6-46f0-76b1-7abd91f4fa41-43b-d/?fullscreen>



A screenshot from the development of the prototype in Adobe XD.

## FriendUp



Users: 1250

Cash: 15 \$

Public opinion  50 %

Daily Use Time  30 min

## Features

Gamify friend invites   Color adjust

Cost: 10 \$

Cost: 11 \$

Streaks 

Cost: 5\$

Endless Scroll 

Cost: 5\$

Likes 

Cost: 7\$

# Socialia

jan-2007

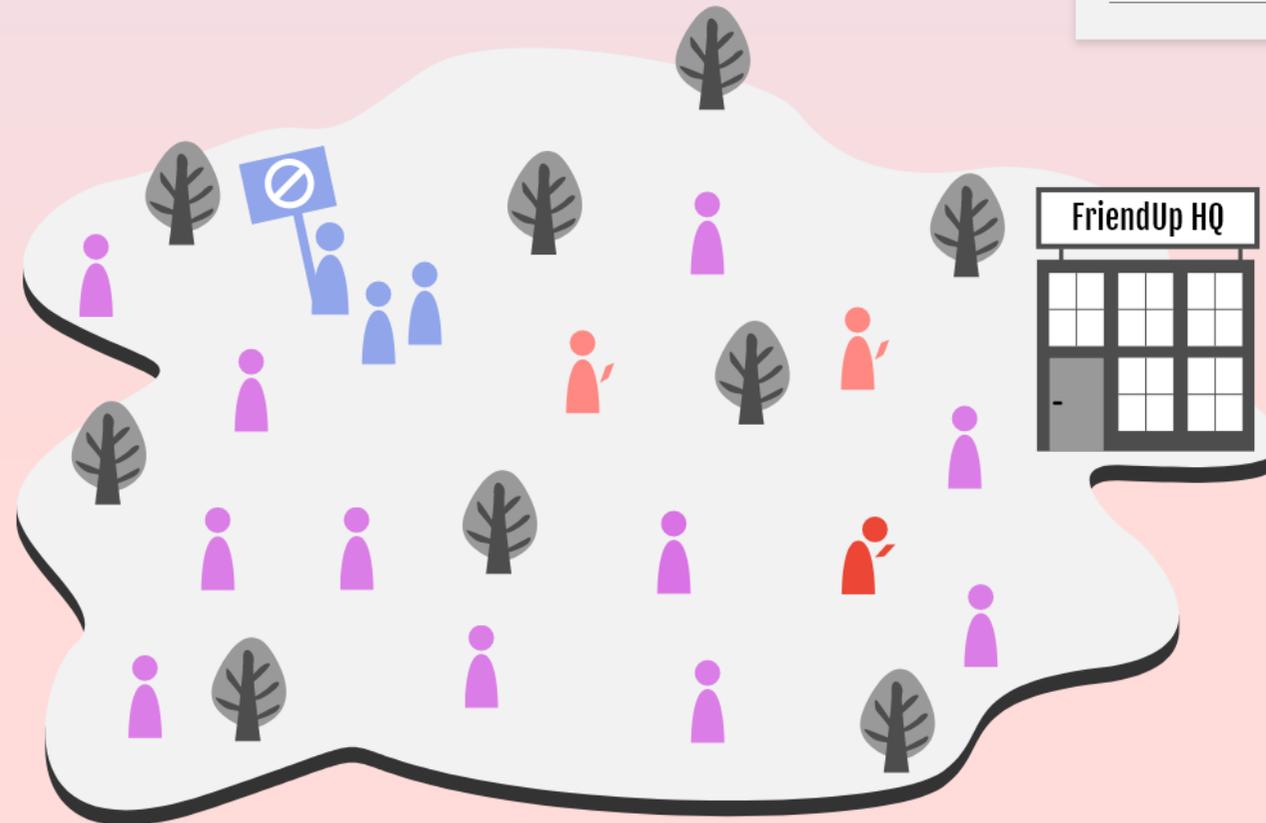
## Other Companies

FaceMash



Public opinion  90 %

Daily Use Time  60 min



## Employees

Developers: 3/10

**Hire** 5 \$

Designers: 2/5

**Hire** 7 \$

Upgrade office for more space:

