

# OSLO MET

An opportunity for user  
experience design in primary  
antibiotics adherence in children:

A narrative-based product, driven by  
big-data and gamification principles.

Fatemeh Mahshid Razmi

MA product design

Candidate at Oslo metropolitan University of applied science

May 2018

The age group	Desired Elements	Potentials	Restrictions
Less than 6 years	<ul style="list-style-type: none"> <li>- Basic learning concepts</li> <li>- Music</li> <li>- interaction</li> </ul>	<ul style="list-style-type: none"> <li>- Educational</li> <li>- Opportunity for Parents or carers involvement</li> <li>- Real-world and social skill improvement</li> </ul>	
6-8 years	<ul style="list-style-type: none"> <li>- Informational content</li> <li>- Ability to tie the content to the real world subjects</li> <li>- Teaching about the world around them</li> </ul>	<ul style="list-style-type: none"> <li>- The learning component is not so obvious</li> <li>- Allow children to use imagination</li> </ul>	
9-12 years	<ul style="list-style-type: none"> <li>- Competition involvement</li> <li>- Multiplayer games</li> <li>- Playing against others</li> </ul>	<ul style="list-style-type: none"> <li>- Allows them to build</li> <li>- Allows them to create their own aspects of world (buildings, characters, game level)</li> </ul>	<ul style="list-style-type: none"> <li>- Setting parental controls is crucial</li> <li>- Monitoring the game play should be done</li> <li>- Older and younger children interacts in the same platform</li> </ul>

Figure 21: videogame characteristic, based on children age group

“ In every **job**  
that must be  
done, there is an  
element of **fun** ”

Mary Poppins



# CONTENTS

# 1

Once upon a time ... (Motivation and Significance)

Abstract	1
Background	3
Technology and digital natives	5

# 2

Who else plays? (Case Studies)

Collaborative partners	7
MedisinStart	9
NMS	11

# 3

The yellow brick road to the Emerald city (Method)

SSQS	12
Ethnographic research	13
Findings from ethnography	15
Design probe	17

# 4

A lost relationship (Introduction)

In the beginning	19
Healthcare in Norway	23
Big data	25
Research question	27

# 5

One thousand and one nights ( Theory and mindset)

Gamification	28
Player-centred design	34

# 6

AntiBug (Concept)

Player	
Mission	
Motivation	
Mechanics	
Method of Loci	41
Storytelling	42

# 7

Happily ever after (Next steps)

Discussion	44
Storyline	
Characters	
Setting	
Dialect	
Rhythm	
Decor	
Spectacle	

Future scenario	53
References	55
Appendic	

# 1

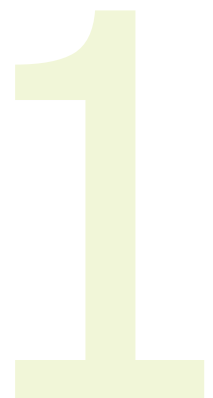
Once upon a time ...  
(Motivation and Significance)

Regardless how effective medications are, if patients do not follow the prescribed instructions, the whole healthcare system would be compromised. Non-adherence with medication generally or antibiotics specifically is a crucial healthcare problem in which substantial cost is required for patient's frequent common hospitalization due to antibiotic resistance. There are two kinds of non-adherence with medications, unintentional and intentional. Unintentional adherence may be the result of forgetfulness and not knowing exactly how to use medicines; as the solution there are many innovations that address the forgetfulness or unintentionally around taking medications like pill dispensers or reminder mobile applications, but few regarding intentionality .

So the focus of this project will be on the second cause, children with intentional non-adherence which is a consistent issue, when they choose not to take their prescribed antibiotics properly based on their experience or their parents' beliefs or knowledge. Norway has recognized non-adherence issue and has produced pharmacy-follow-up solutions called "Medisinstart" service which is going to be adopted in pharmacies all over the country in May 2018 in which patients with chronic illness will receive two follow-up interviews and questionnaires with pharmacy 1-2 and 3-5 weeks after prescription.

So, obviously health providers are trying to solve this problem from a medical and pharmaceutical angle but from a designer's point of view; Intentional non-adherence with medication is largely a result of people's behavior and the factors that prompt such a behavior should be recognized. There the challenge lies in educating the importance of taking medicine in general, but also supporting children to keep taking the treatments.

## 1.1 Abstarct



People in general do not tend to finish a prescribed antibiotics course and specifically they stop taking their treatments once they feel better; it has happened to many of us but when we do not take a full course of antibiotics or take them for the wrong things, the hardest bacteria survive, and spread. If we could break that destructive behavior, we would save thousands of lives and billions of Kroners a year. The final outcome would be an application alongside with the physical pack ; prescribed by doctors and provided by pharmacists to prevent potential children from intentional non-adherence behavior with antibiotics.

This thesis is an exploration of gamification in the context of healthcare system in Norway and uses the widespread usage of technology as an intervention in order to meet a better experience for children, the so-called digital natives. According to Wikipedia, a digital native is a person who was born during or after the general introduction of digital technologies and who, through interacting with digital technology from an early age, has a greater understanding of its concepts (1). They have grown up with access to highly engaging video games and consumer software, and have similar expectations of every innovation. All pictures, Tables and maps are taken and done by me, unless I mention the reference.



“Play is a child’s work and this is not a trivial pursuit.”  
—Alfred Adler, the founder of individual psychology and  
medical doctor

Although Gamification and game design are different in design terminology, there are some overlapped areas between these two, for example the player types. That is the basic rule of design that says the better you empathize with your users, the better you can provide for their needs, so it is crucial to understand for whom we are designing.

Gamification design works on a new focal point, which places the player (rather than the user, which is standard in UX design) at the heart of the design process. The idea is simple: if you can understand what your players want, you can deliver these wants through gamification.

Vibeke Sjøvoll and Tore Gulden in their article about game dynamics (3) quoted Sebastian Deterding who has criticized how gamification in its current form has focused squarely on the ludic dimension, and that is almost invariably constitutes an addition of structure, goals, and rules to a given activity in order to afford gameful experiences of challenge and competition. They later bring another saying from Jacques Lacan, the french psychoanalyst that “when you entrust someone with a mission, the aim is not what he brings back, but the itinerary (journey) he must take; the aim is the way taken” in such a mindset, gamification is way more functional than just chocolate-covered broccoli! (Figure 1) this mindset is going to be refered to several times during this study (4).

## 1.2 Background





# The way of the future?



Figure 1: When the idea of gamification is not properly understood (55).

"Most attempts at gamification currently miss the mark due to poor design, but successful and sustainable gamification can convert customers into fans, turn work into fun, or make learning a joy. The potential is enormous."

—Brian Burke, research vice president at Gartner

People explain their fun times in different ways, they might say that doing shopping, having trips, working out or just laying on sofa and watching TV is what they do to have fun. But what makes these experiences fun is their awareness of this optional situation they have, the situation that they do not have to do these things if they do not want to, they choose themselves what to do during their fun times. In fact there are some fun activities that we do not choose to do, mostly because "they happen by accident rather than design (2)". for example I see people my age having fun ,running and jogging around Sognsvann lake everyday. Once I decided to join them and it was not fun at all, I could not breath properly and I felt rusty and uncomfortable because I thought I cannot be as fast as them, so I wondered how they can see this as something fun, the next week I decided to go swimming as fun and I enjoyed. Here is the point; jogging is fun if you want to go jogging, if you do not, it would not feel that much fun. Definitely there are many people who feel excited even just by thinking about running and jogging. They enjoy it and they like running in groups of their friends, they like showing off their physical fitness, on the other hand there are people like me who do not like it, maybe we do not like competing, maybe we find it repetitive and boring. The example showed whatever the activity is when we; as UX designers remove the element of choice from an activity, some people feel it as a force although the nature of the activity might be purely fun. This is important to target the right population with the right method, using principles of gamification for users who are willing to play is an advantage, although players are not the only ultimate target group of gamification. From the beginning of this project, I was tasked by my project partner to come up with a digital-based solution and that is the reflection behind choosing children as the users of a digital-based medication solution, the population who are willing to get involved in games and gamelike situations by their own choice.



“It is far better to adapt the technology to the user than to force the user to adapt to the technology.”  
—Larry Marine the UI expert

Since the apparition of video games and afterwards its popularization in all walks of life especially among the children, controversial subjects such as circumstances of technology and video gaming on children has been discussed. Regardless of how positive or negative the impacts of daily use of technology and video games on children's lives are; nobody can deny that leading video games like World of Warcraft, Minecraft or Call of Duty are the most dominant forms of interaction between hundred millions of children daily; it has been the scope of innovation for several years and it will remain, as both technology and this generation are growing constantly.

Today when we look around we see video games as a platform for the newest technology trends such as artificial intelligence, third dimension and graphical upgrades. Video-game storm and its gamified impacts has hit our computers, TVs and smart devices to the point that it has almost overtaken everything around us, it has never been like this before, games had a different definition but now technology and games are so tangled to each other that one cannot be improved without influencing the other one.

## 1.3 Technology and digital natives



According to statistics Norway (5) the population of Norway stands at about 5.3 million, with approximately 20 percent of people under the age of 15 (figure 2). The population projections show continued growth in the population based on the assumption that immigration will continue to exceed emigration and that the number of births will still be higher than the number of deaths. Here is a great opportunity to spot from innovation point of view since with the growth of the population their needs in basic areas like healthcare will grow too. Tidd and Bessant (6) pointed out "one of the key lessons is that innovation requires some form of demand if it is to take root, need is complementary pull to the knowledge push" , but what is the remarkable feature of this population and in which area they might have needs? In some sources they refer to this growing population digital natives or generation Z , "the first cohort to have Internet technology readily available at a young age; they have been exposed to an unprecedented amount of technology in their upbringing. Smart-phones offer the potential for deeper involvement in learning and more individualized instruction, thereby making this generation potentially better educated and more well-rounded (7)" There is a social system for adopters of recent innovation, briefly this system consists of 5 types of users,

Innovators  
Early Adopters  
Early Majority  
Late Majority  
laggards

If the proposed innovation is going to be a game-based application, children are considered as innovators since they are by nature players. They are excited by new ideas and new ways of doing things and it is considered as an advantage in design process.



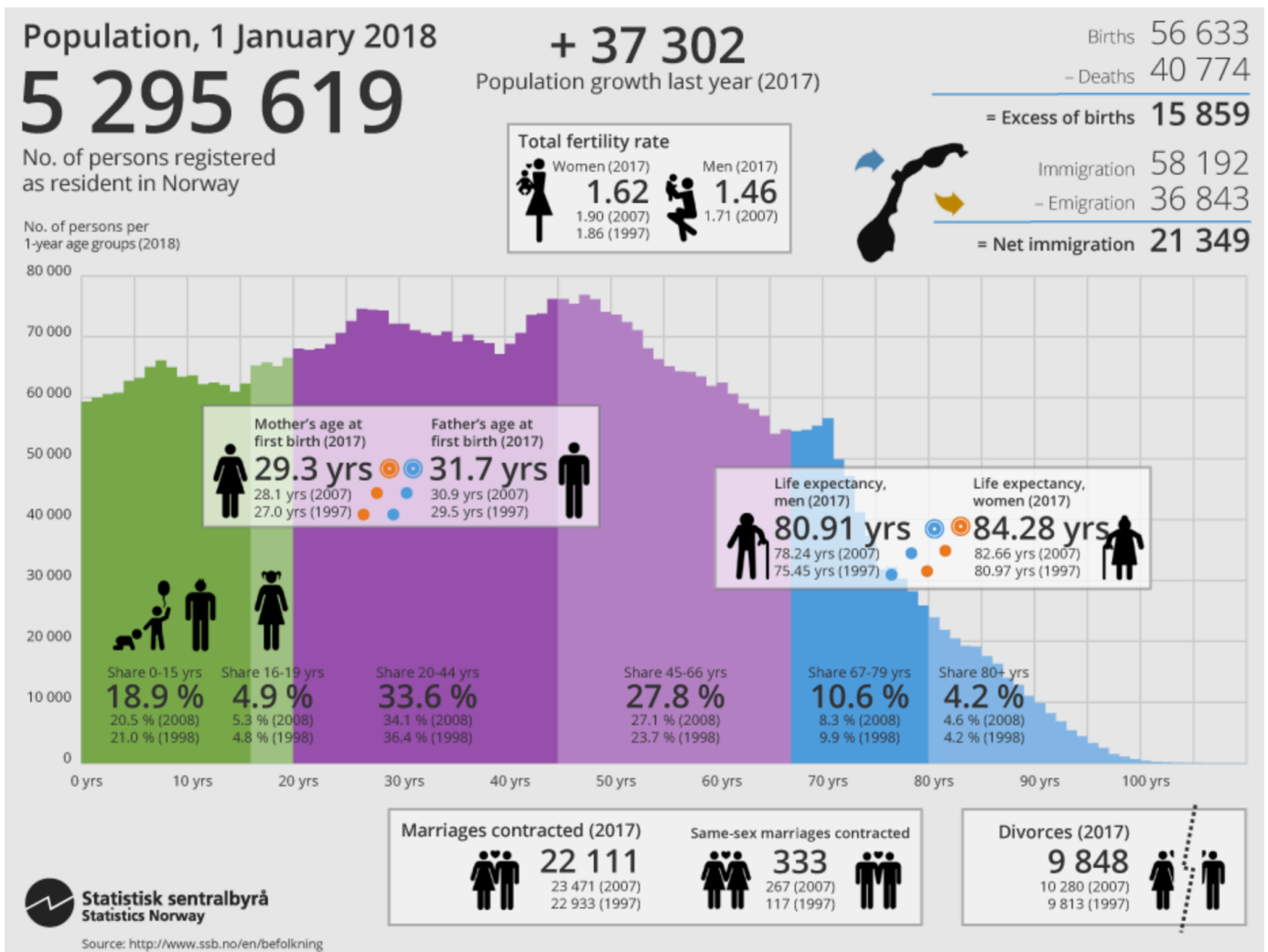


Figure 2: Population of Norway (5)

# 2

Who else plays?  
(Case studies)

Design for healthcare is not just about moving ahead with treatments, it demands applying design thinking methods on every step and then we will uncover ways in which care goes beyond just treatment. In healthcare area, users' experience related to their treatments flows across many moments, as opposed to be restricted to a single point in time; therefore, in order to appeal to such vital moments placed in patient journey, it is crucial to see the problem from experts' points of view when choosing healthcare as the context of a design scope. During my previous project in Oslomet, which was a design project done for Telenor, the norwegian telecommunication company and about the role of technology in medication adherence for patient with chronic illness (45), I got to know "pharmacy association Norway" (Apotekforeningen) with the same concern of adherence. They were such a big help during that project and then I asked them to be my collaborative partner for my thesis as well and luckily they agreed.

Apotekforeningen is the industry organization founded in 1881, for pharmacies in Norway and their owners. "All pharmacies, both privately owned and the publicly owned hospital pharmacies, are members of the Norwegian Pharmacy Association. The association works mainly with pharmacy-based development, pharmacist's framework conditions, business policy, technology and e-health and communications about the industry. The pharmacy association also takes care of a number of practical functions for pharmacies (46).

## 2.1 Collaborative Partner



We set that in order to have a concrete design process for this project, they would collaborate as a valid data source so that I could anchor rigid insights from my research methods. We also agreed that they can be my external mentor to give suggestions. During the meetings I had with Hilde Ariansen, the senior advisor (Pharmacy) and with Terje Wistner, the director of technology in Apotekforeningen, they mentioned studies done in England which due to their success, their projects were case studies for apotekforeningen. The points captured out of those meetings are considerable; They stated that "as a health authority, we have other needs as well than just consumers, but it is interesting to explore how data can be obtained through an application for children, so that we can increase and strengthen the information, then of course there must be lots of considerations like privacy and ethics", they also mentioned that they are willing to see more than just an application, but a service with further possibilities for storing patient records, how to motivate them so they might want to share their records and they themselves will decide with whom they want to share; caregivers, physicians or pharmacists. "that is the possibilities we want to see in the future" as Hilde said.





## Medisinstart er for deg som skal starte med en hjertemedisin

Oppstartsveiledningen består av to samtaler med en farmasøyt. Hver samtale tar inntil 15 minutter, der dere snakker om:

- gode medisinvaner
- kunnskap om og forståelse for behandlingen din
- praktiske problemer og vanskelige situasjoner

Tjenesten er offentlig finansiert og gratis for deg.  
Avtal din Medisinstart på apoteket!

DINE AVTALER			
	Dato	Klokkeslett	Farmasøyt
Avtale 1			
Avtale 2			

Husk å gi beskjed til apoteket hvis du må avbestille timen.

Apotekets stempel

[www.medisinstart.no](http://www.medisinstart.no)

# Få en god start med hjertemedisinen din

Apotekforeningen

## Medisinstart er for deg som skal starte med en hjertemedisin

Medisinstart består av to samtaler med en farmasøyt under full diskresjon. Samtalene skjer de første ukene etter oppstart.

Medisinstart er for deg som nylig har startet med en av disse hjertemedisinene:

- blodtrykksenkende
- blodfortynnende\*
- kolesterolsenkende statiner

Du får svar på dine spørsmål og veiledning i bruk av medisinen.

Målet er at du skal få best mulig utbytte av behandlingen din.

\*Gjelder ikke blodfortynnende medisin til injeksjon.

## Hva bør du vite om medisinen din ?

**Om medisinen**  
Hvorfor og hvor lenge skal jeg ta denne medisinen?  
Hvor lang tid tar det før den virker?

**Praktiske rutiner**  
Er det vanskelig å ta medisinen?  
Har det noe å si når jeg tar den?  
Hva gjør jeg om jeg glemmer en dose?

**Vanskelige situasjoner**  
Hvilke bivirkninger kan jeg få, og er det noe jeg kan gjøre?  
Er det noe jeg må passe på med tanke på mat, kosttilskudd eller andre medisiner?

Figure 3: Medisinstart conversation template (46)

The newly-launched service by Apotekforeningen, the collaborative partner in this project is called MedisinStart; this follow-up service is the nordic version of its english counterpart (NMS) and it focuses on cardiac medicine for whom just started their treatment.

MedisinStart is a new pharmacy service that consists of two pharmacy conversations under full discretion (Figure 3). The purpose of the conversations is to solve any concerns and problems. medisinStart rolled out in pharmacies from May 2018 (46).

Based on successful studies done earlier in England and later in Norway, the government decided to finance MedisinStart in December 2017 as norwegian researchers concluded approximately the same result as english researchers (Figure 4-9).

Medications are used in the treatment of most chronic diseases and have led to the fact that many people can live well for a long time with their illness. Nevertheless, many people find it difficult to use medicines. Research shows that between one third and half of the patients use their medicines incorrectly. Others choose to end the treatment on their own. In Norway, between 1000 and 2000 people die annually from wrong medicine use. Pharmacy has long been working to introduce new guidance services that take this into consideration, which will help patients to get the best effect from their treatment. The authorities want to reduce the degree of wrong drug use by strengthening the role of adviser in pharmacies (46).

