

From concerns to action

A Techno-Anthropological study into responsibility for the development of Virtual Reality in relation to ethical concerns

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From concerns to action: A Techno-Anthropological study into responsibility for the development of Virtual Reality in relation to

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Abstract

This Master's thesis identifies ethical concerns of VR, explores why they matter and discusses the notion of responsibility in relation to them. The purpose of this thesis is to contribute techno-anthropologically to the knowledge of ethics and responsibility in the design and development of VR. The motivation behind it was The IEEE Global Initiative on Ethics on Extended Reality in 2021 to help to move XR technologies from "perilous to purposeful," (IEEE 2021). Through literature review this thesis identifies four types of ethical concerns of VR: privacy and data issues, physical harm, psychological harm, and issues of transparency. Ethnographic methods are used to understand views of different actors on ethical concerns. Designer's ethical responsibility in the development of technology is analysed through Mediation theory by Postphenomenology and Instrumentalization theory by CTT. Collective responsibility is discussed through The Problem of Many Hands. The conclusion of the thesis is the recommendation to place the responsibility to the collective setting, such as a company, to act on ethical concerns, and principles for it are provided as a result. Legal authorities in the level of social responsibility was also found responsible since interdisciplinary team work with the industry would benefit the ethical development of VR.

Preface

I want to take the opportunity to thank Khora and the informants for collaboration and my supervisor Theresa Scavenius for all the support and great advice.

This thesis is for my Vikka, the reason for everything.

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Chapter 1: Introduction

Foreword

A little girl in a purple dress emerges from behind a pile of wood in a park, comes running towards her mother, smiling while yelling "Mom, mom!" Her mother is reaching for her in open arms. She is crying. The little girl asks "Where were you? Did you think about me?" "I do, everyday…" her mother answers sobbing. They spend time playing at the park and celebrate little girl's birthday. After a while the girl gets tired and lays down on the bed. "Good bye, mom. I love you, mom." She falls asleep and flies away as a butterfly.

These are scenes from a South Korean documentary, I Met You, where with a help of Virtual Reality (VR) a grieving mother reunites with her child¹. Her daughter has been dead for four years. What the mother sees through her head-mounted display is a simulation of her daughter in a VR application and she touches her while wearing touch-sensitive gloves. This is probably one of the most extreme examples of current possibilities of VR – in this case meant as a mode of therapy – but none the less it's out there. VR is not anymore just for entertaining purposes, but becoming a powerful tool in e.g. research laboratories, companies, hospitals, NGOs and the military. While its use expands and new purposes are found and tried out, while it has become a valuable technological tool and has potential to achieve great things, also new ethical dilemmas are introduced that need to be acknowledged. But whose responsibility is it to act on them?

In 2021 The IEEE Global Initiative on Ethics on Extended Reality called for corporations, academia, industry, government agencies, and any interested individuals to take part in creating white papers, workshops etc. to ensure that XR² technologies "move from perilous to purposeful."³ The initiative aims to help "augmented reality and virtual reality designers and developers to understand the landscape of ethical & moral dilemmas when designing for XR, and to provide a framework with some guidance of applied XR ethics & ethically-aligned design" (Bye 2021). The

¹ <u>https://www.youtube.com/watch?v=uflTK8c4w0c&t=341s</u>

 ² XR = an umbrella term for AR (augmented reality), VR (virtual reality), MR (mixed or merged reality)
³ <u>https://standards.ieee.org/industry-connections/ethics-extended-reality.html</u>

IEEE, The world's largest technical professional organization for the advancement of technology

industry of XR, including VR, as a relatively new medium still lacks ethical considerations of the development of the technology. More research and discussions are needed on the topic, which is the motivation behind this thesis.

A review of the literature reveals that articles about ethical concerns around VR have started to emerge mainly in the last five years. These have included various themes from empathy (Ramirez 2017) to using Avatars (Maloney et al. 2019) and there was created a first version of Code of Ethical Conduct in VR (Madary and Metzinger 2016). Since technology and uses of VR have developed enormously in the last few years, to fully understand the scope of the problem it is important to gain a more complete and updated picture of the ethical concerns and why do they matter. This paper attempts to first do this through literature review. Ethnographic methods are also used in attempt to comprehend what is the understanding of ethical concerns among the development and use of VR.

The IEEE Global Initiative on Ethics on Extended Reality points out designers' and developers' responsibility to understand the ethical issues on XR. What is though an individual's responsibility? This is explored through the lenses of theories of Mediation based on Postphenomenology and Instrumentalization based on CTT broadening the view then to collective and social responsibilities.

This thesis intends to contribute techno-anthropologically to the knowledge of ethics and responsibility in the design and development of VR. The following research question and sub questions have been formulated:

What are ethical concerns of VR, why do they matter and whose responsibility is it to act on them?

- What makes VR special concerning ethics?
- What kind of levels of responsibility are there?

What is Techno-Anthropology?

Let's first shortly define what Techno-Anthropology means to build the basis for this paper. Techno-Anthropology is a study and research area at Aalborg University in Denmark that aims to contribute to "robust and socially responsible technological solutions to societal challenges" (TANT Vision 2015). How to do that requires from a Techno-Anthropologist's point of view interdisciplinary thinking involving different groups of experts and users with different perspectives and values. Techno-Anthropologist expertise is based on methodological tools and the knowledge of socio-technical theories that help in analyzing, evaluating and developing technologies.