**Upgrade** 30 \$

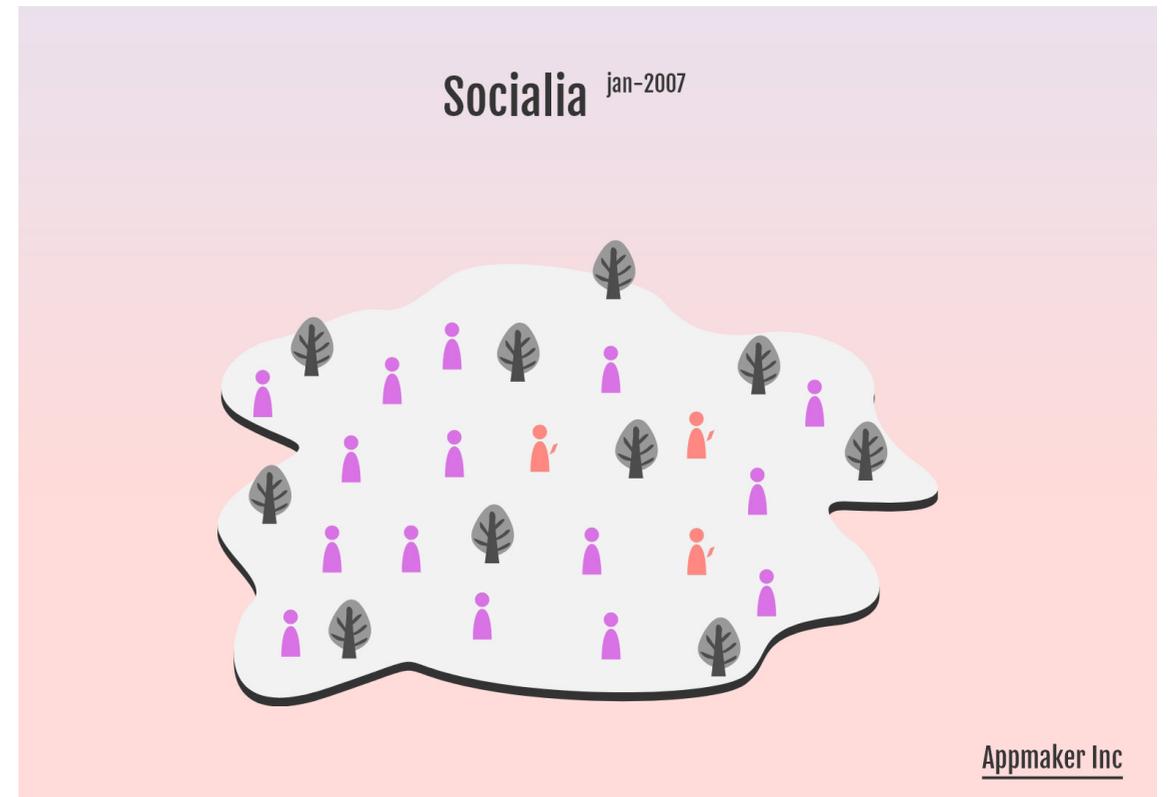
Appmaker Inc

A screenshot from the finished prototype

## The Game Concept

In Appmaker Inc. the player takes the role as a social media entrepreneur and develops an app that will capture the hearts and minds of the users. To achieve this, the player needs to attract more users, improve their app with new features, and respond diligently to events that transpire. Mastering the game requires the player to figure out the best strategy and managing their resources optimally. The game should provide a variety of content to keep the player interested, but should refrain from overdoing this to not have a too high threshold for players to pick it up. The game should be casual, with no need for lengthy instructions .

The game takes place in the fictional country of Socialia. This is a world populated by people, and the player is instructed to recruit as many of them as possible as users to their app. The game starts in 2007, the same year that the Iphone was released. This marked the beginning of a revolution where smartphones soon become ubiquitous in our society (Goode, 2018), and is therefore a suitable starting point for the games' timeline. As the months and years pass the game will mirror important happenings and trends that have happened in the real world.



The fictional world of Socialia and its people.

### The Target Group

At the start of this master thesis, the target group was solely designers. In the interviews for this thesis, the interview subjects agreed that the responsibility for addictive apps lies between the user, the designer, and the company itself with its other employees. It therefore seemed unfitting to make a game that solely focuses on the role of the designer. Thus, the main target group of the game will be designers, developers, entrepreneurs and other tech industry professionals. It is important that the game can reach out to these groups, because they are the ones who are taking the design decisions when creating addictive smartphone services. The game presents these professions as “the bad guys”, and this is meant to provoke a reaction from them. A secondary target group is smartphone users. A message for them is that the apps they might be addicted to are made specifically for that purpose. Hopefully, this will lead to demands from the public that the tech industry stops making services that first and foremost tries to make people spend as much time as possible. This might in turn influence the tech industry to make services that reflects those demands.

Video games are most popular amongst youth. However, they are also familiar with older audiences (Schiro, 2018). Albeit, some people might have preconceptions about video games as being a medium solely used for entertainment (Shaffer et al., 2005). A possible solution to reach out to a broader audience is to present the game through another medium, such as a presentation or a workshop.

The game is developed with a tablet view in mind. The tablet has the advantage of a large screen size, permitting more information to be displayed. It also has the advantages of the touch screen. However, the game does not rely on a specific format. With some adjustments, the game could also be played on a smartphone or a pc.

### Features

The main way of progressing in the game is to enhance your social media app with features. These features reflect real life measures social media services take to “hook” their users into spending as much time on the app as possible or invite as many friends to use the app as possible. Before deciding to develop the feature, the player can watch a video describing how the feature works, and how it will affect the users. Thus, players can learn about the different measures while progressing through the game. It might be beneficial for the users to recognize these features when they see them in the apps they use in their daily lives, but also for designers so they can see the effects of these features.

Upgrading a feature will give you access to more expensive, but also more powerful features. The more powerful features may also require the player to hire a certain number of designers and developers. This reaffirms that these professionals are essential to develop the social media service to hook its users. How the player implements new features has a great strategic impact in the game. If the player installs too many controversial features that lowers the public opinion too fast, the company might face more opposition than it is equipped to handle. In addition, there will be several “bad features” available, that are ineffective or will in some way hurt the company. Examples of a “bad feature” might for instance be Parental Control settings for the app, for making sure that children who use the app don’t overuse it. This will make the users spend less time on the app, and thus it is a bad business move to install such a feature. The player needs to figure out which features might hurt the company, and which features might help it.