## 2.2

# MedisinStart



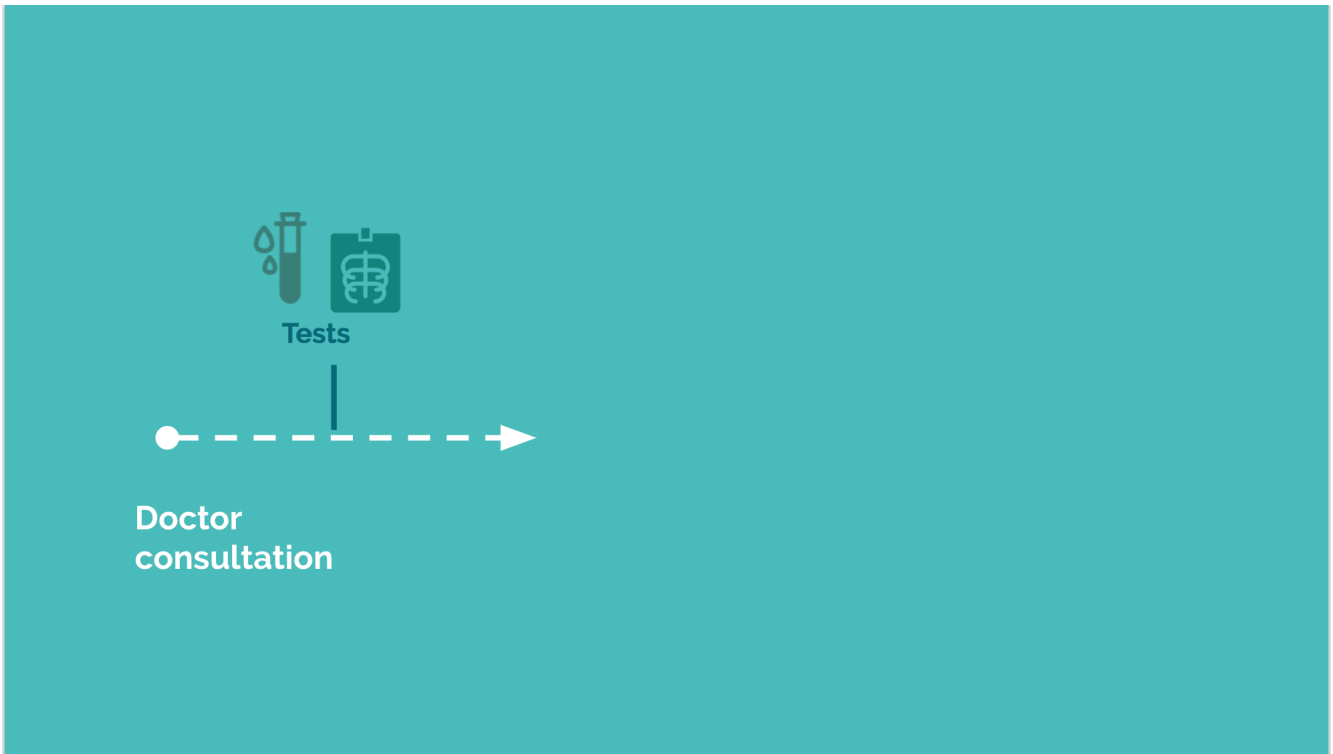


Figure 4 : Patient Journey, In the beginning

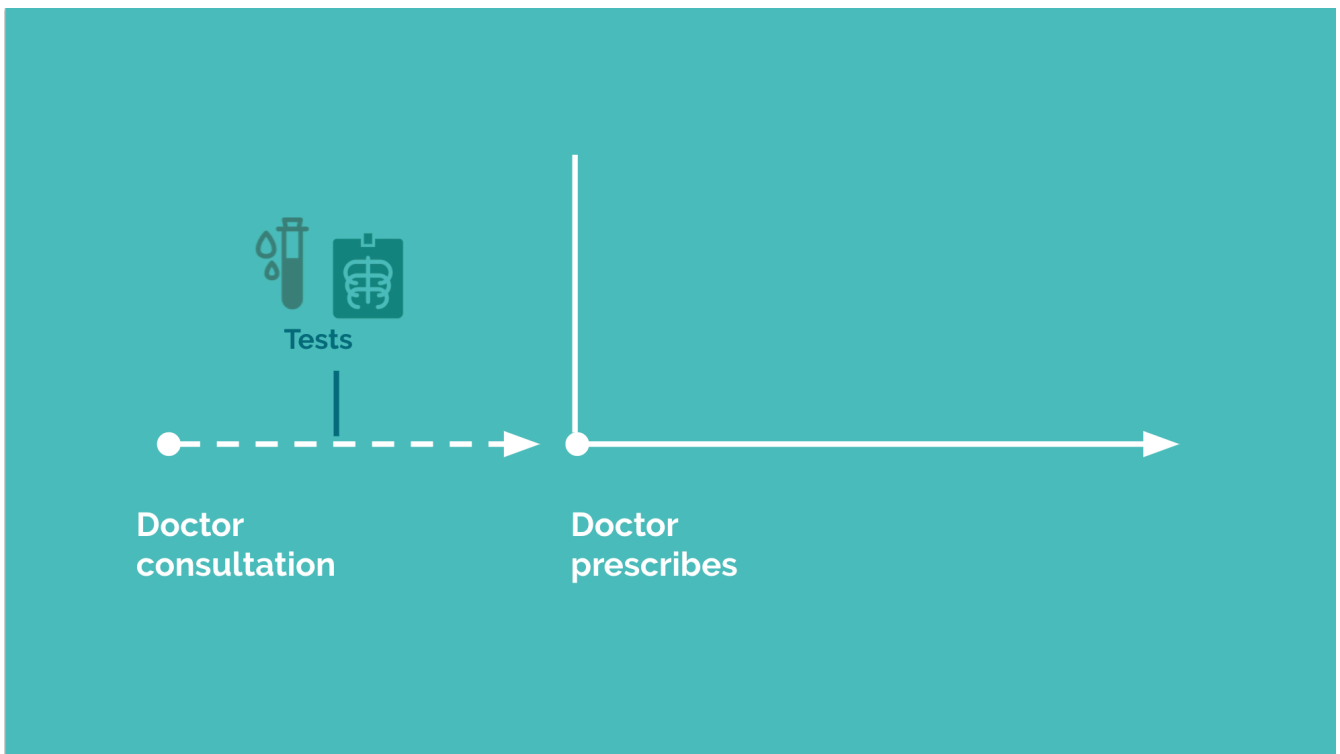


Figure 5 : Patient Journey, Prescription of medication

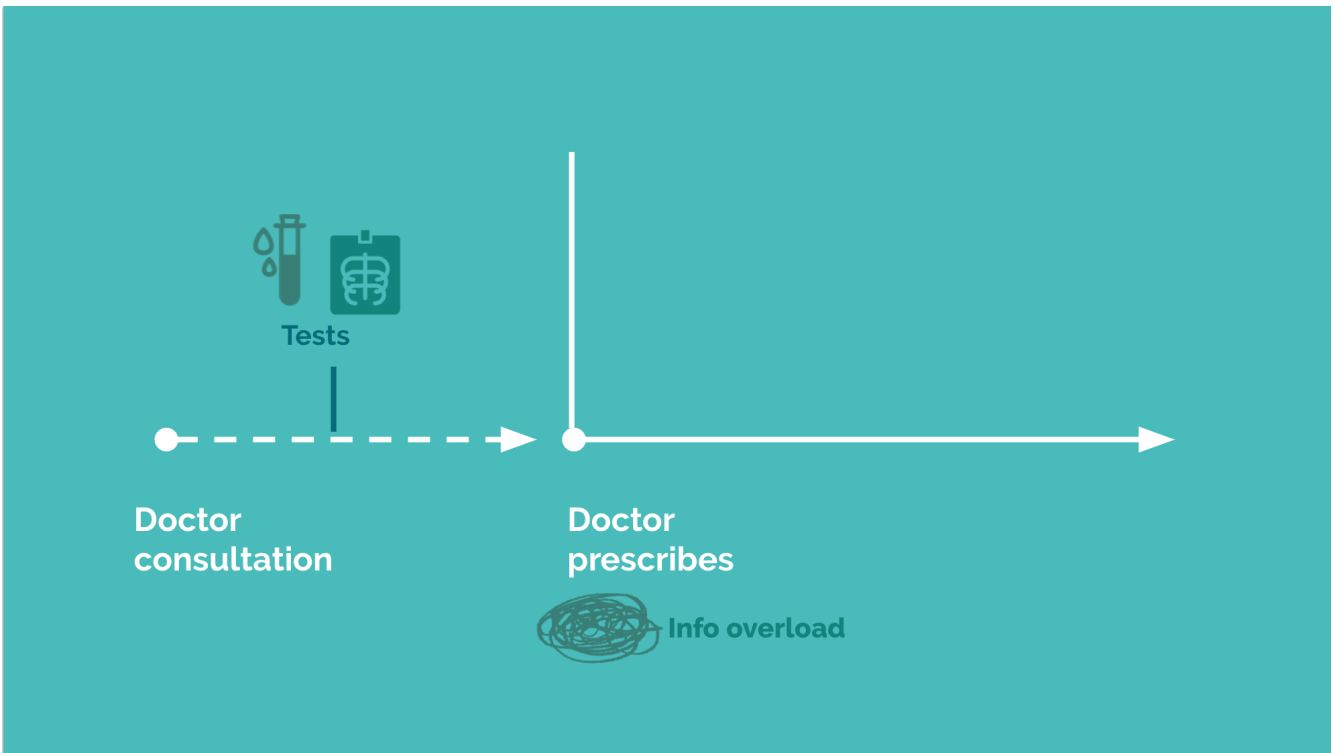


Figure 6 : Patient Journey, Instructions get overloaded

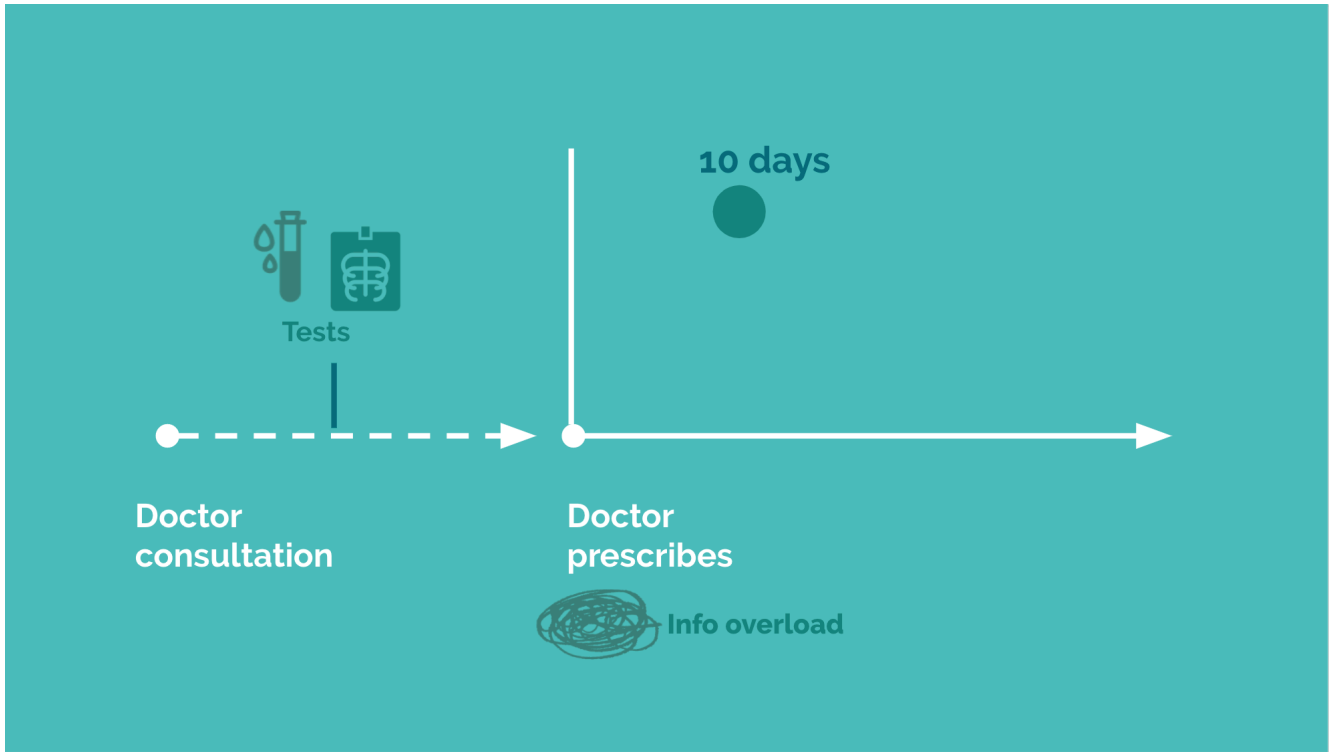


Figure 7 : Patient Journey and pain points

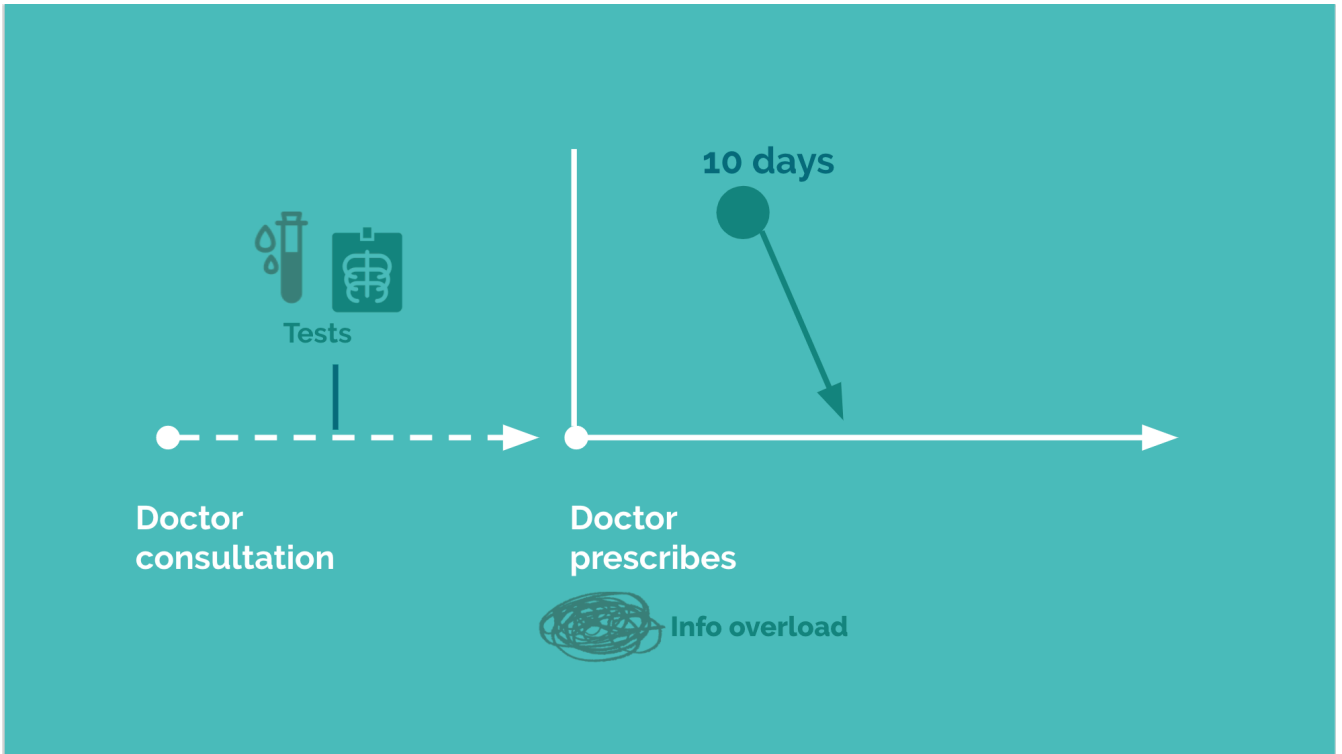


Figure 8 : Patient Journey and pain points, the first slack

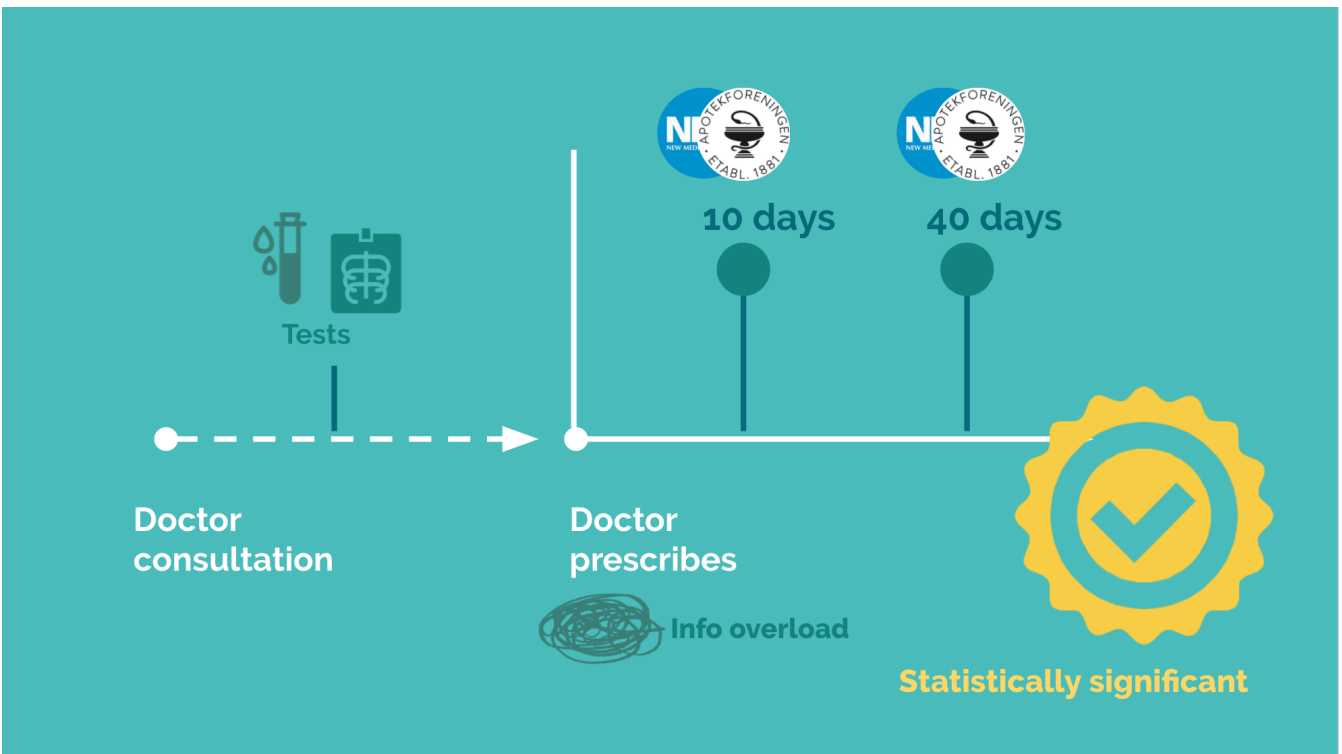


Figure 9 : Patient Journey and pain points, the positive role of medication services

In 2016 the Storting granted NOK 5 million for inhalation guidance for asthma and cholesterol patients. In December 2017, the Storting decided that a three-year trial scheme with start-up guidance (Medicine Start) should be introduced in pharmacies in 2018. The service is publicly financed and the patient pays no deductible. Pharmacists shall send an epicrisis (journal print) to the doctor in cases where the epicrisis contains information relevant to the physician's follow-up of the treatment. Corresponding service such as the Medical Initiative is already established in the UK and Denmark, and evaluation of the UK service showed that the method was cost-effective and contributed to increased compliance with treatment. Similar effects have also been found in a Norwegian Medicine Start Study from 2015, which included 70 pharmacies and 1,500 patients (46). There are two conversational sessions on 1-2 weeks and 4-5 weeks since the medicine is collected from the pharmacy. The conversations take place either in information rooms at pharmacies or over the phone, each session takes up to 15 minutes during which different subjects will be discussed such as good habits related to medication, educational information about the treatment, practical problems like side effects and so on. the service is free of charged for patients and is financed by the government and it supports patients up to three months.

10

NMS is the English counterpart of Norwegian service, medisinstart. It was launched on 1st October 2011 to be added to community pharmacy contractual framework. It also provides support for people who are under long-term treatment and especially newly-prescribed. NMS targets particular patients and conditions with the goal of medication adherence improvement.

Since the introduction of the NMS in October 2011, more than 90% of community pharmacies in England have provided it to their patients. To inform the longer-term commissioning decision, the Department of Health (DH) commissioned researchers at the University of Nottingham to lead an academic evaluation of the service (47) , investigating both the clinical and economic benefits of it. The findings from the evaluation were published in August 2014 and were overwhelmingly positive, with the researchers concluding that as the NMS delivered better patient outcomes for a reduced cost to the NHS, it should be continued. This was the basis for NHS England's firm decision to continue commissioning the service. The successful implementation of NMS would:

- improve patient adherence which will generally lead to better health outcomes;
- increase patient engagement with their condition and medicines, supporting patients in making decisions about their treatment and self-management;
- reduce medicines wastage;
- reduce hospital admissions due to adverse events from medicines;
- lead to increased Yellow Card reporting of adverse reactions to medicines by pharmacists and patients, thereby supporting improved pharmacovigilance;
- receive positive assessment from patients;
- improve the evidence base on the effectiveness of the service; and
- support the development of outcome and/or quality measures for community pharmacy (47).

## 2.3 NMS



# 3

The yellow brick road to the Emerald city  
(Method)



“What kind of knowledge does the methodology aim to produce? ... What kinds of assumptions does the methodology make about the world? ... How does the methodology conceptualise the role of the researcher in the research process?”

The comprehensive method used in this project is called SSQS, abbreviated of a semi-structured qualitative study. This method refers to the research methods with qualitative output rather than quantitative ones because mostly qualitative research has an essential role in understanding users' needs and behaviour; and also evaluating situated use of technology. Most of the research done in this project is among SSQS, such as ethnography, interviews and observations and in fact SSQS occupies a space between ethnography and surveys and methods for analysis based on systematic coding of data. There is a basic checklist proposed by Ann Blanford HCI professor at university college london, that can be adopted to every single project. She divided the checklist into two parts, first considerations for conducting the research, and second considerations for reporting the result of the research.

Some such methods are positivist, assuming an independent reality that can be investigated and agreed upon by multiple researchers; others are constructivist, or interpretivist, assuming that reality is not 'out there', but is constructed through the interpretations of researchers, study participants, and even readers. In the former case, it is important that agreement between researchers can be achieved. In the latter case, it is important that others are able to inspect the methods and interpretations so that they can comprehend the journey from an initial question to a conclusion, assess its validity and generalizability, and build on the research in an informed way (52). The checklist was made during the first phase of design process and got completed for reporting, the complete table is included as an appendix to this thesis.

## 3.1 SSQS

Ethnographic research is a subcategory of SSQS method ; Since the first step in every user-centred design process is to get to know the user (Figure 10), ethnographic research got chosen to delve into who the users are and the environment they engage with by contextual interviews. Subsequently, storytelling and mapping were used to cope with the complexity of this vast subject. To get more from ethnographic research, the next phase was mapping the insights and checking if any objectivity can be found; After the initial ethnographic research, it is the best time for mapping. Empathy map is a tool that helps the design team emphasize with people they are designing for (49) .

In the context of service innovation the search for and use of demand side knowledge is critical and end-user understanding and empathy are essential to success (6). On the other hand, Users tend to choose products/services that meet their needs so that mapping our learning from the research phase, leads us to understand user's needs instead of user's wants while developing a deeper understanding of people we are designing for.

Ethnography is based in the notion that true understanding of complex human practices and contexts requires in-depth, engaged study; A core belief in ethnography is that to gain an understanding of a word that you know little about. You must encounter it firsthand (48 )".

3.2

Ethnographic

13



Figure 10: Asking children to explain their favorite activities, He is showing me how he is mastering in Minecraft videogame

Since some points of this study is linked to an ongoing similar project by the collaborative partner of this thesis (Apotekforeningen) it was found that there are certain individuals who are particularly good sources of information. These people who are experts in medical and pharmaceutical industry, are especially knowledgeable about how relevant work is done and they have the role of key informants who are repeatedly called upon to provide important insights along the way. During those sessions it got emerged that authorities are willing to have more functionality via an application for example a link to children vaccination since antibiotics and vaccinations in children are so tangled to each other and because vaccination data bank called "Visca" is an old fashioned system that is not 100 percent accurate either. It was also said that there is no secure system for patients to share their information with their caregivers. We also talked about the target group which they suggested to be children between the age of 5-10 and ofcourse their parents since some parents treat antibiotic the same refusal way as vaccinations. They also pointed that among all kinds of antibiotics for children, Penicillin is the most prescribed one and it is also the one children refuse to take the most. Besides interviews with experts, there were other contextual interviews as well in an norwegian activity school (Aks) where small talks and painting workshops with children were done, but the result was not satisfying for me. children often described what they do in a way that was not accurate. This may be due to a lack of awareness or understanding of what they are doing, or individuals may report more socially acceptable actions than their actual actions. They were more willing to hear stories other than being asked to recall experiences related to "that one time they had been sick and gotten medication"

Medication in children up to some certain age is noticeably dependent on their parents. The review of ethnographic research showed that most parents prefer to have an active role. They are the most decision makers after collecting the medicine from pharmacies and in most cases they rely on their own belief and knowledge when it comes to antibiotics.

While interviewing, I used stories to explain "Antibiotic" situation to children and I realized the power of storytelling, I concluded that ; It is most helpful to tell the story in a way that guides children to the desired action, logically instead of telling them what carers want them to do, Put them in the Story with familiar characters and locations with the demanding goal , This was the moment when I decided to involve narration into the concept. "Humans are inherently self-interested, So, the best way to make your audience care about something is to make it about them (42) ".It has been also proven that the effect of such stories seems to be enhanced when it is told in a group of children and in a representative framework like a classroom or an event.

Not only the today's children are considered as digital natives, but most of their parents (if at the oldest they are approximately 50) belong to this generation and most of them agreed that "screen times" are often the family times at their homes and almost all of them said that when it happens, video games are always involved. A father of two (9-11) stated " In the evenings, it looks like we are all focused on our stuff on our electronic devices, this picture might not be so intimate when you imagine, but when you look at it as part of an everyday-routine, it is more like we are focusing on separate tasks but together in a group of family. We share the interesting things together or we retell latest news or stories to each other; When I am home I put a video game up on the tv and it gets my children attention, they put away their devices and almost immediately join me to say "Daddy watch out! .... Get that guy.... Go over there".

This potential of video games suggests an active social system that can take advantage of parents desire of playing the decision-making role in their children medications and present this system in a gameplay in which children's progress in game levels, is dependent on their parents confirming the right time and right dosage of medication.

## 3.3 Finding

# 15

The 4-p innovation map gave the direction of where I should head and in which area innovation needs to occur. Using technology and particularly phone applications in medication is not a new approach but using narrative in medication adherence and online medication are radical changes in this map (Figure 11).

It emerged that although innovation sometimes involves a discontinuous shift, most of the time it takes place in incremental fashion. Essentially this is product/process improvement along the lines of “doing what we do, but better” – and there is plenty to commend this approach (6) .

The empathy map has four major areas that analysis users’ experience and they reflect four key traits which the main interviewee presents during ethnographic research phase (Figure 12). After reviewing the notes, pictures and conversations conducted from a group of children and some of their parents in an activity school in Bigdøy, these areas got filled. The main four sections are related to interviewee’s direct experience about what they did, felt, said or thought about the most-played video games in their age, Minecraft. Two other side areas are related to my experience. As the interviewer what I heard and saw during research from other people involved in this project. The next step was synthesizing user’s need based on the map by noticing contrasts between two traits and by pointing out possible gain and pain points (Figure 3) Synthesize phase showed that children are familiar with smart devices and video games, almost all of them had experience playing minecraft. They mostly set goals for themselves to build certain crafts, however due to being everlasting and not having a stopping point, the chance of being addictive to game play will increase. It is also a family friendly game that children share their achievements in a game with their parents, from the other hand parents are concerned about the privacy and offensive language used by other players, this can be eliminated if children play the game offline.

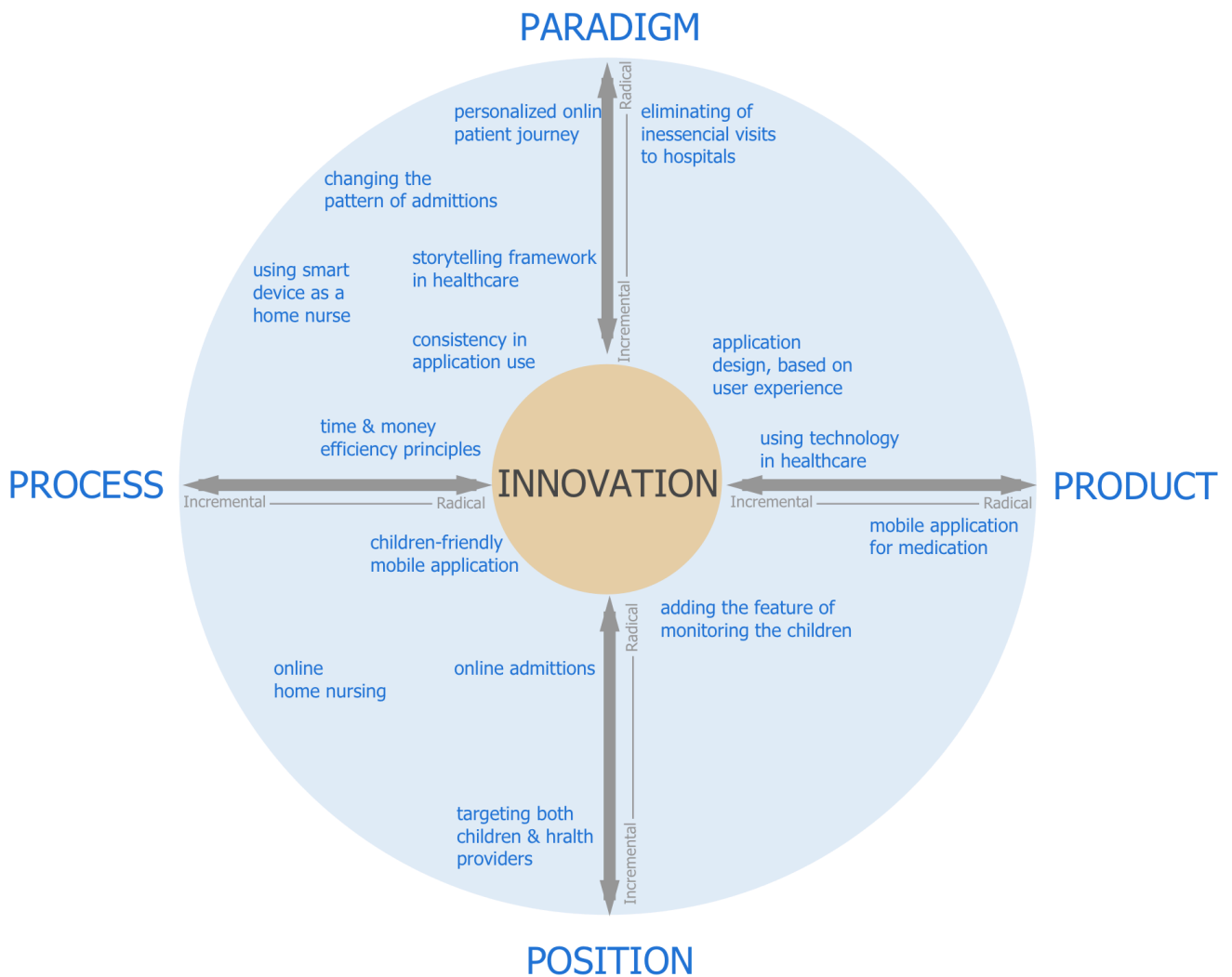


Figure 11: I mapped my preliminary idea, after ethnographic research. the template is inspired (6)

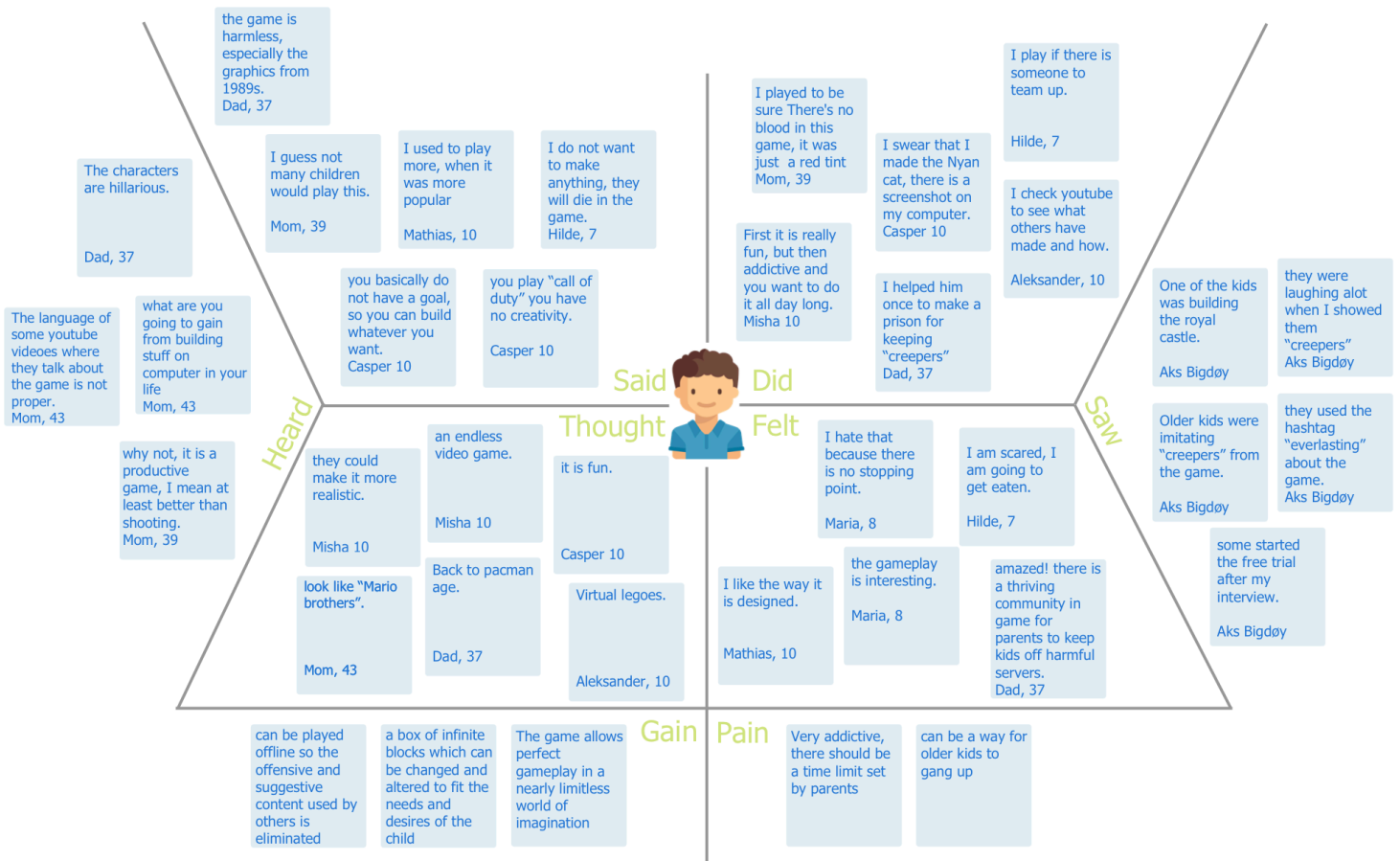


Figure 12: I mapped information obtained from interviews and observations, done in an Aks, in Bigdøy



Whether we are designing a mobile app, a professional online platform or an interactive museum exhibition, it is essential to understand users and the context in which they will use our design. Traditional methods such as interviews and observations will help us to touch the surface of their lives, however a deeper understanding of what our users feel and dream comes from generative techniques (2) such as user experience research tools. User experience design principles are based on empathy; meaning the users need to be understood and brought along the way of design process in early stages by implanting empathy. Social media is a potent source of data about users that enables empathy by showing us their world and their notions on it and even their concealed desire about its future. As designers we can get updated about people's real concerns through social media rather than asking them straightforward to evoke their experiences as regards; nothing is better than getting information from user's language. In all social tools, the content by which users communicate is more than it appears: It is invested with the interests of its creator; It is intended to communicate to others; It is motivated by the investment its owner has placed in the medium and his or her place in it; It is subject to interpretation by means of what it is and the context in which it appears and it is read by viewers according to what those people know of the author, and how (21). indicate that user experience research tools can be modified according to different users and contexts by getting help of big data features as an ethnographic probe kit. Design probes support user participation in information gathering, expressions of needs, dreams and design problems (22); they can therefore be integrated in traditional way of conducting information about users especially when users' sayings and their doings differs.

The challenge about younger target group is their intimacy rate that was evident while doing qualitative research, so the project sought new ideas for gaining research insights particularly those related to children themselves, because it was felt that due to low intimacy between children and me, worthy information would not be well captured by other types of research methods like interviews.

## 3.4

# Design probe

# 17

This method has a background in my previous university projects where I looked at social media as an ethnographic probe in user experience research, for making empirical data. The primary intention of this method used for this project was to complete traditional ethnographic research methods as ideal results did not obtained through interviews and observations, so including productive tools that make the user actively participate in generating insights, like cultural probing seemed wise. A typical probe kit includes materials for activities over a short period. They evoke personal responses to a stimulus or a question. Probes need to be designed in a way that playfully invite users to share rich clues about their lives rather than gather factual information about them. Preparing the right kind of probes kit is essential for gathering rich insights into the target group that will inspire the early stages of design (2). The other complementary method used in this chapter is called Layered-scenario- mapping, a technique used to gain insight into the “situation one designs for”. It is a systemic technique and emphasizes presenting information in different layers going from an overview to very detailed information. The technique proposes a structured approach to collecting and presenting data and provides a template for sorting and presenting the data in a layered manner hierarchically, spatially, and temporally (50). This map is used as a framework so the information gathered from the probes could place in that framework properly. The project was organized as a scenario based on user’s life, with a storyline and different characters presented in a contextual map. All kinds of relations and interactions between characters shown in the map, got conducted from relation-library developed by Birger Sevaldson. The contextual map itself consists of different layers (such as happenings, interaction with objects and people, location) and concealed aspect of the user’s life (including memory, desire, communication, occupation, worry, mindset, need), was designed based on parents’ Instagram account and their online activities. Parents were simply asked to tag me, on a series of photos with captions, taken and shared by themselves on Instagram page within 10 days since they collect antibiotics from pharmacy (Figure 13).

The user-centered technique used here is somehow similar to mobile ethnography research method, allowing the user to gather time and location independently; because then they could define their own touch points within a 10-days timeline, besides this technique can be used anywhere and at any time. All leading social network platforms that are popular among people like Instagram application, enable self-disclosure in a voluntarily desirable way. Desirable interactions are something you tell others about; it has a strong emotional dimension, often giving a pleasurable experience from the interaction (51).