**Possible features:**

**Endless scroll.** When a service has endless scroll, new content automatically loads when the user scrolls down the page, without giving them any visual cues to determine how much content they have consumed. This takes advantage of the fact that humans are bad at determining how much time they spend doing something when they don't have any reference points to go by (Harris, 2018).

**Autoplay.** Autoplaying videos follow the same logic as Endless Scroll. When a new video starts playing automatically the previous video is finished, the viewer does not have to make a conscious choice to watch another. According to Nir Eyal, if you wish to create habit-forming products it's important to make the actions required as easy to perform as possible, preferably without the need for conscious thought (Eyal, 2014, p. 61).

**Likes.** Likes represents a powerful tool for hooking users – variable reward. When users upload content, they get an uncertain amount of likes and reactions from their friends. The excitement of whether they get many likes or not makes the user come back from more again and again (Eyal, 2014, p. 102).

**Change the logo colour.** In later years, many apps and services like Airbnb, Instagram, YouTube and Google have made their logos brighter and redder in colour. The reason is that the human eye gravitates more towards bright and red colours, and this influences users subconsciously into pressing those logos rather than others while using their smartphones (Vox, 2018).

**Streaks.** Popularized by Snapchat, this feature gives the users a reward for sending snaps to each other daily. The users can see how many days they have kept up the streak, and if they fail to send a snap one day the

streak is lost. Users will go to great lengths to keep this from happening (Støstad, 2017). The reason is that people irrationally value things they have put effort into making, a cognitive bias known as the “IKEA effect”. The name derives from customers of the Swedish furniture producer, who values their products more because they have put effort into assembling the products themselves (Eyal, 2014, pp. 136-138).

**Algorithms.** Major social networks like Facebook use algorithms to determine what kinds of content to promote to its users. According to Tristan Harris, these algorithms favour content that keeps the users engaged for a longer time on the service. Because people engage more with controversial and sensationalist content, that type of content ends up being recommended to users (Harris, 2018). Such algorithms direct users searching for the word “Vaccine” to Anti-Vaccine conspiracy groups on Facebook, and Anti-Vaccine conspiracy videos on YouTube (Wong, 2019).

**Gamify friend invites.** To get more users to the app, the player can utilize a range of gamification techniques to incentivize inviting friends. The app might for instance give the user access to additional functionality in the app if they invite a certain number of friends to try the app.

### User involvement

Users will sometimes leave bubbles of “User Data”, which the player can harvest for in-game money. When developing features, the player needs to do “User research” and talk to different users about their experiences with the app. Here the player learns about how they feel about the app, and how it affects them. At the start of the game, when the app has a low Daily Use Time, the users will often respond in a positive manner. But when the player has accumulated a sufficiently high Daily Use Time, users will start telling you about some of the negative effects that smart phone use have on their every-day lives. The player will hear about some of the consequences described in the literature review, such as addiction problems, loss of sleep and depression. The users also might mention how it is harder to connect to other people when they spend all their time on their phones, and how a “Instagram reality” puts pressure on them to appear perfect to their peers. If there is a low public opinion, the player might have to deal with protests, or worse, attempts by the government to restrict the leeway for the company to do as they wish. The player will need to stop these attempts by for instance chasing away the protesters and bribing the elected officials if they wish to keep their company strong. The ultimate consequence of having a low public opinion will be that the government breaks up the company or forbids the app entirely.



*"Endless Scroll? That would make the feed less of a hassle to read, sounds good!"*

*- Markus Polewille, 37*



*"My girlfriend says i have become addicted, but i don't think i have a problem..."*

*- Joe Harper, 21*

The feedback from the users will change as they start using your app more

### Events

Events are situations which the player needs to react to in the world. The situation requires the player to take a choice, challenging them to find the optimal action. In a larger context, the events show the player some of the macro-effects of a society “hooked” on digital applications. Such effects might include the polarizing effects of tweets on social media (Brady et al., 2017), how fake news spread through social media have affected democratic elections (A. Ward, 2018), or how social media companies have violated data privacy by spreading user data to third party companies without the consent of the users (Carole Cadwalladr, 2018). The event system can also be a way to present new research on the negative effects on smartphone addiction, which will make the Public Opinion drop.

### Competition and other companies

After a while, the player might get competition from other companies. These new companies will give the player competition, and the average time might be lowered because of this. If the player doesn't step up their game and improve their app fast enough, this effect might increase, and some users might stop using the players app completely. The user will have different ways of combating this. The safer choice is to differentiate their service by adding types of features that the competition does not have, and thus try to not compete directly. Alternatively, the player might try to compete directly and use the same kinds of features, but doing it better. This is risky, but the player might end up stealing a lot of the users of the competition. Finally, the player may opt to buy out the competition, but this is a very costly move. The competition aspect will show what Tristan Harris refers to as the “race for attention”. There is a limited amount of attention, and if one company does not try to “take their piece” another company will swoop in and take this for themselves.

## Oxford AnalytiCo



The big data company “Oxford AnalytiCo” wants access to the user data of your customers, and they will pay 10\$ for it. Do you agree?

**Yes**

The company always needs more money, why refuse?

**No**

This doesn't seem right.

The events mirror real life events, like for instance the Cambridge Analytica-scandal following the american presidential election of 2016.

### The Ending

The game ends with two different scenarios. In the first scenario, the players' app cannot compete with other companies, loses too many users, and eventually gets bought out by a rival company. This will happen if the player has not followed a sufficiently aggressive approach and made their app addictive and time-consuming enough. In the other scenario, the players' company manages to keep up with the other companies by taking controversial choices and installing questionable features. However, this will inevitably leave the user with a too low Public Opinion, and as a result the app gets forbidden by the government.

Thus, the game ends with the inevitable failure of the player. This is necessary to emphasise the message of the game, which is that the business model of time-consuming apps is unsustainable in the long run. At the end of the game, the player should not have the impression that the social media industry is inherently evil. Rather, they should have the impression that this is an industry that values short term profits while disregarding the long-term effects of the products they are making, an ethos some have termed "run fast and break things" (Girling, 2019). While playing the game, the player will hopefully see this industry in a new light, and by criticising the different methods and strategies used, the player might recognize these when they encounter them in real life. Professionals might refrain from using their skills to draw in people in time-consuming apps that does not really help the users fulfil their overarching goals, and smartphone users might realize when they are being manipulated into using a service more than they really need.

### Graphics and visuals

The graphic style takes inspiration from the clean, minimalistic look seen in a multitude of today's social media apps. The colour scheme is contained to grayscale colours and colours ranging between red and blue. The app has an internal logic that red colours signify advantageous effects to the player, while blue colours signify things that hinder the player. Purple signifies something that can go either way. The fact that red equals good is opposite to the conventional logic of video games. However, this is done intentionally as a comment on the tendency of the tech industry to use red and bright colours to attract the attention of the users through notification bubbles and bright logos (Harris, 2018). It also signifies that the player takes the role of the "villain" in this game, and not the hero.

## Further Development

### Game development and Business model

Appmaker Inc should be a non-profit game. This will make sure that there are no paywalls that can hinder the spread of the game. It will also hinder speculations about whether the “real” motive for making the game is for profit. This puts restrictions on the development process, removing the possibility to develop the game using a staff of paid professionals. However, the game is a relatively simple one, and therefore does not require a large staff of people to develop.

### Graphics and visuals

While the prototype has a static image, the final concept would have a more active and exciting background. The passing time could be visualized by seasons changing and the people on the island should interact more with each other. The game should visualize the improvements of the application in a satisfying manner. This can be done in many ways, for instance by making a visual representation of the social media app and showing how the app gets better when the player spends time improving it. Sound effects and other visual effects, like screen shake, can also aid with this. Effects like this is sometimes referred to as “Juice” and is important to make the player feel like their actions matter. There are a lot of technical improvements that the final game concept would have. That includes a soundtrack, and sound effects for the different actions the player takes. The Game should have systems for saving and loading, controlling the sound level, and pausing the game, etc.

Since the game is meant to make the player reflect on their actions and the social media and smartphone industry, different measures could encourage this directly in the game. This could be achieved through a more active narrator, that asks questions directly to the users. It could also be made clearer that designers are the target group. This can be accomplished by making the interface of the game look more familiar to designers, taking inspirations from programs like Sketch or the Adobe package. To make the player reflect, the game could open with a set of questions before the game,

making the player take a stance on different questions. However, these measures should be implemented with a certain care. They might come off as preachy, telling the player how the smartphone industry is rather than showing them

### Social media as the topic

The game focuses on social media as a source of smartphone addiction, even though other types of apps also contribute to this, such as entertainment services like Netflix and YouTube, and games themselves may also be a source of addiction. However, research shows that social media is potentially more addictive than entertainment or games (Jeong et al., 2016). However, many of these types of services overlap with each other. YouTube have its own community and support for social functions, and Facebook works like a Hub for both games and videos. A more developed version of the game might reflect this, or have its own game modes for entertainment services and games.

### A more complex game

In the prototype version of the game, the feature system is relatively simple. This way, players aren’t dissuaded by an overly complex system which requires a thorough introduction to learn. However, a more complex model has the potential for both delivering a more engaging and strategically rich game experience, but it also has the potential for reflecting real life in a better way. A more complex feature model might introduce a more life-like version of the design process required to develop the feature, for instance.

### A more casual game

Most of the ideas explored in this section aim to make the game experience richer and more rewarding, motivating the player by giving them new content to explore and a gradually more complex world to master. However, some players might be dissuaded by a seemingly complex game. If the threshold for playing is too high for anyone but a “hardcore” minority, the game will fail at its mission. Therefore, an alternative approach would

be to make a much more casual game, working almost like an interactive storytelling experience. The player would be guided through a creation of a social media app, and along the way would make some choices of the apps' development. Along the way a narrator would explain the choices of the player, and how they affect the world. The player's choices would be limited, and the player would not need to follow a range of different variables like the number of users, Daily Use Time, and money. Thus, the game would not demand as much involvement or attention. A casual game like this might, ironically, be suited better for the smartphone as a platform than a pc version. However, this is also a fact that can be utilized as a narrative device. Phone story, from Molleindustria, is an example of this, as the narrator specifically points out that the phone in the player's hand is a part of the problems it aims to critique (Ferri & Simulations, 2013).