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Happenings	Today I had to skip work, because he did not feel well, he had fever and couldn't eat or drink much for almost 12 hours, my first guess was flu, but his Dr diagnosed throat infection	This is his first time that he is getting Antibiotics, last night he took it without any trouble, and then he cried! but this morning he just ran away and promised after 7h he will be better but he did not and I had to fool him as I learned in youtube!	I am still tricking him by his favorite drink, he thinks the taste is not like always but he drinks it anyway!	Today I stopped his medication because I realized he got diarrhea, I panicked and I thought maybe the Dr did not detect his problem correctly, but after a call, they said it is normal and one of the side effects	He already feels so much better but Dr emphasized that we continue the treatment for whole 2 weeks. He could go back to kindergarten today again.	His teacher explained to everyone why he was absent these days and told them what pills do, afterwards my son painted this, he explained to me that these are the good stuff for fighting diseases	He asked me to tell the same story as his teacher did yesterday, I had no idea so the first thing that came to my mind was the cartoon on his shirt and then I related it somehow to pilot he was captivated :)))	His teacher is a genius! everytime that story about good guys fighting bad guys, he has taken his medicine almost everytime without trouble, it is just nagging after the horrible taste and that is it!	He is great and I feel better myself!, he eats and drinks properly and goes to kindergarten everyday, here he is painting a fight between good pills and bad diseases.	Today is the last day of his treatment and it feels such a relief even for me, his opinion is really changed about his medicine, he does not refuse anymore to let "good guys" inside his body and he actually thinks it is so cool!
Involved people										
Interactions with objects	-waking up -booking an appointment -calling the boss -Driving -visiting Dr -picking up drugs	- dealing with Antibiotic -struggling with child - watching TV together -persuading on medicine -surfing the web -tricking with drinks	- keep taking antibiotics - keep tricking - child thinks it is suspicious	- symptoms -not being informed -panicking the treatment -stopping antibiotics -getting informed -keep taking medicine	- getting tempted to stop medication - expert's instruction as a dissuasive factor - normal routine	- educating kids - using storylines - using characteristics - visualization as a tool - learning in a group	- asking for more stories - making up a story - using familiar characters - good and bad - involving medicine	- positive effect of story - giving human characteristics to pills - keep taking medication - refusing turns to nagging	- improvement - mom feels better - drinking and eating properly - back to routine - remembering the story	- last day - mom feels relief - being under influence of story - volunteering to take medicine
Interactions with people										
Location										
Memory										
Desire										
Communication										
Occupation										
Worry										
Mindset										
Need										
Contextual information										

Macro systemic relations:  
Examples: A winter coat and bikini are both part of the clothing wardrobe of the same person.

Semantic relations:  
Examples: Fish lives in Water. Fish and water are the entities while lives in is the relation connector.

Structure social relations:  
Examples: Family members

Action relations:  
Examples: social relations created through actions

Negative / Positive relations:  
Example:  
If node A increases, node B decreases / If node A increases, the node B increases, or if node A decreases, then node B decreases

Figure 13: the modified design-probe. I mapped information that parents shared with me in a social platform, here is one of the maps.

# 4

A lost relationship  
(Introduction)

Antibiotics are one of the most important discovery in the medical history and have made it possible to treat and cure diseases that could previously be fatal. The use of antibiotics is constantly increasing and unfortunately, antibiotics are often used not only against dangerous diseases, but also against harmless and troublesome conditions. Man has a large amount of different bacteria in and on the body. Bacteria are necessary for the body to function. They have important roles in digestion and immune systems, and most bacteria are not pathogenic (12).

Many of us have taken antibiotics for wrong purposes like colds, the flu and other viral infections, without knowing that ; the majority of these conditions are "fought off" by our own immune systems without the need for drugs; taking antibiotics in these instances will make the patient feel worse and potentially wipe out the "friendly" bacteria in their body(15), but this is not all, we stop taking our antibiotics which are prescribed correctly by medical experts, once we feel better, but before finishing the whole course. Improper use means more bacteria are exposed to antibiotics for the wrong reason, or in weak doses, and those that survive pass on their resistance as they multiply, this situation is called "Antibiotic Resistance"

4.1

In the beginning

19

Adherence is described by the World Health Organization (WHO) as the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, correspond with agreed recommendations from a healthcare provider. There are several factors that can have an impact on adherence . a person can intentionally be non-adherent because of personal beliefs or experience. One can also be unintentionally non-adherent by forgetting to take their medicine or because of language issues. Non-adherence can have a negative impact on the health benefit of a medication regimen and contribute to increased morbidity and mortality, and increased healthcare costs (19).

The word “adherence” has been considered by some in the pharmaceutical industry to be a reflection of a more patient-centred approach. Used in place of the more commanding and obidient-driven term “compliance” (8). However, as a medical doctor pointed out “we have made a superficial symantec adjustment, without shifting our approach” (9).

The World Health Organization (WHO) (11) has identified antimicrobial resistance as one of the three greatest threats to human health. An estimated 25,000 people die each year in the European Union from infections that are resistant to multiple drugs. The annual societal costs are estimated at €1.5 billion, although the true economic and societal burden is unknown. New forms of resistance continue to appear with patients playing an important role in its emergence and spread, incrementally reducing doctors’ ability to bring infections under control.

Guidance issued by the european Medicines Agency (EMA) defines patient acceptability as ‘the overall ability and willingness of the patient to use and its caregiver to administer the medicine as intended’. Acceptability is also considered to be ‘driven by the characteristics of the user (age, ability, disease type and state) and by the characteristics of a medicinal product. palatability, swallowability, appearance, complexity of modification before administration, required dose, container or administration device use and mode of administration are proposed as characteristics of the medicinal product(17).

20

As mentioned before in the abstract, professionals are trying to solve this problem from their medical and pharmaceutical point of view. One of these leading institutes is IDSA ( Infection disease society of America) who called for 10 new antibiotics approved by 2020 in a plan called 10×20. (16). The situation looks a bit different for us as designers ; millions of dollars are being spent on the research and development departments to create new antibiotics because pharmaceutical companies might be more focused on hunting for more lucrative medicine than spotting the roots of this problem. The issue is not that we do not have antibiotics, in fact we have lots of them. The problem is that we use them too much and for the wrong things. So the solution CAN NOT be to create more. If we simply create more antibiotics, but continue to use them heavily, without aiming to complete a full course or even use them for wrong things then we will only get more antibiotic resistance. Fortunately only two new classes of antibiotics have been brought to the market in the last three decades, not because they have noticed that making more is not the solution but as ; the industry has withdrawn from the antibiotic R&D area because it is considered a high-risk/low-return market with little to satisfy shareholder expectations.(10)

21

In Norway, we have previously been able to control the incidence of antibiotic resistance by persistent and extensive infection control measures in healthcare institutions but the problem may eventually become so widespread that these measures are no longer effective (13).

The annual report of medication and prescription from 2015 published by Folkehelseinstituttet indicates that "A key part of the strategy against antibiotic resistance is knowledge of the consumption in the population. The Norwegian Prescription Registry (NorPD) and the Norwegian Drug Wholesale Statistics are important sources for monitoring and analysing antibiotic use in Norway (14)"

Unaccepted medication rejected by the children is also an important problem for caregivers that cannot achieve the prescribed treatment; however, this reflex is the reflection of the child's basic biology. Taste is a crucial criteria for acceptability of oral medicines but not of ear or ocular preparations. This parameter is also more important for the paediatric population than for elderly because taste sensitivity is decreased in this population. According to EMA, acceptability should be an integral part of the pharmaceutical and clinical development and should be preferably studied in children themselves (17).

We assume that it is possible to identify predictive factors of acceptability. Which would thus allow designing a predictive model. This model will predict the expected acceptability of a medicine in a targeted population based on their characteristics. It could help medicines' designers to study acceptability of new products from the early stages of paediatric formulation development (17). Age is an important variable associated with adherence, with younger age having poorer adherence, this suggests that children are more likely to be newly diagnosed and therefore both they and their parents are less familiar with controlling those diagnosis.

To attain maximum implementation, such an educational healthcare resource needs to be targeted at the most suitable age group, so that the learning objectives can be understood and the subject is taught within the most appropriate part of the school curriculum since Teaching is compulsory for children aged 6–16 years in Norway, and in the first year of primary school, students spend most of their time playing educational games and learning social structures (18)





“Resistant bacteria is a major public health problem, and knowledge along with the reduction of unnecessary bio-congestion is our strongest weapon against resistance development!”  
—Antibiotica.no

Proper use of antibiotics is an important and demanding part of Norwegian general practice. The Ministry of Health and Care Services in 2016 made an action plan aiming to reduce antibiotics by 30% by 2020. The Ministry of Health and Care Services redisplayed NOK 5 million in the budget 2016, as earmarked follow-up of the action plan. This has led to a great strengthening of the Antibiotics Center for Primary Medicine. Antibiotic resistant bacteria are one of the biggest challenges for public health, and the consequences are dramatic if we get a spread of antibiotic-resistant bacteria. We will then come back to that time when people will again die of what we are currently looking at as trivial diseases. Nor would we be able to avail of current advanced medical treatment methods if we do not have effective antibiotics available (12). It is also important with measures aimed at the public, in order to increase the level of knowledge and competence regarding the use of antibiotics in the population. In addition, expanded and increased use of vaccines and re-vaccinations could reduce the incidence of infections and thus infection and antibiotic use as a result of this.

## 4.2 Healthcare in Norway

# 23

Awareness around the growing problem of antibiotic resistance has been increasing, and in 2015, the government published the National Strategy for Antibiotic Resistance 2015 – 2020 based on regulations from the ministry of Health and Care Services. The main goals of the strategy include:

- 1- Reducing total antibiotic use
- 2- Correct use of antibiotics – «only when needed»
- 3- Increase knowledge about what is causing the development and spread of antibiotic resistance
- 4- Be a driving force in international, normative work to strengthen access, responsible use and development of new antibiotics, vaccines and better diagnostic tools.

There are specific goals as well including:

- 5-Antibiotic consumption in the population will be reduced by 30 percent, measured in defined daily doses (DDD) compared with 2012.
- 6-Norway will be among the three countries in Europe who use least antibiotics for humans, measured in DDD/ 1000 inhabitants per day.
- 7- The average prescription of antibiotics will be reduced from the current 450 prescriptions to 250 prescriptions per 1000 inhabitants per year.
- 8- There will be studies of burden of disease relating to antibiotic resistance, the consequences of insufficient antibiotic consumption and the effect of infectious disease control.
- 9-There are also sector-specific goals for livestock, pets and fish as well as climate and environments.

Big data as its name suggests is such data that cannot be easily processed through common methods due to its huge size. When this huge amount of data set is somehow refined, it is the time for User experience designers to play their leading role in order to offer user-centred solutions based on the reports they got from purifying big data. The richness of big data being collected by all types of companies has unleashed a treasure trove of information for user experience designers; UX designers can create more robust solutions for users by analyzing these enormous data sets. (20). One of the crucial parts of UX design job is predicting and helping the users to have access to desired goods or services when or even before they think they need them. Taking advantage of big data in the era when we have much data more than ever is a good idea; especially when we want to design e-experience for users (target group is a crowd of thousands!) who dealing with each of them is a big challenge. When it is difficult to validate between user's words and user's actions, we have to set aside traditional user research methods such as interviews and look for other options in our toolbox. We need to have a rigid empirical data that support our proposed ux solution. Big data can be used when the presence of users in design process is insignificant in comparison with the total number of end users.

## 4.3 Mystic relationship through big-data

25

From the fortune-tellers in ancient civilizations till this super technological century, human being has been historically curious about the future, whether it is concerning our personal lives or the world around us; we have come a long way to design more and more ways in order to precisely and scientifically prove what is going to happen in the future. Data Science or Big Data is one of these ways that has been able to develop logical futuristic arguments. This led to numerous investments from different companies into building data platforms. Experience design is one such domain which brings human empathy to the table; This essentially allows us to effectively differentiate between a closed and open systems; Open systems are ones which involves emotion and empathy as the input, which is highly complex to predict through normal data science (2). UX designers have the opportunity to look beyond the so-called big data in an excel sheet, we have the ability to involve human intuition powered by elements such as Psychology, ethnography studies and user research which brings empathy and behavior to the table and is able to explain the big data with lot more context around.

The research question was explored through three projects done in Oslo and Akershus University College of applied sciences which had somehow the same theme. Integrating gamification into healthcare design has been evolving recently and although this is not a new approach, there is a need for a diversity of methods that aim to add context and insights into the process of designing the user's experience. Stakeholders (including pharmaceutical experts) have looked at social network as an opportunity to expand their commercial service among users; conversely, in the academic world, social media has been immediately recognized as an interesting primary source of data (23). Popularization of technology such as social media, internet and gaming in everyday life of users, suggests a new topic in design for healthcare. As mentioned earlier, In the medical world, compliance is the word that is used to demonstrate to what extent patients are loyal to their prescribed treatments. however as patients are getting more and more aware and empowered, this term becomes more and more offending as it adjudges that patients are naively following their caregivers' commands and do not follow recommendations voluntarily. Instead, they want to have an active role in their health, they also want the patient-doctor relationship to be on an equal level; Instead of compliance, they want to be motivated constantly and permanently which leads us to the research question that focuses on an opportunity for user experience design in primary antibiotics adherence in children: a narrative based product driven by big-data and gamification principles.

## 4.4 Research question

27

# 5 One thousand and one nights (Theory and Mindset)

“Games give us unnecessary obstacles that we volunteer to tackle”

—Jane McGonigal, American designer and author

The gaming industry is huge, and it can keep its audience consumed for hours, days and even weeks ; Some play the same game over and over again (24) . Gamification is a 21st century UX term and its principles help mostly designers to enhance users engagement in the systems they design. Firstly, we use it to inject fun into the systems that might otherwise lack joy or pleasurability for users, and motivate them to achieve the goals that we have set, we will boost these functions within a structure by designing challenges or virtual rewarding systems. Secondly, a successful gamification tool will help designers to generate users’ innate motivation of engagement in systems based on their choice of involvement. When it comes to inspiring users’ engagement by introducing gamification approach, it is the main function that activates an existing system.

Tore Gulden in his article describes systems and writes that ; an active system is what defines structures, and structure is everything on which the system, which forms the activity, relies and builds, accordingly structures are only functional or existent if the system operates. The activity influences the structure, and the structure influences the activity” (25).

there are some mechanics derived from video games that are common in every gamification approach, while applying them, we should be aware of the rule of “the right amount at the right time”, the goal should be not turning the gamification project fully into a game design project. Some of the mechanics are the challenge, points, badges and stickers, leaderboards, journey and constraints, each mechanic will be explained in a great detail in next pages.

Additionally ; when designed and implemented correctly it can have a huge impact on user loyalty and engagement ... Constantly ask yourself "does this benefit the user and is it fun?" throughout your project and you will stay on target (28).

## 5.1 Gamification 28

Gamification and behavioral design are linked in many points. Forty to forty-five percent of our daily decisions are actually not decisions at all. They are habits (2), so when introducing the new approach of gamification into an existing system, it might not be really easy to guide our users to shift their habits. Gulden also quoted (25) the Chilean biologist, Humberto Maturana when he suggested that: when exploring system behavior, one cannot point to what intelligence is, but must instead consider how intelligent behavior is generated as a consequence of systems. Charles Duhigg's book, *The Power of Habit* (26), introduced a concept called the habit loop (Figure 14). He breaks this into three steps:

Cue: the trigger for an automatic behavior to start

Routine: the behavior itself

Reward: what our brain gets out of it

When cue and a behavior and a reward become neurologically intertwined, what is actually happening is a neural pathway is developing that links those three things together in our head (27). As designers we should specify children cues and present rewards that will make them want to form routines. This way, we can help children form habit of adhering to their medication, and help them use our systems without the constant need for them to make conscious decisions.

Unfortunately gamification has been used for wrong purposes recently, we should be aware that gamification is about motivating users by activating them to have fun, it is all about improving the experience of using a service or a product and not about manipulating them to do unpleasant tasks. Understanding the users and their mission is the key, respecting the game-like mechanics and approaches which are going to be designed according to the characteristics of the user and their mission. A successful (gamification) project is one that covers both aspects of increasing engagement through pleasurable activity and satisfying the bigger picture – the original purpose for the design; Overall, gamification is an experience designers "weave" carefully into an existing system, not a feature they insert (2).

Summing it up ; gamification is quite a new technique which is now on the path of active proving its reliability as an effective design method (Figure 15); Nevertheless, its popularity is growing really fast so it has good chances to become the leading approach in a short time (29).

29



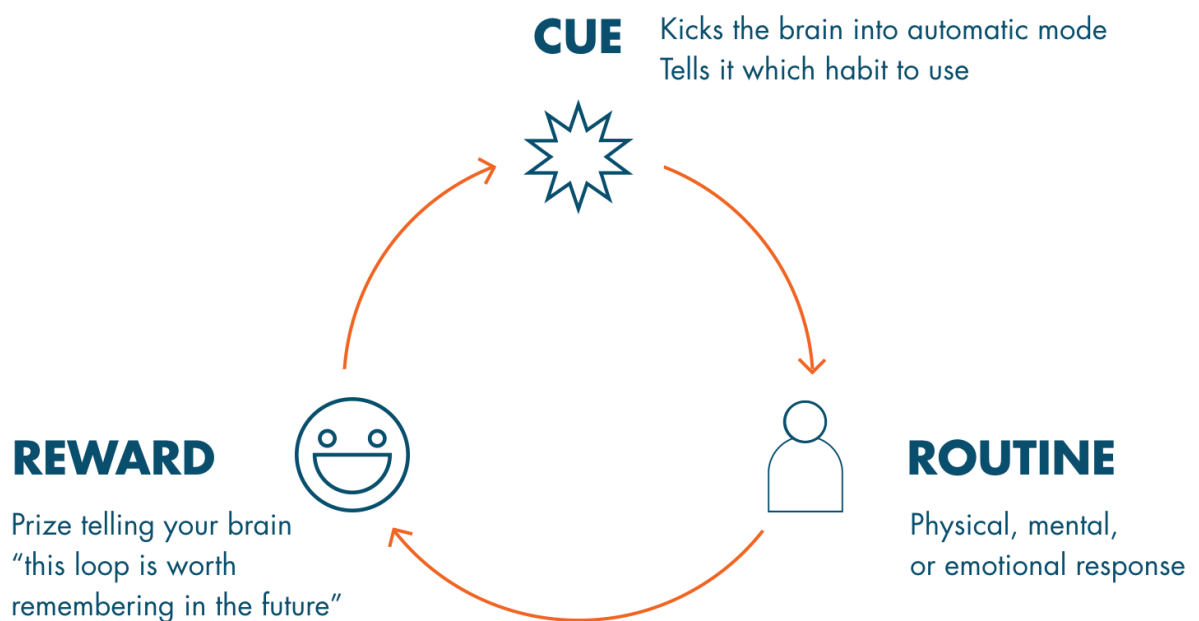


Figure 14 : Gamification and behavior design are tangled, gamification aims to target users behavior and its root.

“a game is a series of interesting choices.”  
—Sid Meier, creator of the Civilization series

The appearance of games dates back to the history of humanity. We have been playing games for an epic period of human history and it has always been one of the basic activities that all newly-born babies do before learning to do any other activities like having dialogue or walking on their two feet. The interesting part is playing games has never been an objective to the human, rather it is a natural part of being alive. For millennia, people have held an innate compulsion to play, and that will not change anytime soon; What they needed, they innovated, leaving us a wealthy legacy of devices through the centuries, ranging from the basic but powerful wonder of dice, to the timeless strategizing involved in chess, and on up to a library of latter-day board games that run the gamut in their levels of sophistication. As long as you have got an understanding of the evolution of games, you can begin to make intelligent choices about what elements of games you might want to include in your gamification designs (2). Andrew Rollings and Ernest Adams in their book, on game design stated that there are four actions related to a game (30):

- Play: it is more like an optional, recreational activity than an activity that has impact on the game. In Danish and many other languages, the word “play” can be translated as two words, “lege” (In Norwegian it is Leke) and “spille.” Lege (Leke) is like when children are playing; Spille is like when you are playing a game. The difference is small but present. When children are playing, there are usually no initial goals or rules — they are playing simply because they want to play(24). (Figure 15)
- Pretending: games often allow the players to define a role for themselves with desired characteristics.
- Rules: almost all games have rules that specify what players can or cannot do.
- Goals: regardless of the size of a goal, achieving a goal can lead to a great satisfaction. When you encourage users to complete a task, they are more likely to try to do it (24).

30



Figure 15: Aiming To Reduce Cleaning Costs, It turns out that men, in their urinal behaviour, cannot resist peeing on things, especially if they look as though they might wash away. Amsterdam's Schiphol Airport (31)

“Everyone has played video games at some point these days,  
and video games are fun.”

—PewDiePie, Swedish comedian and web producer

Games have a long history, as you can see, and the electronic game’s roots stretch right back to the earliest of human games. It is not that our ancestors needed to tell us that games go with the territory of being alive; games are hardwired into our DNA (2). In the course of just a few years, the international video game industry has grown to become one of the largest industries within entertainment and media ; The Nordic video game market is (also) developing fast (32) . Video games are a medium that has undergone a rapid technological and artistic development, and has become a major cultural expression. Today, video games are primarily played by children and young people, and form a major part of their daily cultural and media consumption (32) . The Government has a vision of Norway as a leading cultural nation that attaches importance to culture in all parts of society. Development of video games shall be part of this cultural focus. The video game market constitutes a major and rapidly growing part of the culture and entertainment market. Video games are also a medium that has undergone a rapid technological and artistic development, and are used by an increasing number of people, particularly children and young people.

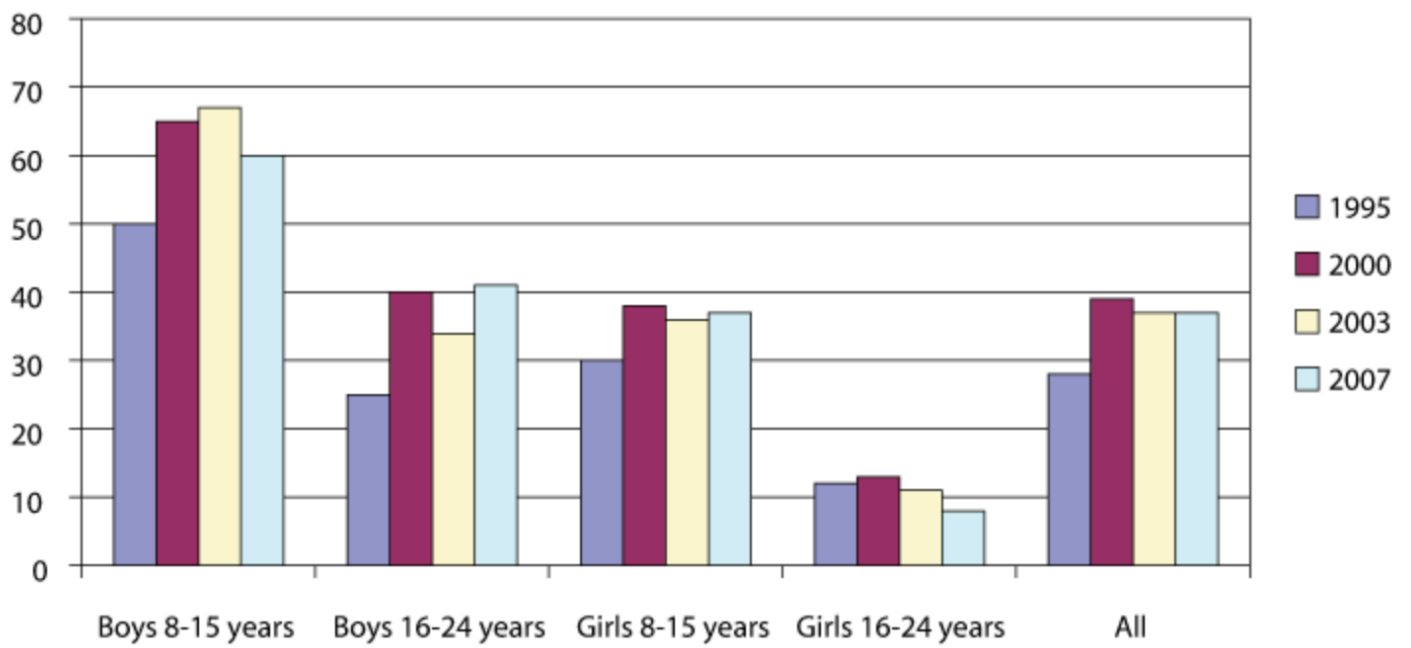
Peter Steen Høgenhaug, in his article called gamification and UX design, where the users win or lose (24) , in addition to repeating these four components of a game, tries to expand on them by bringing up another factor of cooperation and competition. He mentions the fact that “Games are more fun when you have someone to play them with. You can fight against an opponent or collaborate on completing a task “. Later on he talks about the ideal conditions of corporations with others that have been made these days by social networking.

31

Video games have become a major part of daily cultural and media consumption of children and young people, and the use of games is on the increase (Figure 18) (32). The attitudes of parents on Norwegian games were on the whole positive, and very few of them were negative to Norwegian games. This may indicate a certain potential market for more Norwegian games ,

children are seen to use video games increasingly often until they are 13–15 years old, and the frequency of use then falls. Boys play video games much more often than girls. According to TNS Gallup's survey (34) , virtually all children (96 percent) have access to technical equipment that video games can be played on and Hand-held games are by far the most popular with the younger age groups. Video games may also be useful teaching aids. In connection with development of the provision of electronic teaching aids, cooperation with the video game industry might prove interesting (32).

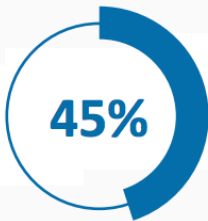
A report from Norway (33) indicates that "70% of parents have children that play games. Of these, the majority play with their children (55% parents play games with their children vs. 15% don't). The most common reason parents play games with children is because they are ASKED TO. A quarter of parents playing games with their children do so for the EDUCATIONAL BENEFITS. Many parents see gaming as having a positive impact on their child(ren). 57% believe gaming encourages their child to DEVELOP THEIR SKILLS more. A further 46% believe it encourages their children to be more CREATIVE. Parents of children who don't play games rarely acknowledge the potential educational benefits" (Figure 17)



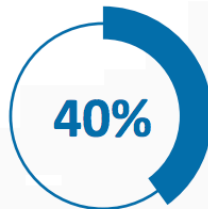
Use of video games on a random day 1995–2007. 8–24 years. Expressed as percentages.

## REASONS PARENTS PLAY GAMES WITH THEIR CHILDREN

They ask me to



It's a fun activity for all the family



To spend time with them



I enjoy playing with them



To monitor what games they play



Educational benefits



To monitor how long they play for



Health and fitness benefits



Figure 17: Parents who play with their children in Norway (33)

let's consider children's favourite game and think about what makes it so enjoyable and engaging for them, then let's think about the fact of "taking medication" and try to understand what makes it such a bad experience for children. what If "taking medication" for children, could feel abit like their "favourite game" ? lets compare these two areas attribute:

During the ethnographic research it got emerged that yet there is a lot to learn from games, the first outcome would be type of players. there is a framework resulting 1996 players' preferred actions within a game, done by Richard Bartle (37). It is based on character theory and is interesting to place different video game caterories in this frame to understand players' interests (Figure 20).

According to Statista Norway, the most played games among children aged 5-12 is minecraft, (Figure 16, 18, 19) a sandbox video game created and designed by Swedish game designer Markus Notch Persson. As the name suggests, this game is all about digging (mine) to collect blocks of materials and building (craft) to create your own masterpieces in the world of different terrains and habitants. Players can define how they want to explore the world, in a single-player-mode ar in a multiple-player-mode. According to players, Minecraft is unlike other video games, because every time they log in, there might be a different number of players or modes or even difficulties so everytime "playing the game" can mean different experience to each player. Based on the ethnographic research and mostly interviews done for this project, the majority of children believed that the most common reason for them to be reluctant to take their medicine is the flavor and of course the way the medicine is administered to them. With that introduction lets go to the different attributes of "playing Minecraft" and "taking medication" which suggests the elements that must be considered in the concept :



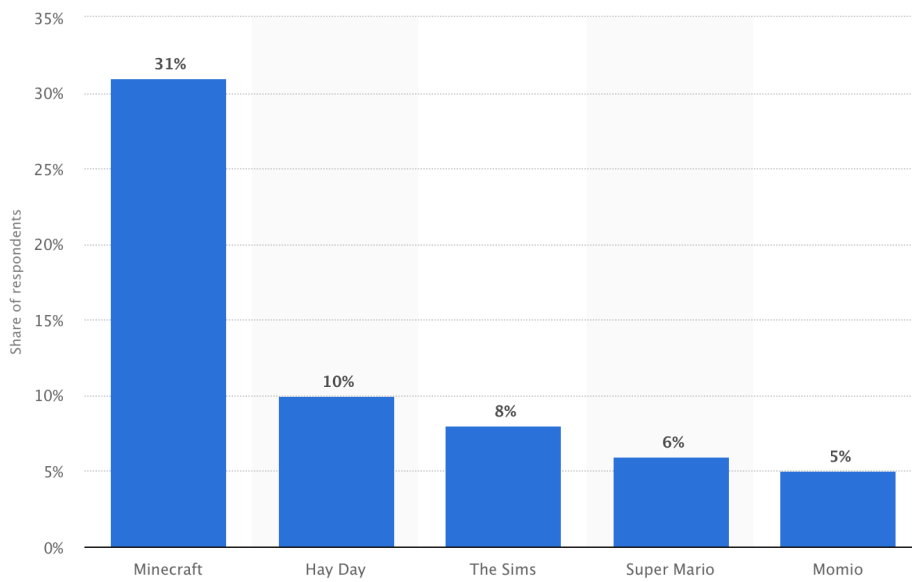


Figure 16: Most played videogames among girls, aged 9-12 in 2015 in Norway

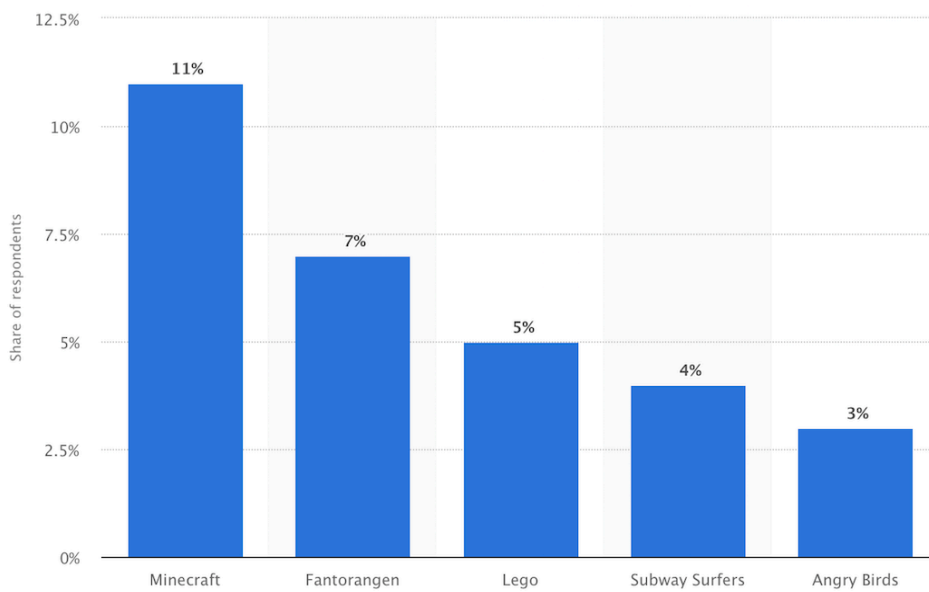


Figure 16: Most played videogames among girls, aged 5-8 in 2015 in Norway

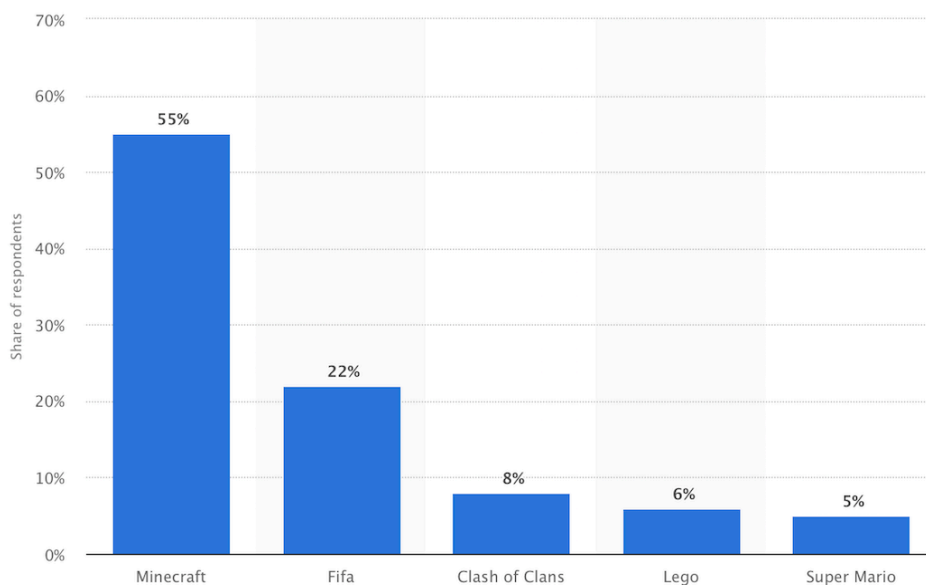


Figure 16: Most played videogames among boys, aged 9-12 in 2015 in Norway

Table 5.1 Distribution by age of users of video games on a random day (2006)

Age	9-12	13-15	16-19	20-24	25-44	45-66	67-79
Per cent	51	39	22	19	8	5	5

Source Norwegian Media Barometer 2006, Statistics Norway

Figure 18: Age of players, children between 9 and 12 have the highest percentage of playing videogames.

Attributes	Playing Minecraft	Taking medication
Task	Repetitive but fun	Repetitive and boring
feedback	constantly	When needed
goals	Clear, customizable	Vague, opposed
Rules	Clear, adoptable	Unclear, strict
information	Right amount at the right time	Overloaded and just in the beginning
Failure	Expected, bragable!	Do not talk about it!
Status of users	Different according to progress	stationary
collaboration	Definitely	Maybe
excitement	High	Low
Autonomy	High	Mid to low
narrative	yes	If you are a good kid
obstacles	Challenging	unpleasant

Figure 19: Comparisson of taking medication and playing minecraft

"My goal for the next decade is to try to make it as easy to save the world in real life as it is to save the world in online games."

—Jane McGonigal, American game designer and author

The word "player" has a straightforward explanation when compared to "user". Probably the most distinct part is that users mostly do not have a choice but participating in an activity, for example we all are electricity users, our lives are somehow tangled to electronic devices and it is not easy to ban all those devices while interacting with the society ; but players on the other hand, are granted with the choice to participate in an activity, imagine electricity devices again, if you choose to spend your calm sunday evening in front of TV, while using your cell phone and waiting for your dinner to get warm in the microwave, then you are a electricity-player . Here is the point for designers that I have practiced alot, to always base the gamification project on "choices" and not on "obligations" so that it can fit people who choose to participate in the activity. Player-centred design builds on and extends user-centred design to a whole new level; Player-centred-design is a process and expression that Janaki Kumar and Mario Herger coined in their book, Gamification at Work: Designing Engaging Business Software (35) .We can use user-centred design to develop applications as much as we can to develop games.(2)

## 5.4 Player centred design

# 34

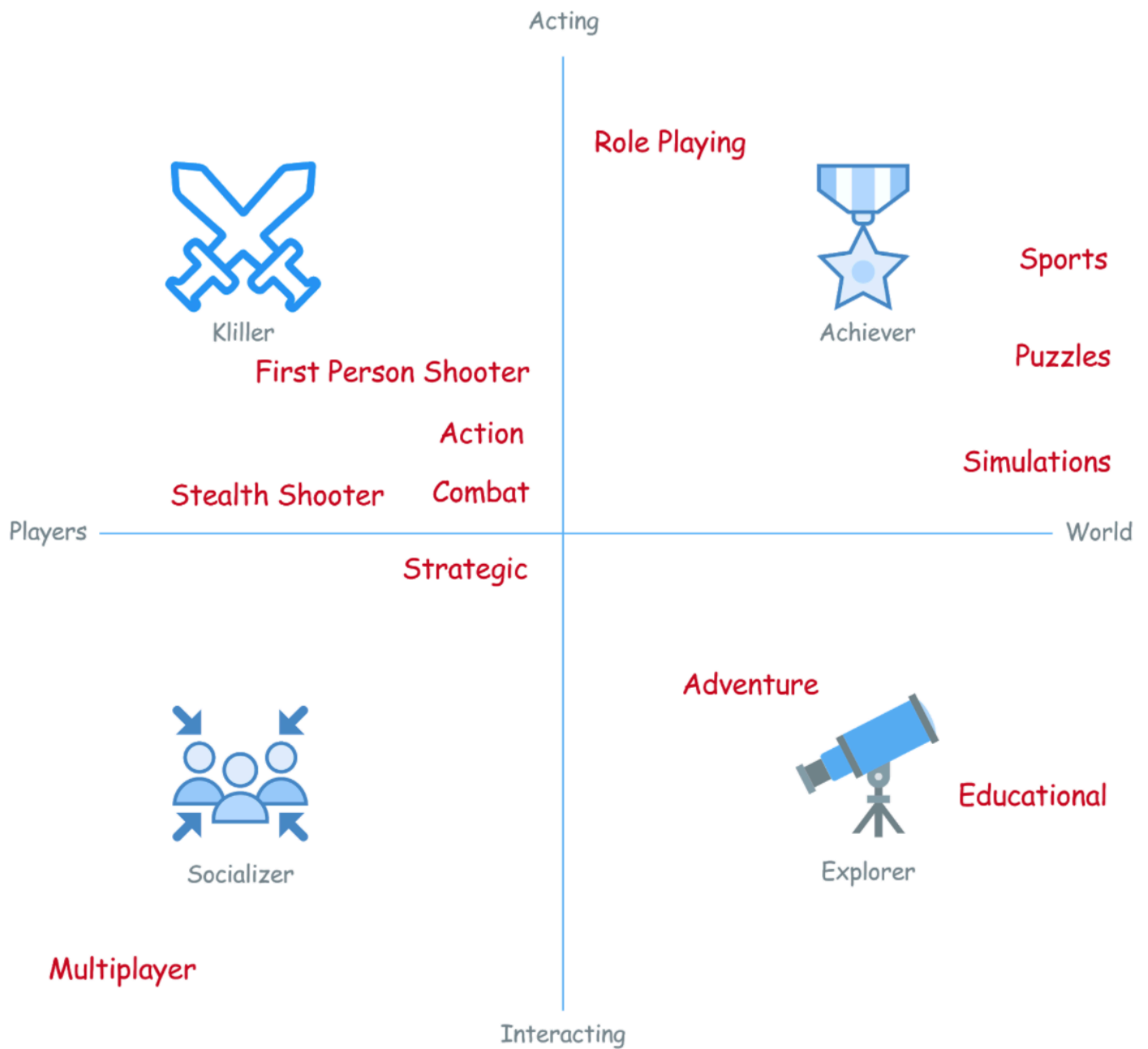


Figure 20: the map is inspired by Bartle category of videogame players

Player-centred design approach affirms that a game exists to be played, every game can be seen as a system that operates successfully when chosen to be played by a player; the activity influences the structure of this system and the structure influences the activity. This approach also considers the components of a game that influence players. The first step of player-centered design is to understand the players; as discussed in the first chapter, when targeting children with a familiar intervention (digital devices and gaming) in mind, we empower ourselves against primary design barriers since this generation is already involved somehow in the concept and they have lived always with high digital-device-accessibility .