#### User testing

An important step in the further development would be to make the game into a playable prototype and present it to the target audience. This could lead to several insights. Firstly, does a game like Appmaker Inc have the potential to influence designers and other tech professionals? Should the game be more casual, or would a more complex and challenging game work better? In addition to overarching questions such as mentioned above, user testing would also be an ideal way to make sure that the game is user-friendly and that the gameplay and metaphors used are easy to understand.

## Outreach

#### As a standalone game

While designing the game is important, it is equally important to have a plan on how the game should be distributed to the audience. By uploading the game online, players will have the opportunity to play it and explore it individually. If the game is enjoyable and thought-provoking, players might share it with their friends, and the game will reach a bigger audience. However, to get enough attention, the uploader should also contact relevant information outlets to spread the game further. All attention will benefit the cause, but the primary target group is designers and other tech professionals, so the focus should be to reach out to outlets that are related to these fields. These might include blogs, podcasts, YouTube-accounts, magazines and other content tailored to or popular amongst a design- and tech audience. To spread the game with the help of the media is also possible. When Apple banished the Molleindustria game Phone Story from the App store the game got the attention of major international press institutions, such as English newspaper the Guardian (Dredge, 2011). Likewise, a publication in a national and international newspaper might attract more players and reach a bigger audience.

The website where the game is uploaded should also have the findings from the literature review available for the player. Thus, the user knows the source material for the game, and can fact check the claims that are made. This would increase the credibility of the game and enhance the message. This is also a way to reach viewers who would normally approve of game as an information medium, but might be happy to read it in a more traditional format.

### As a basis for discussion

While the game should stand on its own as a critical design artefact, it can also be used as a basis for a presentation within a meetup or a convention. The interviews with designers in the insight phase of the project revealed that conventions and discussions about design ethics are on the rise. The design milieu is a home for debates and discussions of different kind. Here in Trondheim, for instance, both IXDA and companies like Eggs have monthly events with presentations. After a presentation of the game, a discussion could follow about what the design- and tech industry should do about the problems with addictive smartphone apps.

In a meetup or workshop setting the game could also function as a competition. If the game was developed as a multiplayer game, different players could all compete to make their own social media company, and fight over the attention of the same users. The game would be designed so that the most “ruthless” players, who manage to keep a reasonable public image, will win over the others. After the competition the players meet for a discussion. They talk about which strategies were the most successful in the game, and how that relates to the real-life social media industry. Furthermore, the players could discuss their own roles as designers in this industry, and what kind of powers and responsibilities they would have as members of it. The game, and locale, should be designed so that an audience can have an enjoyable experience watching the game. Maybe they can even have a minor role as a “user” in the game. In this case, the user has a simulated daily life, where more and more of their free time is automatically delegated to spending time on their phones as the social media apps made by the players are getting better. A competitive game will have different feel than a single player one. A possible outcome is that the players will be less interested in exploring the world and reading up on the different features, and that they will be more interested in competing and beating their opponents. This might decrease the game’s value as an immersive world in favour of being a competitive platform. At the same time, it will also emphasize how the “attention economy” works and enable the discussion.

This game could be used as part of a curriculum in a design ethics subject taught at universities. It could be played solitarily, or as a part of a competition, as described above. After playing the game, the students could have a discussion in common. Design students, as young people, might be more accepting of a game as a concept than older generations, and might also be familiar with game-based education beforehand.

part 5:

# Final Thoughts

The final part of the thesis will cover the discussion and conclusion, along with references and attachments.

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**Page 100**   **Conclusion**

**Page 102**   **References**

**Page 111**   **Photo References**

## Discussion

### The game

Appmaker Inc takes a critical view of smartphones and social media. But social media have also proved useful for many people, and many get something out of it. Perhaps it would be fairer to focus a bit on the positive sides about social media as well. This would decrease the risk of the player distrusting the game, because it feels overtly biased. On the other hand, the literature review showed that smartphones in general are related to many negative effects for its users, while there is inadequate research indicating that smartphone use have positive effects on its users. Thus, focusing too much on the upsides of smartphone use and social media might indicate a false equivalency between the positives and the negatives of smartphone use to the player. This false equivalency may in turn make the message of the game less clear than it should be. Albeit, while it is important for the game to have a clear message, and the game has a critical view on games, it should not mislead the user into thinking that social media apps are worse than they really are. If the player interprets the game as overtly untrue, the player might reject the message of the game entirely.

While Appmaker Inc argues that the tech industry and their employees should take more responsibility for potentially addictive apps, the game does not claim that the users have no responsibility for their own actions. This would be counterproductive, as research shows that people with an external locus of control are more likely to become addicted to smartphones (Y.-K. Lee et al., 2014). In other words, if you convince people that they spend so much time on their smartphones solely because they were designed that way, they are more likely to become addicted to them. Thus, it is important that the Appmaker Inc is clear that both the designs of the app and the users themselves are responsible for compulsive smartphone usage.

### Time use

Critics of games might argue that games are timewasters in their own right, and that making a game against time-wasting smartphones is counter-productive. An important point in this context is that the business model of time-consuming apps encourages using the apps as much as possible, preferably incorporating it as a daily habit for the user. Appmaker Inc, on the other hand, is designed to be played once, which should not take more than 30 minutes. The purpose for why the user should give up their time is also different between the two. The ultimate goal of the social media companies is to profit of the time spent by the users, while the ultimate goal of Appmaker Inc is to enact change on a worrying trend in our society.