Video games for children can be a really positive thing; They can allow children to express their creativity and use their imaginations, and they can encourage children to think in ways they normally would not. So if a game sparks your child's interest, has some educational value and has a respectable rating for your child's age group, go for it! (36) (Figure 21)”

"Begin with the end in mind"  
— Stephen Covey

After getting to know the players, it is time to understand their mission. Setting the mission is the key part that the success or failure of the whole gamification project is largely dependent on that. In this chapter, I am going to firstly understand the current scenario of taking medication, secondly identifying the desired outcome from experts' points of view and lastly setting an appropriate mission for this project based on the previous steps and by the help of SMART approach. There are many successful examples of designing missions following the same three steps (Figure 25)

The aim for analysing the current situation was that I wanted to know currently what and how children are experiencing medication and particularly antibiotics, and not just the children, but everyone involved in this situation. First, the common way of conducting qualitative research such as interviews, observations and site-visits was done with the key research of empathizing with children and their parents around everyday experience of taking medication. Besides due to lack of sense of satisfaction in results obtained by these methods, a modified cultural probe had been designed that will be explained in details in method chapter of this thesis.

When collecting antibiotics from Apotek, Children get a pack consists of a calendar and a set of animated stickers which asks them to use it on days whenever they take their medicine (Figure 22-24). Parents also get brochures about tips on how to administer their child with medication and information about what are antibiotics, I also defined that the worldwide problem of antibiotic resistance has a root in people's behaviour when they are intentionally non-adherent to their prescribed medication; empathizing with children and their parents showed that most common reasons of non-adherence with antibiotics in children in Norway are children's experience of the taste of their medication and parent's beliefs and knowledge besides self-prescribing when antibiotic is not needed at all; they all lead to medication refusal in some levels, before completing the whole course and threaten children with antibiotic resistance.



Figure 25: The famous piano stairs, project by Volkswagen, using 3 steps of setting mission





## Tips for å gi LEGEMIDLER TIL BARN

Kilde: Apotekerforeningen

Før du gir barnet legemiddel, les nøye doseringsanvisningen som står på etiketten og pakningsvedlegget.

Lag faste rutiner for legemiddelinntaket. Barn i «hermealderen» vil lettere kunne ta legemidler hvis andre i familien tar sine vitaminer eller eventuelle legemidler til samme tid.

Premier barnet med trøst, ros eller noe det ønsker å drikke eller spise hvis det å ta legemiddel oppleves som et problem og barnet tross dette tar sin medisin. Prøv å unngå tvang. Hvis tvang er nødvendig, bør barnet få ekstra mye trøst, ros og premiering etter at medisinen er tatt.

### Mikstur:

Bruk alltid doseringssprøyte (til de minste barna), måleskje eller målebeger for å få målt opp riktig dose. Husholdningsskjeer varierer i størrelse og er ikke egnet til å måle opp legemidler. Vær nøye med tannpuss hvis barnet jevnlig får sukkerholdig mikstur. Bland ikke miksturen i en for stor porsjon væske eller mat. Syke barn har ofte dårlig appetitt. Hvis de ikke drikker eller spiser hele porsjonen, får de ikke i seg riktig dose legemiddel.

### Øyedråper og øyesalve:

Hvis det er puss i øyet, så fjern dette først med en myk vaskeklut eller kompress fuktet i kokt, lunkent vann. Få barnet til å ligge eller holde hodet bakover med lukkede øyne. Åpne barnet sitt øye og drypp/legg en salvestrimmel på innsiden av nedre øyelokk. La barnet lukke igjen øyet og vent litt. Alternativt kan du dryppe en dråpe/legge en salvestrimmel i øyekroken mens barnet har øyet lukket. La deretter barnet blunke dråpen/salven inn i øyet.

### Tabletter:

Det kan være vanskelig for barn under 5 år å svelge en tablett. Prøv da å knuse tablett og bland med litt syltetøy, moset frukt, yoghurt, is eller liknende som barnet liker. Før du gjør dette så sjekk pakningsvedlegget eller med apoteket om tablett kan deles eller knuses. Det finnes også tablett-ovretrekk som kan legges utenpå tabletter. Dette gjør at tablett blir glatt og tilføres smak slik at den blir lettere å svelge. Les flere tips for å gi legemidler til barn på [www.apotek1.no](http://www.apotek1.no)

**APOTEK 1**  
Vår kunnskap - din trygghet

Figure 22: parents and children get brochures and animated calendar

Lek med meg på bedringens vei

Dag 1  
Dag 2  
Dag 3  
Dag 4  
Dag 5  
Dag 6  
Dag 7  
Dag 8  
Dag 9  
Dag 10

APOTEK 1  
Vår kunnskap - det trykkest



Figure 23

## ANTIBIOTIKA

Antibiotika har bare effekt på infeksjoner som skyldes bakterier. Det finnes ulike typer antibiotika, legen må derfor vurdere hvilken type som er best egnet for deg. For å unngå motstandsdyktige bakterier er det svært viktig at antibiotika brukes på rett måte, og bare når du trenger det.

### DU HAR FÅTT UTLEVERT:

#### DETTE LEGEMIDDELET SKAL TAS:

- sammen med måltid
- utenom måltid
- uavhengig av måltid

#### RIKTIG BRUK AV ANTIBIOTIKA

Fordel dosene jevnt utover dagen.

Fullfør kuren! Ta hele kuren slik legen har beskrevet. Selv om du føler deg frisk etter et par dager, kan infeksjonen blusse opp igjen hvis du slutter for tidlig.

Antibiotikamiksturer skal som regel oppbevares i kjøleskap og ristes rett før dosen måles opp.

Bruk medisindåser for å få riktig mengde mikstur. Kjøkkenredskap er ikke egnet. Spør på apoteket.



## KOSTHOLD OG LIVSSTIL

Noen kan reagere allergisk på behandlingen. Kontakt lege så snart som mulig dersom du får kløe, hudutslett eller pusteproblemer.

### DIARÉ OG LØS MAGE

Antibiotika kan forstyrre naturlig bakteriesammensetning i tarmen og gi løs mage. Et daglig inntak av melkesyrebakterier under antibiotikakuren kan hjelpe til med å opprettholde en normal bakteriebalanse i tarmen.

Hvis du får kraftig diaré kan effekten av andre legemidler reduseres.

### SOLØMFINTLIGHET

Enkelte typer antibiotika (spesielt tetracykliner, sulfonamider og kinoloner) gjør huden mer følsom for sol. Unngå soling, dekk til huden eller bruk solkrem med faktor 15-25 eller høyere.

### ANDRE LEGEMIDLER

I enkelte tilfeller kan antibiotika påvirke effekten av andre legemidler. Effekten av legemidlene kan både forsterkes eller reduseres slik at man opplever bivirkninger eller svikt i behandlingen.

Apotek 1 kan sjekke om legemidlene du bruker påvirkes av antibiotika.

### GRAVIDITET

Ikke alle typer antibiotika kan brukes av gravide. Apotek 1 kan sjekke om legemiddelet er trygt å bruke ved graviditet.

Les mer om riktig bruk av antibiotika [www.apotek1.no](http://www.apotek1.no)



The second step is what stakeholders wish the users to do in this system. Having informal talks with experts in medical and pharmaceutical industry is the way used for conducting information in this field to realize what behavior change they wish. Figure 26 (38) shows the SMART goal setting approach used in this chapter, this method is recommended by the authors of the book gamification at work (35) to set the mission in the S.M.A.R.T way based on the analysis from current scenario and desired scenario

The current scenario is, first being described, children stop taking their antibiotics intentionally due to their experience or their parents beliefs.

The desired scenario is, children completing their course of antibiotics and parents not using antibiotics for wrong purposes. besides we want to create a patient record bank .

Mission is, to motivate children to be adherent and educate them and the parents to not use antibiotics for wrong purposes. we also want them to record their pharmaceutical history in a fun and engaging way within a familiar context for them (digital devices and gaming).

So after understanding the players of the project, we need to set an appropriate mission suited to their characteristic, the S.M.A.R.T approach has been used to summarize the current and desired scenarios in order to specify a feasible mission for players.



Figure 26: SMART approach, had been used to clarify desired mission of all stakeholders

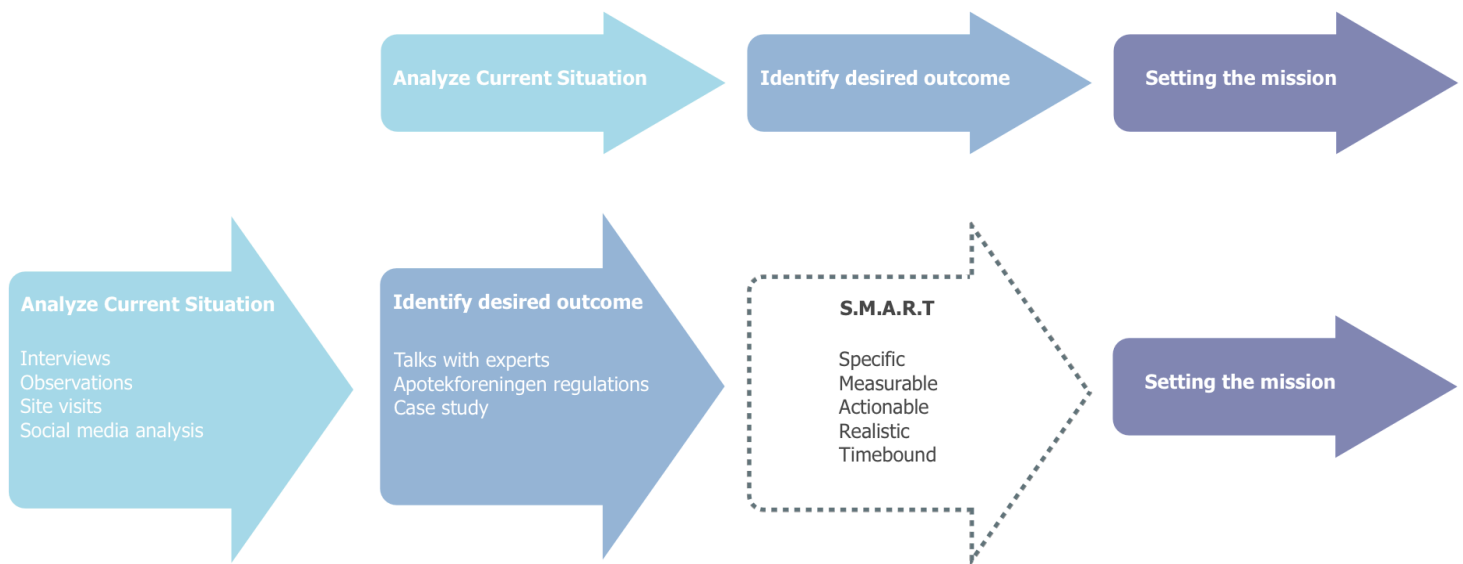


Figure 27 : three steps of setting a mission

"Gamification is 75% Psychology and 25% Technology."  
— Gabe Zichermann

The third step in player-centered design is understanding the motivations: It is proved that the gateway to a successful gamification project is through motivational factors for players. Motivation in Gamification has two main types (Figure 28), it is either intrinsic or extrinsic as shown in this figure (35). Spotting motivational factors in children leading to do an activity is not complicated, interviewees mentioned that they have taken pills before because adults told them to do and some did that in an effort to please others (Doctors or parents), such engagements are extrinsically motivated, the example is the calendar and stickers for children who get antibiotics in norwegian pharmacies and it is meant to keep them motivated. The challenge here is the reward should be continually given to child for keeping them motivated, and if this procedure stops, the motivation will fail radically; It is also " more difficult for a child to sustain extrinsically motivated activity because of this reliance upon some outside force".

opposed to this type, there is another form of motivation called intrinsic ; Children do many things simply because they want to do them; Selecting a toy or a shirt to wear is the result of intrinsic motivation. The child makes her own choice and achieves satisfaction from both the act of choosing and from the opportunity to play with the toy or wear the shirt. Since the activity is generating the motivation, it is mostly self-sustaining for as long as the child wants to continue the activity. (39)

38

## Types of Motivators

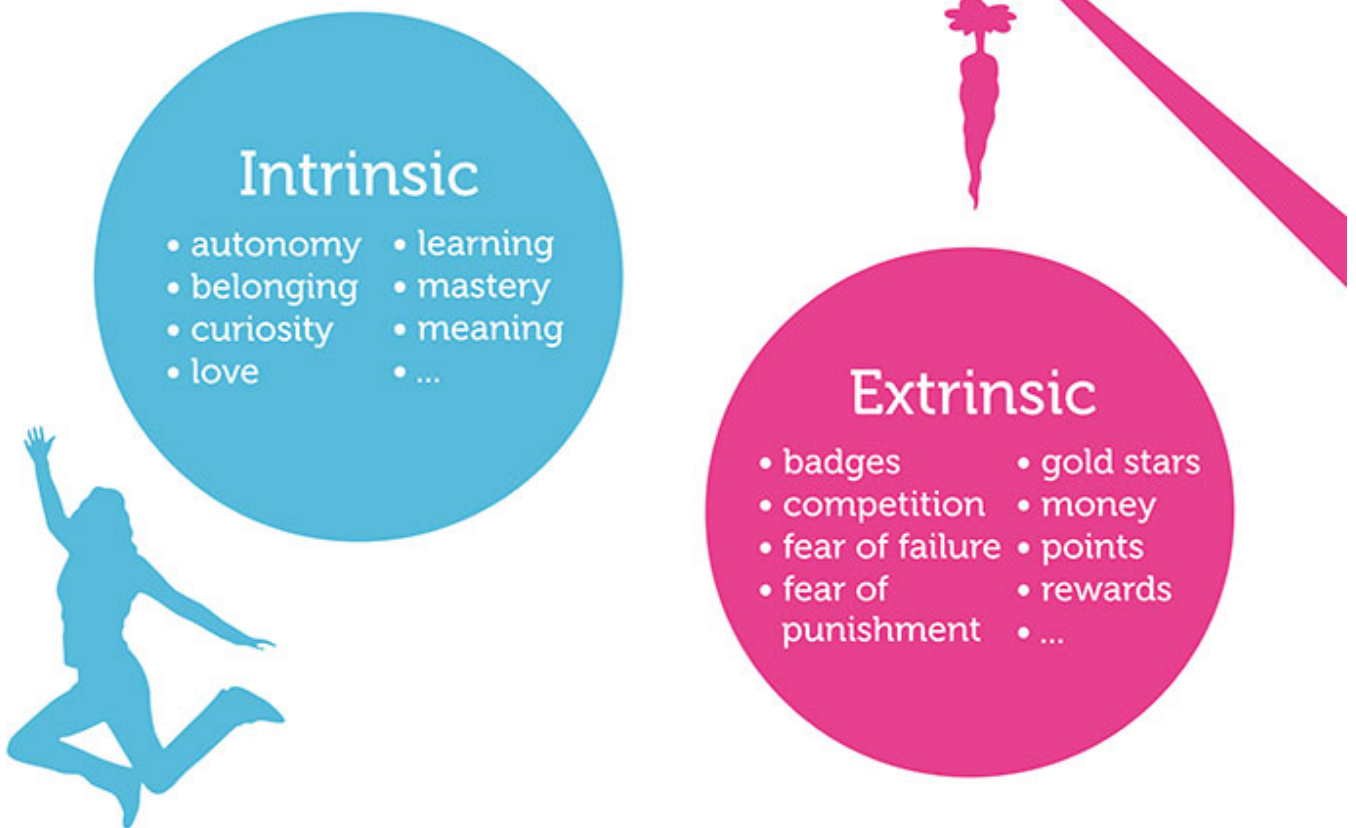


Figure 28: two types of motivations



defining extrinsic motivations could be effective if we just wanted children to passively obey the medical and pharmaceutical instructions from carer givers, the same scheme as current scenario of children taking medication; but we agreed that we want to have an educational plan to activate children in recording their medication history too.

Since intrinsically motivated activity is more rewarding in and of itself, children learn more from this sort of activity, and they retain that learning better. Intrinsically motivated children are more involved in their own learning and development. In other words, a child is more likely to learn and retain information when he is intrinsically motivated – when he believes he is pleasing himself. Parents can build on this sense of confidence by guiding their child's play and activities while still giving the child a range of options. This unstructured play is an essential element of the child's motivation, learning, and development(39).

Antibiotic course for children is 7-10 days on average, if the mission and motivation in medication scenario are going to be defined in a game-like framework, their engagement may get down after finishing the antibiotic course, One strategy to counter player fatigue is to plan for a few releases ahead and introduce new features periodically to sustain novelty and interest. A similar strategy is to consider the players' journeys and their level of expertise with regard to the gamified system. Introduce a small set of features in the beginning as the player is onboarding, and unlock more functions as the player acquires more skills.

“Game mechanics are the core of what a game truly is. They are the interactions that remain when all of the aesthetics, technology and story are stripped away.”  
—Jesse Schell, game designer and owner of Schell Games.

The fourth step is understanding the mechanics (Figure 29). Mechanics are the most visible element of gamification, and are able to create positive dynamics. Kumar and Herger (35) Compare gamification mechanics to different paints in an artist's palette. Artists do not create their masterpieces just by adding too many colors on the canvas unless they have an artistic vision, talent and training to begin with.

Similarly, successful game mechanics depends on a good understanding of the player, the mission, and human motivation. They provided a list of gamification mechanics that if apply correctly, they can leverage the motivational driver in players. the mechanics are:

- Points: single count metrics for counting players' activities. Collecting of some amount of points to get a budget is motivational for players and it can cause positive attitude for the target behavior.
- Challenge: that motivates players to action especially if they believe that they are doing something bigger than themselves.
- Constraints: in this context which taking medicine in a right time is vital, having constraints in the shape of deadline combined with optimism can be seen as another kind of powerful game mechanics. There is a desire to act immediately to tackle an obstacle combined with the belief that there is a reasonable hope of success after overcoming.
- Narrative: it draws player into a story within the game. Humor in such context with negative tone for children, can be used as a mechanic to deflect their bad experience about taking medication into a cool experience.

40

# The Game Economy



Figure 29: game currency, one of the mechanics of a game

I looked at mechanics as ingredients of a food that I could adjust the measures based on users taste and offer them a modified version of a food. while doing ethnographic research I had to use narration to attract children to gather around me and encourage them to share their own stories, so I could write the points down; that inspired me to continue the same method as concept feature too. So, among mechanics I chose narration the most and then added other elements to taste! Information structured in a visualized form and through narration makes very powerful memorial tools as visualized narration provides fine-drawn orders and structures which allow new information to fit precisely into existing map we already have about a subject. This is the main doctrine of method of Loci that was used far back in ancient Greece. The method of loci is a method of memory enhancement which uses visualizations with the use of spatial memory, familiar information about one's environment, to quickly and efficiently recall information.

Memory contest champions claim to use this technique to recall faces, digits, and lists of words. These champions' successes have little to do with brain structure or intelligence, but more to do with using spatial memory and the use of the method of loci (40). This interaction made by visualization suggests that recalling new information in any subject, for example healthcare, can be enhanced when offered in a visualized format. In design, the storytelling approach takes full advantage of this method, where a story template provides familiarity. Stories mostly come with pictures and if not they pave the ground for listeners to use their imagination and create images in their mind based on the world they know (Figure 30) .

## 5.5 Method of Loci

41



Figure 30: Method of Loci based on spatial memory and familiarity works

“Make the audience put things together; do not give them four,  
give them two plus two.”  
—Andrew Stanton, Wall.E creator

Usual school health curricular and other behavior-change interventions targeted at children have had limited effectiveness. New channels are needed to reach children that offer promise of promoting substantial health-related behavior changes (41). One such new channel is the video game, since many children spend numerous hours playing them. Using video games to promote behavior change could capitalize on the children’s pre-existing attention to and enjoyment of them. No review has appeared of health-related behavior-change video games. A common component of games is “story” (41).

Storytelling is a powerful behavioral tool because it does not give people the facts in an orderly list, it forces them to infer the facts for themselves, which leads to a greater comprehension. It is most helpful to tell the story in a way that guides the reader to the desired action, logically instead of telling them what you want them to do, Put Your Reader in the Story. Humans are inherently self-interested. So, the best way to make your audience care about something is to make it about them (42). Research shows that the human brain is better at retaining and recalling information and concepts when they are presented in a story format. Information structured through a narrative makes for very powerful mnemonic devices because stories provide order and structure allowing new information to slot into existing schemas and cognitive maps we already have about the world (43). This much abbreviated exposition suggests that behavior change can be enhanced when stories address behavior-change issues, and the lesson to be taken from the story promotes health behavior changes (41).

## 5.6 Storytelling

42

Since time immemorial, humans have represented powerful messages and insights about their own condition through storytelling. Stories are powerful ancient tools, but applying them into other contexts like healthcare is simply connected to innovation. We already established that; innovation is a process and needs to be managed (6) so what is important to know is that by setting up our story step by step within the process of designing an application, we can create a great innovative foundation for our final output. From another point of view, storytelling can be used as the main way of interaction between the user and a product as well as an innovative design process thinking since it is established that people love to hear a story, it is an enjoyable way to receive information too. Stories are the way we convey information to our users over and over again, this is beneficial especially when we target children, "This very abbreviated exposition suggests that behavior change can be enhanced when stories address behavior-change issues, and the lesson to be taken from the story promotes health behavior changes (41). Earlier we recognized one of the key drivers of innovation which is need pull by continues growth in antibiotic resistance in Scandinavian countries and particularly in Norway; although the need pull source in this concept is stronger, the growing field of information/communication technology and everyday use of smart devices have eased the way for knowledge push innovations as well. With the rise of the internet the scope for service innovation has grown enormously, not for nothing is it sometimes called "a solution looking for problems" (6). UX designers can benefit two sources of innovation, need pull and knowledge push; they also can inject emotion and value into the end innovative product/service for users (44). In fact UX design can be the third key driver; the increasing importance of design as a source of innovation also engages with the world of services. The term "experience economy" is used to describe the evolution of innovation from meeting needs towards creating experiences.

43

# 6 Super AntiBugs! (Concept)



The chosen framework is based on a work done by Shoemaker and Olivier (53) in which they summarize insights about patient medication experience as a result of an ethnographic research. Here is a map to understand which guideline should be created for the concept of this project involving ethnographic insights of parents from design probe (Figure 31). Additionally, the guidelines were created from themes so that research might be practically applied to parents' expectations of a useful educational and motivational medication application (Figure 32).

Resistance development remains one of the most important problems in society and in hospitals. In many European countries, the prescribing of antibiotics is highest for children. Teaching children about the various forms of microbes, the impact of antibiotics, and the increasing antibiotic resistance problems as a result of unnecessary use of antibiotics can help raise awareness about the proper use of antibiotics in children, which is our future generation of users. In the school, infections are the most common cause of absence. Poor hand and airway hygiene contributes to increased proliferation. Hygiene campaigns aimed at schools can reduce the incidence of infections in students, employees, and their families, which in turn can reduce the use of antibiotics (12).

## 6.1 Discussion



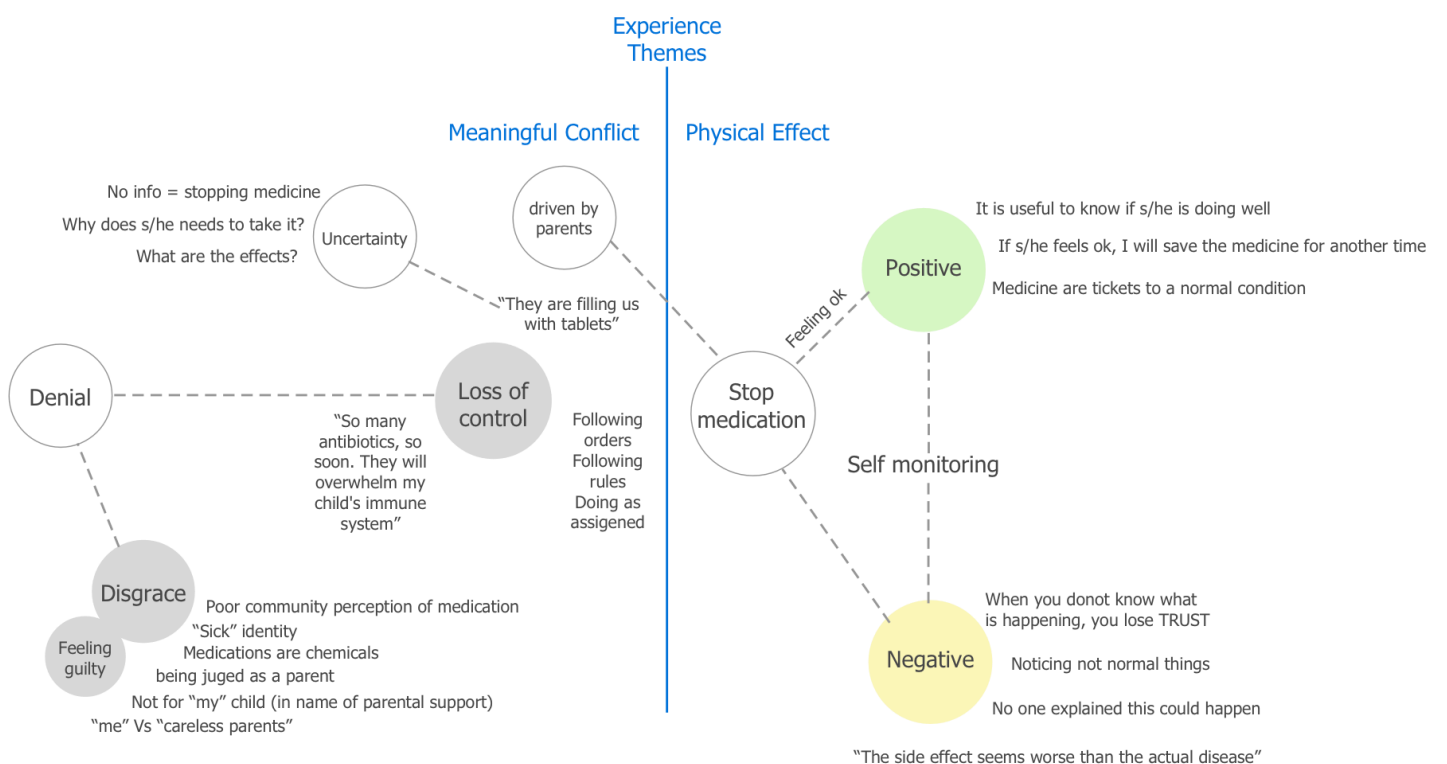


Figure 31: Analysis map of parents' antibiotic experience when Children were prescribed

Stage	Theme	Guideline
Meaningful Conflict	Loss of control	Provide information about medication, in children-friendly terms. So that children and parents can understand how it intends to help them.
Meaningful Conflict	Loss of control	Information must be easily understood and accessible. Children and parents must understand the reasons why they are taking the medication; and feel as if they are taking part in managing their health, rather than obeying orders.
Meaningful Conflict	Disgrace	The product should be positioned in a way that promotes a positive transition period, where children will receive support
Physical Effect	Positive	Information must strengthen the consequences of adjusting dosage as well as identify common misunderstandings from non-medical influences.
Physical Effect	Negative	Information must identify common and uncommon side effects, accomplished by contact information that is readily answered. Benefits of medication should be illustrated.

figure 32: Synthesizing the map and generating guidelines

Since time immemorial, humans have represented powerful messages and insights about the human condition through storytelling. They are undeniable part of every culture with almost the same structure here and there. Storytelling and user experience have common elements like planning, research, and content creation that can be utilized for effectively developing an experience. This designed experience can then offer meaning and emotion for its users. Utilizing storytelling, UX designers can also inject emotion and value into the end product for users (44), back to ancient greece, they are the most famous civilizations who used storytelling to transmit information to a willing group of audience.

The episodic natures of these stories meant that storytellers were able to pick up a storyline, adding more and more adventures and leave cliff hangers so that the stories could be continued the following night. This would have been an oral tradition with each storyteller adding their own embellishments to the stories and using their own strategies to keep their audiences spellbound and wanting to come back for more (54). They had a timeless formula according to that classical masterpieces had been created. Ever Since that era, Many artists and writers got inspired by their storytelling formula that is going to be the framework of this chapter as well.

There are illustrations on antibiotic packs whether they are in shape of pills or syrups, these characters are also the main "hero"s in the gameplay who are going on mission, during a course of antibiotic (on average 10 days and at most 14 days) every time the child take a pill or a spoon of syrup, one of the heroes get activated, it is shown in the package that which one of the heroes they can take.

# 45

## Storyline:

Patient journey starts with a storyline. It helps children and parents to have a clear vision throughout the treatment, it is also like a road that we take children with us to approach the goal. Almost all kinds of stories in real life or in gameplays start with a simple change in a routine.

"Kaveh is a 7-year-old boy who is living with his mom and dad, it was a snowy cold day in winter when he came back from school and he felt fever, he was earlier making a snowman with his friends so he thought it is a cold he got. At dinner, mom realized that Kaveh doesn't look really well, in fact he could barely talk because of sore throat. Mom tried to figure out what is wrong so she looked into his mouth and you know what did she see? To be continued...

46

## Characters:

After defining what the “change” would be, it is time to determine how children should cope with that change. This will form characters who want to participate in the storyline and according to the storyline, they all have a task to do. Here we have Kaveh, His mom, Doctor, Pharmacist and mysterious Antibugs.

Mom saw a lot of white spots inside Kaveh’s mouth, she had no idea from where they came from, so she called his doctor and book an appointment for tomorrow. The next day they went to visit the doctor, when he examined Kaveh he said: Ummm, have you ever heard of the gang of Antibugs? When Kaveh said that he has not, the doctor continued: I know someone who has a tiny army of Antibugs, I suggest that you and your mom go there and pick up those guys, they will show you how to get rid of this sore throat and fever, but remember that you should follow the structure exactly for 10 days. Then he wrote a letter to that guy he knew and Kaveh and mom with that letter went to meet Doctor’s friend. To be continued....

47

Setting:

It is a set of different components that forms the unique concept of ours which is different from other competitors. Using gamification and narration for motivating and also educating children is the main setting for this project. We want children to enter the ideal world that we designed for them and follow the adventures we expect them to do. We want to make it enjoyable for children using their favorite activities.

They went to a Apotek and doctor's friend gave Kaveh a pack of pills and he said that they are not normal pills, but each of them has a unique characteristic with privileged ability. He also gave a password to mom so that they could enter the world of Antibugs together. He insisted that "once you enter their world you cannot come out till you complete the mission! Do you accept the challenge? What do you think Kaveh said?

48

Dialect:

As agreed upon before, we want to change the way of giving medication to children, instead of obeying the orders by them, we want to use patient-friendly terms and ask them to get involved in the process of treatment. We also want them to believe us as health authorities who are well aware of every aspect and concern they might have.

As probably u guessed, Kaveh accepted the challenge, everyone knows he loves to explore. whatever it is, he was thinking that he must stay home for next days and it is a nice way of spending days in bed anyway. Mom used the password to download the Antibug application from Apotek.no. once it was done and after specifying the Doctor and the Apotek they went to earlier, Kaveh was asked to make a profile and then he saw the shadows of mysterious superheroes, the Antibugs! Exactly the same number as pills he got. Kaveh realized that he is not alone, in fact the Doctor and his pharmacist friend were available if Kaveh wanted them to be.

49



Rhythm:

Rhythm in an digital-based application for children is the same common pattern that children are familiar with based on the gameplays that they have experienced before, that is why we studied their favorite game to play the same rule! So we are going to have "bad guys" and "good guys", "territories", "Magic features" and "personalised worlds".

Superheroes were asleep and Kaveh had to choose which one he wants to wake, he read the characteristics of every pill on the pack and he decided to unlock the soldier, but before that he had to take the actual pill and that was something he never would do... pills.... Yack! ..... But if he wanted to know what his soldier could do. He had to take it, so he closed his eyes and let the soldier in with a glass of orange juice! Then mom confirmed in the application what time Kaveh took the pill and he was all ready to go. The black and white soldier opened the eyes and started to talk to Kaveh, he explained what happened to their gang and some viscous bugs made all of them asleep so that the bugs could escape from their world and hide inside children's body. He asked Kaveh to wake his fellows so they can overcome bugs who cause headache, sore throat, fever, vomiting and refuse them to eat or drink properly. There was a pallet of different paints that Kaveh could use to paint soldier's outfit however he wanted him to look like. After that they went together to explore the world.

50

Decor:

It is simply the graphical look of a concept, this is how we want to present our application to children age group, we want it simple, understandable and graphically pleasant with lots of illustrations and colors.

The next day When they were on their exploring trip, the soldier showed him a dirty land and he said it is bugs' territory and told him how they attack immune system and how they can go unnoticed and expand their territories, then he told Kaveh to wake another fellow. Kaveh knew what to do, swallowing the yacky pill and ask mom to confirm so that he could wake that hero with icy torch who could point the torch at them and make bugs frozen for a while and stop them from expanding.

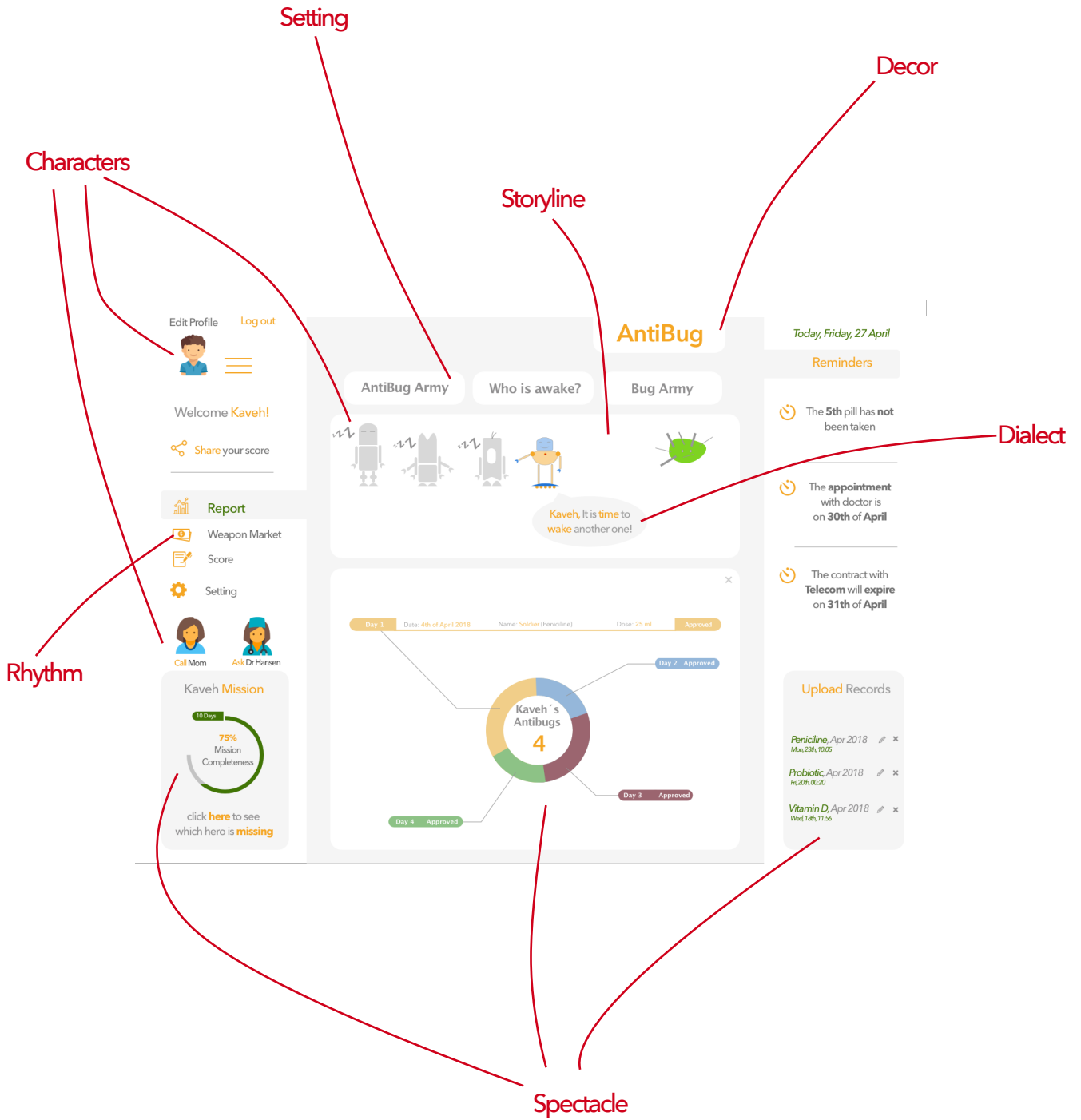
51

Spectacle:

The special features of our design that are going to stick in children minds. They use these features to describe their experience in that they did not expect to see those features.

After 3 days Kaveh felt better and he was ready to go back to school, he was looking forward to meet his friends and tell them what happened when he got sick and how he experienced a new game where he could color the heroes and go exploring with them. He already felt better but as doctor and his friend insisted he had to finish the mission and wake all Antibugs again so although he did not feel sick anymore, he continued to take his medicine to protect the world from more powerful bugs and stop their returns.

52



7

Happily ever after  
(Concept)

“If people knew how hard I worked to get my mastery;  
it wouldn't seem so wonderful at all.”  
—Michelangelo, artist and creator.

There is the question of what will happen if the antibiotic course is over and children still demand the continuous gamified system? At this phase of the game, there are two options for you in reality. The first is to continuously run the same content over and over again, the second is to be of help to other players, to show them around the game and make certain that they become as involved in the game as you are. You can create your own challenges, too, as part of this (35). If we look at the sample of children current favourite game, Minecraft, there is a smart expertise route for players in this game (beginners, regulars and masters) during which we will understand what really motivates players, so by tapping on them we can continue focusing of what players think they are growing in. there are five different modes on Minecraft: survival, creative, adventure, hardcore and spectator (Figure 33).

## 7.1 Future scenario

# 53

Survival	Player needs to gather all the material, craft items and tools to build. They also gain "experience points"
Creative	Player has access to an infinite amount of blocks to build, they also can destroy what they created instantly.
Adventure	Player can interactive with objects and mobile characters.
Hardcore	This is not technically a game-mode, it is a difficulty level for survival mode.
Spectator	Player can fly around and observe the world without interacting with anything and anyone.

Figure 33: Discovering tips out of children favorite game in order to create a future scenario when the course of antibiotic is over

What is so obvious about Minecraft is that there is no score and no real end. Players are “tasked” to make a life for their character. People often like to see how they are performing in a particular domain. Indeed, being told how they are doing can spur them on to involve themselves at a deeper level. Providing users with information relating to their performance levels, such as the number of positive reviews you have gained from your peers or other users, can give them the incentive to persevere with a task or a range of tasks, depending on the nature of the experience. In addition, you could offer users the opportunity to gain collectible achievements, such as 'medals' or an elevated status within an online community (2); but why such a design achievement pattern matters? When we target children to make them adherent to their medication through a gamified system, such collectible achievements can provide some kind of determination or motivation to do the thing we wish them to do. Presenting achievements visually can motivate them to explore more like we intended to do by waking up heroes everytime the child takes the pill for having a whole army of “good guys”. If the players can see their progress status gradually changing time to time as they explore the things that you are presenting, they feel rewarded for their engagement in the system and this gives them a sense of involvement. Every little achievement they get, makes them a step nearer to their goal. Despite the fact that using achievement pattern in design can boost users’ egos, showing the points to other users can add value to their involvement in the system so that others can see how trustworthy, how regarded and how involved they are. Presenting this pattern in a visual way can make a virtual track for them that shows what they have done so far and what they need to do in the future.

Major resources have been used in public and healthcare-setting campaigns to improve hygiene and antibiotic use, However, there have been few educational initiatives in this area aimed at school children. As people under the age of 15 years represent 19% of the population of Norway, the concept suggested by this study may encourage Norwegian-wide behavioural changes in the future by targeting school children in their early learning environment.