### Causal relationships

Much of the smartphone literature cannot with certainty point out causal relationships between compulsive smartphone use and its various correlated deleterious effects, like depression, anxiety, stress, and others. In other words, the research may show that there is a connection between for instance depression and smartphone addiction, but few studies have with certainty found out if people get depressed because they are addicted to smartphones, if they get addicted to smartphones because they are depressed, or if both are true. However, both relationships can potentially harm the user. If for instance a depressed user is addicted to their smartphone, it is hard to imagine how constant use of social media, where the user is constantly comparing themselves with picture-perfect versions of others, will better their situation in any degree. Moreover, even if it turns out that it is solely people with depression, anxiety, stress and other such psychological traits that tend to become addicted to smartphones, those people must still live in a world where smartphones have become ubiquitous. If designers and companies release apps that are potentially addictive, they should then do so with the knowledge that a sizeable amount of people are vulnerable of being addicted to them.

### Relevance to the design world

The game Appmaker Inc is a contribution to an ongoing debate about interaction design, and the responsibilities of designers. It argues that designers need to take a higher degree of responsibility of their designs and take greater insurances that their products do not end up hurting the user. The literature review is a source of information for designers and others to learn about the smartphone research field, and how people are affected by smartphone use.

There are no ethical guidelines for designers, as there are for doctors, but perhaps there should be? We shape the daily lives of millions of people, and therefore hold tremendous power over them. Designers are powerful, and their ability to affect millions of people through their work should not be underestimated. Designers and interaction designers also have a personal reason to refute addictive UX. If the profession gets a reputation for tricking people into doing things against their best interest, design might lose credibility to be a viable solution to the many great problems the world is currently facing. To increase their credibility and the credibility of design as a discipline, designers can be more vocal in their opposition to addictive UX for solely monetary gains.

### My process

Some limitations have affected the outcomes of this Master Thesis. Being located in Norway, there is a limited access to designers that have contributed to potentially addictive smartphone apps. This could have led to useful insights of their thought process and the context of their work. There are also some limitations related to doing this thesis solo. With a bigger team that included more people with coding proficiency, a more advanced prototype of the game could have been developed.

The design process led to the development of several solutions, both a critical game, and a literature review. In addition, the process has led to insights about smartphone users and the viewpoints and experiences of designers

regarding design ethics. While all these solutions may prove useful to the reader, an alternative approach could have focused on just one or two of these solutions. More time could then have been dedicated to each solution.

## Conclusion

Smartphones have become increasingly popular over the last years. While they offer a variety of benefits, critics and scientists have raised awareness over smartphone addiction in the latter years. The business model of many tech companies, that rely on the users spending time on their devices for profits, have been criticised for encouraging the use of manipulative techniques to make the users spend as much time as possible on their devices. In particular, the companies are taking criticism for their use of algorithms, and their willingness to take advantage of cognitive biases among humans to make them spend time on their apps, even if they do not get much out of it. While this issue has grown on the agenda, there are no clear solutions on how to fix it. This master thesis has investigated the issue of addictive smartphone apps with a critical design mindset. In this mindset, the main goal is not to come up with a solution on its own, but rather to design an artefact that contributes to discussion on a societal issue or trend. This master thesis aims to contribute to this discussion with three deliveries. These three deliveries may provide designers with inspiration, insight, and knowledge about addictive smartphone apps.

### 1. Findings from the insight phase.

The insight phase was conducted using different qualitative research techniques, including interviews and a design probe. The recipients and participants of these methods were designers, smartphone users, and other professionals with opinions on the subject.

### 2. A literature review on smartphones

The literature review aims to summarize the field of smartphone research that investigates the effects smartphones have on their users. The research field is still relatively new, and therefore there are still no standards for measuring smartphone addiction. This can partly be explained by the fact that the smartphone is a relatively novel commodity. However, the main body of research have discovered correlations between compulsive smartphone use and a variety of deleterious effects on its

users. These effects include anxiety, stress, and depression. Researchers have also discovered several concerning effects smartphones have on our ability to connect with other people, on our short-term memory, and on our sleep quality.

### 3. A critical game

The Game Appmaker Inc is a game that criticise the business model of a tech industry that relies on getting people to use as much time as possible on their services. It puts the player in the shoes of a social media entrepreneur and gives them the goal of increasing the profits by any and all means necessary. Throughout the game the player may learn about different methods and techniques that are utilize to “hook” players to smartphone apps, and witness that these techniques end up hurting the user.

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## Photo references

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# Attachments

Disclaimer: Some of the attachments are written in Norwegian.

## Attachment A: Info-letter, interviews

Informasjonsskriv til intervju for masteroppgaven:

### Hvordan kan designere påvirke utviklingen av avhengighetsskapende mobiltjenester?

#### Formål og bakgrunn

Mange av dagens teknologiselskaper som Facebook, Snapchat, og Youtube bruker forskjellige strategier for at brukerne deres vil bruke så mye tid som mulig på tjenestene de tilbyr. Denne masteroppgaven vil utforske hva designere kan gjøre for å påvirke utviklingen av slike tjenester.