1: Digital native. (2018, May 12). Retrieved from [https://en.wikipedia.org/wiki/Digital\\_native](https://en.wikipedia.org/wiki/Digital_native)

2: UX Design Courses & Global UX Community. (n.d.). Retrieved from <https://www.interaction-design.org/>

3: Sjøvoll, Vibeke; Gulden, Tore (2017). GAME DYNAMICS IN DESIGN - A PROCESS TO ACHIEVE CREATIVE AGENCY (TO GIVE PEOPLE A CHANCE), proceedings of E&PDE 2017 – International Conference on Engineering and Product Design Education. s. 274-279. The Design Society.

4: [http://dg293.weebly.com/uploads/5/1/7/2/51727845/4395608\\_orig.png?531](http://dg293.weebly.com/uploads/5/1/7/2/51727845/4395608_orig.png?531)

5: Population. (n.d.). Retrieved from <https://www.ssb.no/en/befolkning/nokkeltall/population>

6: Tidd, J., Bessant, J. R., & Pavitt, K. (2013). Managing innovation: Integrating technological, market and organizational change. Hoboken: Wiley

7: Generation Z. (2018, May 13). Retrieved from [https://en.wikipedia.org/wiki/Generation\\_Z](https://en.wikipedia.org/wiki/Generation_Z)

8: Reeve, E., & Wiese, M. D. (2013, November 17). Benefits of deprescribing on patients' adherence to medications. Retrieved from <https://link.springer.com/article/10.1007/s11096-013-9871-z>

9: MAPD5100 Problem Definition. (n.d.). Retrieved from <https://docs.google.com/document/d/1VkyMjszbNkBz7w192Qs1TpYgqn5n2lQO40msnzT5XRg/edit#heading=h.sat82bx4xgol>

10: Drive AB - Tackling the growing threat of antibiotic resistance. (n.d.). Retrieved from <https://www.fhi.no/en/id/antimicrobial/drive-ab---tackling-the-growing-thr/>

## 7.2 Reference

- 11: Antibiotic resistance. (2018, May 13). Retrieved from <http://www.euro.who.int/en/health-topics/disease-prevention/antimicrobial-resistance/antibiotic-resistance>
- 12:Antibiotika.no. (n.d.). Retrieved from <https://www.antibiotika.no/>
- 13:Antibiotic resistance in Norway. (n.d.). Retrieved from <https://www.fhi.no/en/op/hin/health--disease/antibiotic-resistance-in-norway---p/#surveillance-of-antibiotic-resistance-in-norway>
- 14:<https://www.fhi.no/globalassets/dokumenterfiler/rapporter/2014/reseptregisteret-2010-2014.pdf>
- 15:University of Northampton. (2015, August 24). Are we really over-using antibiotics; what is all the fuss about? Retrieved from <https://medium.com/academic-musings-from-the-university-of-northampto/are-we-really-over-using-antibiotics-what-is-all-the-fuss-about-8612a98ad658>
- 16:Antibiotic Development: The 10 x '20 Initiative. (n.d.). Retrieved from <http://www.idsociety.org/templates/twocolumnnavigation10X20.aspx?pageid=32212258833>
- 17: Ruiz, F., Vallet, T., & Aoussat, A. (2016, April 25). Standardized method to assess medicines' acceptability: Focus on paediatric population. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/jphp.12547/abstract>
- 18: Education in Norway. (2018, April 30). Retrieved from [https://en.wikipedia.org/wiki/Education\\_in\\_Norway](https://en.wikipedia.org/wiki/Education_in_Norway)
- 19: Use of medicines, adherence and attitudes to medicines among persons with chronic spinal cord injury. (1970, January 01). Retrieved from <https://siidon.guttmann.com/es/registro/use-medicines-adherence-and-attitudes-medicines-among-persons-chronic-spinal-cord-injury>
- 20: Atkin, H. (2016, December 02). How Can UX Design Make Sense of Big Data? Retrieved from <https://generalassemb.ly/blog/can-ux-design-make-sense-big-data/>

56

- 21: Instagram profiles: The social image. (n.d.). Retrieved from <http://www.gravity7.com/blog/media/2012/11/instagram-profiles-the-social-image.html>
- 22: V., & G. (1970, January 01). PLAY PROBES - AS A PRODUCTIVE SPACE AND SOURCE FOR INFORMATION. Retrieved from [https://www.designsociety.org/publication/39089/PLAY PROBES - AS A PRODUCTIVE SPACE AND SOURCE FOR INFORMATION](https://www.designsociety.org/publication/39089/PLAY_PROBES_-_AS_A_PRODUCTIVE_SPACE_AND_SOURCE_FOR_INFORMATION)
- 23: Using Social Media For User Research. (2017, March 01). Retrieved from <https://www.smashingmagazine.com/2017/03/using-social-media-user-research/>
- 24: Gamification And UX: Where Users Win Or Lose. (2012, April 26). Retrieved from <https://www.smashingmagazine.com/2012/04/gamification-ux-users-win-lose/#sec>
- 25: Gulden, Tore, engagement in systems : (2016, December) by Tore Gulden, HIOA
- 26: Duhigg, Charles. The Power Of Habit: Why We Do What We Do In Life And Business. New York : Random House, 2012. Print.
- 27: The Habit Loop | Game Design Thinking Research Group. (n.d.). Retrieved from <https://gdt.stanford.edu/the-habit-loop/>
- 28: Staff, C. B. (2012, April 19). 5 examples of great gamification. Retrieved from <https://www.creativebloq.com/web-design-tips/5-examples-of-great-gamification-1233261>
- 29: 1. (2017, April 26). Gamification in UX. Increasing User Engagement. – UX Planet. Retrieved from <https://uxplanet.org/gamification-in-ux-increasing-user-engagement-6437cbf702aa>
- 30: Rollings, A., & Adams, E. (2003). Andrew Rollings and Ernest Adams on game design. Indianapolis, IN: New Riders.

31: <https://worksthatwork.com/1/urinal-fly>

32: Affairs, M. (2018). Report No. 14 to the Storting (2007-2008). [online] Government.no. Available at: [https://www.regjeringen.no/en/dokumenter/report-no.-14-to-the-storting-2007-2008/id502808/sec1?q=video%20games#match\\_0](https://www.regjeringen.no/en/dokumenter/report-no.-14-to-the-storting-2007-2008/id502808/sec1?q=video%20games#match_0) [Accessed 13 May 2018].

33: Isfe.eu. (2018). [online] Available at: [https://www.isfe.eu/sites/isfe.eu/files/attachments/norway\\_-\\_isfe\\_consumer\\_study.pdf](https://www.isfe.eu/sites/isfe.eu/files/attachments/norway_-_isfe_consumer_study.pdf) [Accessed 13 May 2018].

34: Tns-gallup.no. (2018). Mediebarn 2017. [online] Available at: <http://www.tns-gallup.no/kantar-tns-innsikt/mediebarn-2017/> [Accessed 13 May 2018].

35: Kumar, J. and Herger, M. (2013). Gamification at work. [Aarhus]: Interaction Design Foundation.

36: Care.com, I. (2018). Video Games For Kids: What Is Age-Appropriate?. [online] Care.com. Available at: <https://www.care.com/c/stories/4015/video-games-for-kids-what-is-age-appropriate/en-gb/> [Accessed 13 May 2018].

37: Matthewbarr.co.uk. (2018). Take the Bartle Test. [online] Available at: <http://matthewbarr.co.uk/bartle/> [Accessed 13 May 2018].

38: Interact software. (2018). 11 Ways To Perfect Your Internal Communications Plan | Interact software. [online] Available at: <https://www.interact-intranet.com/blog/11-ways-perfect-internal-communications-plan/> [Accessed 13 May 2018].

39: Naspcenter.org. (2018). NASP Center - Motivating Learning in Young Children. [online] Available at: [http://www.naspcenter.org/parents/earlychildmotiv\\_ho.html](http://www.naspcenter.org/parents/earlychildmotiv_ho.html) [Accessed 13 May 2018].

40: En.wikipedia.org. (2018). Method of loci. [online] Available at: [https://en.wikipedia.org/wiki/Method\\_of\\_loci](https://en.wikipedia.org/wiki/Method_of_loci) [Accessed 13 May 2018].

58

- 41: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2189579/>
- 42: Dagenhard, C. (2018). How to Use Storytelling to Enhance Your Healthcare Content. [online] Kunocreative.com. Available at: <https://www.kunocreative.com/blog/enhance-healthcare-content> [Accessed 13 May 2018].
- 43: Medium. (2018). Healthcare's superheroes – IDEO Stories – Medium. [online] Available at: <https://medium.com/ideo-stories/the-antibiotics-234821e539ea> [Accessed 13 May 2018].
- 44:Smashing Magazine. (2018). UX Storytelling For A Better User Experience - Part One. [online] Available at: <https://www.smashingmagazine.com/2010/01/better-user-experience-using-storytelling-part-one/> [Accessed 13 May 2018].
- 45: Google Docs. (2018). Telenor Health Medication Adherence. [online] Available at: <https://docs.google.com/presentation/d/1FSbBCWNsSPvc9aAc-LpgvIUfKBZg9zKotZsy4Z5mfPE/edit#slide=id.p> [Accessed 13 May 2018].
- 46:Anon, (2018). [online] Available at: <https://www.apotek.no/om-oss/apotekforeningen> [Accessed 13 May 2018].
- 47: Nottingham.ac.uk. (2018). [online] Available at: [https://www.nottingham.ac.uk/~pazmjb/nms/downloads/press\\_release/nms\\_final\\_press\\_release\\_web.pdf](https://www.nottingham.ac.uk/~pazmjb/nms/downloads/press_release/nms_final_press_release_web.pdf) [Accessed 13 May 2018].
- 48: Lazar, J., Feng, J. H., & Hochheiser, H. (2017). Research methods in human-computer interaction. Amsterdam: Morgan Kaufmann.
- 49: Robert Curedale (2013). Mapping methods: for design and strategy. Design community college Inc.Topanga, Usa.
- 50: B. (n.d.). Related Approaches. Retrieved from <http://www.systemsorienteddesign.net/index.php/giga-mapping/related-approaches>

51: Kolko, J. Thoughts on interaction design: a collections of reflections. 2011 (Elsevier, Inc, USA)

52: Blandford, A., Furniss, D., & Makri, S. (2016). Qualitative HCI research: Going behind the scenes. San Rafael, CA: Morgan & Claypool Publ.

53: Shoemaker, S. J., Ramalho, D., Alves, M., & Ekstrand, M. (2011, June). The medication experience: Preliminary evidence of its value for patient education and counseling on chronic medications. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/21435815>

54: The Ancient Greeks & storytelling. (n.d.). Retrieved from <http://theplayhouse.org.uk/outofthebox/the-ancient-greeks-storytelling/>

55: The psychological mechanisms behind addictive and engaged play of Massively Multiplayer Online Role-Playing Games (MMORPGs) and their potential role in education. (n.d.). Retrieved from <http://dg293.weebly.com/>

60

Thank you

Hilde Ariansen

Terje Wistner

Christine Frigaard

Astrid Maria Heimer

Bente Skjelbred

Tore Gulden

Liv Mathiesen

Angelsea Saby

Acknowledgements

Parameter of SSQS	Considerations for planning and conducting studies	Considerations for reporting the result of the studies
1: Purpose	<p>What will be the purpose of the study: to enhance the antibiotic adherence among children</p> <p>Why is it necessary to conduct the study? By breaking the vicious behavior of non-adherence and incorrect usage, we would save thousands of lives and billions of kroners a year.</p> <p>What knowledge do you expect to gain from the study that you don't have already? Role of gamification and technology in healthcare</p>	<p>What are the most novel and important findings you will report? The possible role of narration and gamification in medication adherence</p> <p>Why will these findings matter to the reader of the report? Each of us has experienced non-adherence somehow in our lives</p>
2: Resources and Constraints	Which resources do you have to work with? Inside the healthcare system in Norway	Did you use anything new or novel to conduct the study? Yes, I used gamestorming technique, using games to brainstorm. Presenting the

# Appendix



	<p>What are the constraints that might limit the possibilities of the study?</p> <p>Contacting the target group and time limits</p>	<p>problem to children in a game and painting event.</p> <p>Did the availability of resources (time, money, etc.) limit what you could achieve? yes</p>
<p>3: Researcher Attributes and Roles</p>	<p>How many people will be in the research team? There will be a collaboration partner, norwegian pharmacy association</p> <p>What roles will they fulfil? conduct statistics and discuss e-health services since they have launches a service lately with the purpose of enhancing medication adherence for patients with chronic illness.</p> <p>What specific knowledge and expertise does each</p>	<p>What attributes of the research team may have influenced the outcome/output of the study? After having some meeting with the senior adviser and the director of technology and e-health at Apotekforeningen; it got emerged that there is a lack of patient records in the system which provoked me to consider having an option for users to share their health information digitally and voluntarily with their providers.</p>

	<p>team member add to the study? Giving Health-related information and making fast connections with other healthcare professionals.</p> <p>What (if any) training will you need to provide? Making basic digital platforms.</p> <p>What relationship do you intend to foster between your researchers and the study's participants? There is a lack of communication between healthcare providers with themselves and with the patients.</p>	<p>What roles did the researchers fulfil in the study setting? informant</p>
<p>4: Participant Recruitment</p>	<p>How will you recruit your participants? Workshops, observations, interviews</p>	<p>How did you end up recruiting participants? The individual interviews have been done the same way as</p>

	<p>What's your sampling approach for participants? Gamification</p> <p>What inclusion/exclusion criteria will you use? Will this change over the course of the study? Confidentiality must be part of the research conducting</p>	<p>I-know-someone-who-knows-someone-who-knows-an-elf! I asked friends to ask their friends if they know any child taking antibiotics. I had also a visit to an activity school in Bigdøy, called Aks where I had a group interview of parents and children.</p> <p>Did you need to change your initial approach and did this change have any bearing on the reliability or quality of the eventual outcomes? The information had to be conducted according to confidentiality, which made troubles recording some participants.</p> <p>What roles did the participants and researchers play in the</p>
--	---	--

		<p>study? Both Participants and researchers were my source of ethnographic research but there were sometimes challenges. According to my experience when doing research in a group of children, the loudest voice dominated the conversation and downed out other opinions.</p>
<p>5: Location and Intervention</p>	<p>Where will you base the study? Norway</p> <p>What forms of intervention are to take place? I will challenge medical and pharmaceutical experts to look at this topic from designers point of view.</p>	<p>Did the location have any influence over the way the study was conducted? yes , the duty of confidentiality regarding doing research related to children was pretty strict in educational places.</p> <p>Did the location influence any outcomes of the study? Yes, the most prescribed antibiotic in</p>

		<p>Norway is Penicillin, which is the most horrible one in taste based on participants opinions, so non adherence rate in penicillin is higher in Norway than other countries.</p>
<p>6: Role of Theory</p>	<p>What theory will you use to base your data gathering, analysis and reporting on? Gamification</p>	<p>How did that theory shape your study? It helped to look at everyone as an participants, weather the child, their friends, the parent, the teacher or caregivers. While conducting the information, participants felt like they are playing while they actually were helping me to empathise with their experience. They also felt it is so cool that they are sharing their stories with each other which suggested one of the elements of</p>

		<p>gamification that everything is interconnected.</p> <p>How did the theory relate to the findings? Designing for children in the way of a fun and informative digital narration can enhance the general knowledge of children and their parents about healthcare and besides it can cause better adherence to medication.</p>
<p>7: Ethical Considerations</p>	<p>What ethical considerations will you need to address to run the study? Respecting participants privacy</p> <p>What will you do to make sure that participants benefit from taking part in the study? Taking advantage of gamified</p>	<p>Did the ethical considerations you address shape or alter the study? How? Yes, having that in my mind, forced me to invent new ways to conduct information that are not in conflict with participants privacy. For example while interviewing I asked them to define a</p>

	<p>workshops and rewarding systems</p> <p>What will you tell participants about the study and when will you tell them? I will inform the parents and supervisors of children in advanced and will explain it to children themselves within a game.</p> <p>How will you protect the data of the participants? The data will be gathered anonymously and will be presented through personas, conducting personal information such as name, living place, health background is not the necessary in this research.</p>	<p>character for themselves and tell me a story about that character being sick once, or asking them to talk to me through visualizations, both because of the language barrier we had and due to not making them to talk about their family or personal lives.</p> <p>How did you ensure that participants were fully informed about the study and how their data would be used? I explained it to children in a story format with examples of their favorite gameplay .I did not ask for any personal data from their parents or supervisors, I just asked them to tell me the experiences they had.</p>
--	---	--

<p>8: Techniques for Data Gathering</p>	<p>What data will you gather? I will gather statistics of antibiotic adherence in Norway, I will also gather data about digital gaming among children in Norway</p> <p>How will you structure the gathering of data? The way of doing research is going to be related to the five-stage-model of design thinking, proposed by stanford University.</p> <p>What protocols will you use for observations, interviews, instructions, etc? It is going to be exempt protocol which will not deal with with clinical trials and participants will not face more risks than they would in daily life during the research period.</p>	<p>How did the data actually get generated? The majority of information got conducted by literature review and then interviewing the experts, pharmacists and GP s, there were observations of children as well but they did not provide any rigid statistics. Social media-Design probe also was a big source.</p> <p>Did you divert from your protocols at any stage? No, there was not any need to change the preliminary protocol.</p> <p>How were participants given instructions? In a fun, entertained group activities mostly.</p>
---	--	--



<p>9: Interleaving, recruitment, data gathering and analysis</p>	<p>When you analyse data, how will you do it? By breaking down the complex concept and problems into smaller, easier-to-understand constituents.</p> <p>What tools will be used in the analysis? Visualization in form of giga mapping and patient journey mapping or mind mapping along with storytelling</p>	<p>How was your data gathering and analysis interleaved? The analysis strategy helped me to gain empathy for children, my actual users who I decided to design for in an empathetic way.</p> <p>Did your analysis change the way you gathered data during the course of the study? Yes, the analysis phase affected directly the next step which was synthesys during which I had to involve creativity to put research pieces and analysis together in order to have a whole understanding of the situation.</p>
<p>10: Reporting</p>	<p>Who is your audience(s)?</p>	<p>What is new? Using gamification in healthcare</p>

	<p>Design professors and pharmaceutical / medical professionals</p> <p>How will you report your findings? Since gamification and narration are the main theories behind this project, I guess I will use them as well to report and present.</p>	<p>area is not a new approach by having that specifically for short-term medication adherence is new, the most novel function is giving the possibility to patients to share their health records and history with their caregivers when needed.</p> <p>What's most important? Suggesting a game based digital platform both for children who have been grown up by digital games and for the caregivers who are in demand of having a digital bank of patients health history.</p> <p>Are the claims you make supported by the evidence? The recent similar service proposed by the collaborative partner</p>
--	--	--

		in this project was done and significantly approved.
--	--	--

Edit Profile

Log out



Welcome Kaveh!



Share your score



Report



Weapon Market



Score



Setting



Call Mom



Ask Dr Hansen

Kaveh Mission

10 Days

75%

Mission  
Completeness

click **here** to see  
which hero is **missing**

# AntiBug

AntiBug Army



Who is awake?



Kaveh, It is time to  
wake another one!



Bug Army

Today, Friday, 27 April

## Reminders



The **5th** pill has **not**  
been taken



The **appointment**  
with doctor is  
on **30th** of April



The contract with  
**Telecom** will expire  
on **31th** of April

## Upload Records

Peniciline, Apr 2018

Probiotic, Apr 2018

Vitamin D, Apr 2018



Day 1

Date: 4th of April 2018

Name: Soldier (Peniciline)

Dose: 25 ml

Approved

Day 2 Approved



Day 4 Approved

Day 3 Approved