#### Om intervjuet

Dette intervjuet vil være et av flere semistrukturerte intervjuer av designere og andre fagfolk, som omhandler hvordan potensielt avhengighetsskapende mobile tjenester oppleves både fra et designperspektiv og fra et brukerperspektiv. Data vil bli innhentet via notater.

#### Om informasjonen du gir fra deg

Informasjon fra intervjuene vil kunne publiseres i masteroppgaven min, som leveres i løpet av Juli 2019. Senere vil masteroppgaven offentliggjøres. Du vil være anonym, og jeg vil ikke notere ned personopplysninger som kan brukes til å identifisere deg under intervjuet, som for eksempel navn, fødselsnummer, telefonnummer eller epostadresse. Jeg vil også forsøke etter beste evne å ikke notere ned bakgrunnsinformasjon som indirekte kan identifisere deg, som for eksempel en kombinasjon av kjønn, alder eller arbeidssted.

#### Frivillig deltakelse

Det er frivillig å delta på dette intervjuet, og du kan når som helst trekke deg fra studien uten å oppgi grunn. Dersom du vil trekke deg kan du kontakte meg ved hjelp av kontaktopplysningene under.

Jørgen Molaug

Epost: [jorgmol@stud.ntnu.no](mailto:jorgmol@stud.ntnu.no)

Telefon: 99410344

Hovedveileder for oppgaven er Marikken Høiseth, hun kan nåes ved epost

[marikken.hoiseth@ntnu.no](mailto:marikken.hoiseth@ntnu.no)

## Attachment B: Email-guide, interviews

Hello! My name is Jørgen Molaug. I'm currently writing my master thesis at Industrial Design, NTNU, which deals with how certain mobile apps like Facebook, Netflix, and Snapchat sometimes use up the time of their users unnecessarily. I'm exploring how designers can influence the development of these kinds of mobile services, and therefore i want to hear the opinions and perspectives of designers and other professionals regarding this subject. I'm contacting you because [...] Do you have the opportunity to join me in an interview about this?

I will not take notes of any personal information about you during the interview, and you will be anonymous when the master thesis is published as well.

Kind regards

Jørgen Molaug

Master Student, Industrial Design, NTNU

## Attachment C: General interview guide, designers

### Forklare om oppgaven:

Jeg skal jobbe med potensielt avhengighetsskapende apper. Mange selskaper som Google, Facebook og Snapchat bruker forskjellige virkemidler for å få brukere til å fortsette å bruke tjenesten deres. Dette gjør at folk bruker mobilen mer, og det er en utvikling noen er bekymra over. Min masteroppgave dreier seg om å finne ut av hva designere kan gjøre for å påvirke denne utviklingen.

### Forklare om databehandling, og hvorfor ikke samtykkeskjema

Det har vært vanlig å dele ut samtykkeskjema for masterintervjuer, men det har kommet nye regler for databehandling. Jeg kan ikke samle inn personopplysninger på noen som helst måte, inkludert samtykkeskjema. Så jeg vil ikke samle noen som helst opplysninger som kan knyttes til deg direkte. De nye reglene er grunnen til at jeg ikke vil ta opp lydopptak heller.

### Om deg som designer

Hvor lenge har du jobbet som designer? (I hvilke selskap)

Har du noen gang hatt gjort etiske vurderinger i forbindelse med jobben din, eller en oppgave på skolen?

Har du noen ganger opplevd en interessekonflikt mellom brukeren og klient?

Hva gjorde du da?

Hvordan følte det å være i en sånn konflikt?

Har du noen ganger sett eller lært teknikker i UX som du tenker: dette vil jeg ikke bruke?

Hvis en person bruker mobilen sin for mye, så mye at det har en negativ effekt på hverdagen til brukeren, hvem har ansvaret for det? Personen selv? Designerne? Selskapet?

Hva slags makt har vi som designere i forbindelse med etiske spørsmål?

Hva slags ansvar har Designere?

Hva er ditt forhold til designtikk? Har du hatt om det på skolen? Lest om

det?

### Om deg som mobilbruker

Hvordan bruker du mobilen i ditt daglige liv?

Hva slags verdi får du ut av mobilbruken i forskjellige kontekster?

Har du reflektert over din egen mobilbruk?

Har du noensinne gjort tiltak for å redusere din egen mobilbruk? (Hvordan virket de?)

### Til slutt

Har du noe du vil si? Eller spørre om?

## Attachment D: Design Probe



## Informasjon

### Formål og bakgrunn for Masteroppgaven

Dette heftet er en del av min masteroppgave. Mange av dagens teknologiselskaper som Facebook, Snapchat, og Youtube bruker forskjellige strategier for at brukerne deres vil bruke så mye tid som mulig på tjenestene de tilbyr. Min masteroppgave vil utforske hva designere kan gjøre for å påvirke utviklingen av slike tjenester.

### Om heftet

Dette er et hefte med forskjellige oppgaver som handler om din egen mobilbruk. Meningen er å gjøre en side per dag, og du trenger ikke bruke mer enn 10 minutter på hver side. Enkelte av spørsmålene er ganske åpne, og det er kanskje ikke gitt akkurat hva du skal svare. Hvis du er usikker på hva som er "riktig" måte å løse oppgaven på, vil jeg oppfordre deg til å svare det du synes gir mest mening, det finnes ikke "feil" svar på slike spørsmål! Jeg kommer tilbake [SETT INN DATO HER] for å samle sammen heftene igjen.

### Om informasjonen du gir fra deg

Jeg kommer ikke til å stille deg spørsmål om personopplysninger i heftet, så du vil være helt anonym. Jeg kommer til å bruke resultatene fra heftet videre i masteroppgaven min. På et senere tidspunkt vil masteroppgaven offentliggjøres, og ligge ute på NTNU sine nettsider.

### Frivillig deltakelse

Det er frivillig å bruke heftet, og du kan når som helst trekke deg fra studien uten å oppgi grunn.

### Min kontaktinfo

Dersom du har noen spørsmål må du gjerne kontakte med ved hjelp av informasjonen under.

Jørgen Molaug  
Epost: jorgmol@stud.ntnu.no  
Telefon: 99410344

Hovedveileder for oppgaven er Marikken Høiseth, hun kan nåes ved epost:  
marikken.hoiseth@ntnu.no

## Har du noe på hjertet?

Har du noe du vil si om mobilbruk, som jeg kanskje ikke har spurt om?

## Ei uke uten internett

Forestill deg at du ikke skulle bruke internett i ei uke, og at mobilen bare kunne brukes til ringing og sms. Hvordan hadde dette påvirket deg? Hvis du skulle ha levd ditt vanlige liv i ei uke uten internett, hva slags forberedelser måtte du ha gjort for at det skulle ha vært mulig?

## Refleksjon

Hvor mye har du tenkt på hvor ofte du bruker mobilen?  
Plasser deg selv på skalaen under!



Jeg tenker  
ikke noe sær-  
lig over det

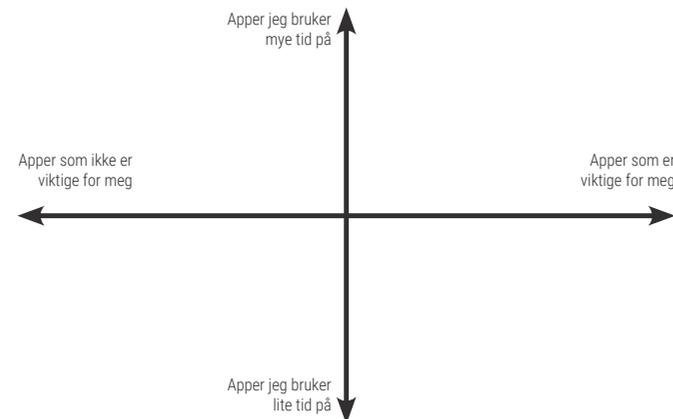
Jeg tenker litt  
over det

Jeg tenker  
mye over det

Kan du skrive litt om hva slags forhold du har til din egen mobilbruk?

## Tidsbruk vs nytte

Kartlegg 5 eller flere av appene du bruker i diagrammet.  
(tips: noen mobiler har en oversikt over hvor mye tid du bruker på forskjellige apper)



Hva skal til for at en app er viktig for deg?

## Normer

Hva slags normer vet du av om hvordan man bruker mobilen når man er sammen med andre?

Hvis du kunne ha laget regler om mobilbruk som alle i Norge måtte følge, hva slags regler hadde du laget da?

### En tegneserie

Lukk øynene, og tenk på en mobiltelefon i ti sekunder. Skriv så ned de tre første ordene du kommer på.

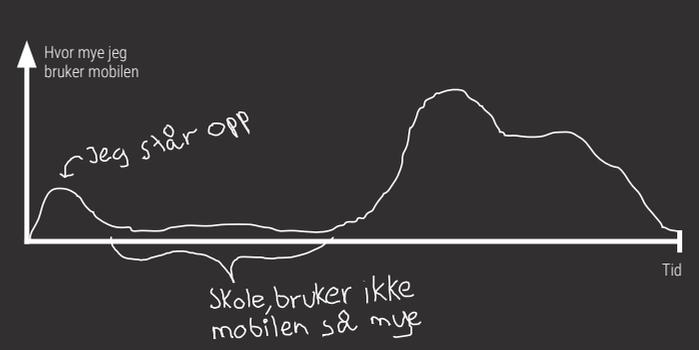
Lag en tegneserie som handler om de tre ordene du skrev over.


### En typisk dag med mobilen

Tegn en linje som viser når du bruker mobilen under en typisk hverdag, og skriv litt om hva du bruker den til!



Et eksempel: min egen hverdag

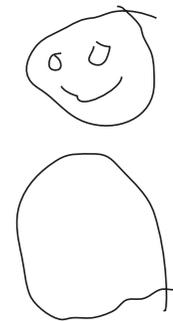


## Din oppvekst med mobilen

Hvor mange år var du da du fikk en smarttelefon for første gang? Og hva slags regler bestemte foreldrene dine for deg med tanke på mobilbruk?

## Mobilavhengighet

Dette er Mobilspell-Ola.  
Han bruker mye av tiden sin på å spille og sjekke sosiale medier på mobilen sin. Han er litt bekymret over hvor mye tid han bruker på mobilen, og han har prøvd å bli bruke tid på mobilen, men han synes det er vanskelig, fordi det å bruke mobilen hele tida har blitt en vane for ham.



Foreslå noen løsninger til hvordan Mobilspell-Ola kan få hjelp til å bruke mobilen mindre.