Below there is a graph (Figure 1) that attempts to illustrate the Techno-Anthropological field (Børsen 2016). The Techno-Anthropological research domain consists of various components: Technical experts, procedures + artefacts and users. Interdisciplinary core-competencies of Techno-Anthropology are then shown below as interactional expertise (defined further in Chapter 4), skills in anthropology-driven design and social responsibility competence (Børsen 2016). This paper is concentrating on the expert-artefact interface and a competence of social responsibility.



Ethics, that is one of the themes of this paper, enters Techno-Anthropology from the side of technology, that is entangled with values, normative orientations and power relations, and the side of anthropology that is developed, designed and used by humans, that are "explicitly guided by or tacitly influenced by values and normative assumptions" (Børsen 2016).

Chapter 2: Virtual Reality as a technological tool

This chapter is finding out through literature research what Virtual Reality is as a technological tool and what it is used for in order to understand where the ethical concerns might rise from.

What is so special about VR?

What are we exactly talking about with the term 'Virtual Reality'? In technical terms Virtual Reality (VR) is a three-dimensional, computer generated environment which a person can become part of and explore and interact with (Virtual Reality Society). It can be confused with Augmented Reality (AR) and Mixed Reality (MR) so let's make a distinction between the three. All these "realities" are different combinations of technology and the real world. AR allows the surrounding real world to blend with virtual elements but one is still present in the real environment. AR projects images in a certain area on a user's view that one can see e.g. through the screen of a mobile phone. It is adding digital elements that aren't really there to the real-world setting. In AR one is not immersed in an artificial environment like in VR.

VR completely replaces what people see and experience by virtual information. It has been argued that a user can be "absorbed" by this simulated environment so strongly that she "forgets" the actual physical environment (Ligthart et al. 2021). This *immersion* makes VR a unique, and powerful, medium. In order to have that complete immersion experience, a sense of presence, "the combination of hardware, software and sensory synchronicity" has to be implemented just right (Virtual Reality Society). Hardware wise it can be achieved by using a head-mounted display (HMD), that can block away the surrounding real environment. There is also available the least immersive "360-degree" VR content (e.g. panoramic video) but in this paper when VR is talked about the focus is on the high-level immersion VR. Sensory wise the synchronicity means that our senses and brain can easily tell if something is not quite right, so the VR technology needs to consider also our physiology.

The third version of technology and reality, Mixed Reality, uses both VR and AR technologies creating an environment where one can see physical and virtual objects and interact with them in real-time. MR can be seen through a mobile camera, smart glasses or headsets. All these three different realities can be called Extended Realities (XR). For the purposes of this paper I will only be looking at the use of VR due to its possibility to offer a high level of immersion.

So why exactly is this immersiveness of VR such a powerful factor? What does it do other than make us think that we are somewhere else than we actually physically are? Here the field of psychology becomes relevant. "One central result of modern experimental psychology is that human behavior can be strongly influenced by external factors while the agent is totally unaware of this influence" (Bagheri, n.d.). Here we have a medium, that unlike others can create for a user an *entire environment* that is "made up" and determined by the creators of VR. To put it differently, with the help of VR we can create a whole environment, which can be anything that our creative mind comes up with and it can influence a user. The VR experience, unlike physical environment, can be totally controlled and modified by the makers of the virtual reality. This fact not only makes VR a unique and powerful tool but it could be argued that it also gives a great amount of power to its creators.

Past and present

In 1935 Stanley G. Weinbaum described in his story "Pygmalion's Spectacles" a pair of goggles which enabled "a movie that gives one sight and sound [...] taste, smell, and touch. [...] You are in the story, you speak to the shadows (characters) and they reply, and instead of being on a screen, the story is all about you, and you are in it." This is a very good early attempt of imagining of what VR headsets today are actually about. It took some failed experiments and poorly functioning products tracing back to 1950's Sensorama, an "arcade style theater cabinet" to the first motion-tracking HMD, "the headsight" in 1961. By the 1980's, Jaron Lanier popularized the term 'virtual reality.' In 1990's virtual reality found its way to the arcade and video game sector that was growing fast. However technical development faced some difficulties and the interest seemed to fade away. There was a substantial decline in research and production. The "death of VR" was a common quote through the late 90's and early 2000's. It wasn't until 2012, when the development picked up

again. The Oculus Rift was looking for funding through a Kickstarter campaign which triggered a widespread virtual reality revival. VR was back. What is different to this current virtual reality age compared to its pearlier stages is that this time around the technology is much more advanced and there are subsequent resources thanks to funding from major technology companies. Google, Sony, HP, Facebook, Samsung, Intel, Apple, Disney, Microsoft, Fox just to name few, are all involved to drive the innovation. (Bagheri 2017)

Today VR is a market of billions of dollars. An estimation tells that "the global virtual reality market size was valued at USD 15.81 billion in 2020 and is expected to grow at a compound annual growth rate (CAGR) of 18.0% from 2021 to 2028." (Grand View Research 2021). It has come a long way since its early days, materializing itself out of science fiction novels to a very powerful tool for various uses with immeasurable potential. It could be argued though that it is not just VR as an immersive medium that makes it powerful, it is also the fact that it is now so heavily invested in by the tech giants.

What is VR used for?

As the key informant, a VR professional I interviewed with concluded people usually associate VR to entertainment: "They think that it's all about fun and games. They think it's about roller coasters, pornography or gaming." Entertainment is a big part of the possibilities that VR can offer but today VR is also used more and more to much different purposes. Especially in recent times when the COVID-19 pandemic affected many businesses, VR technology experienced a growth in demand since business operations had to move to the virtual platforms. But even without pandemic, VR has found usage in e.g. healthcare, education and research. Hospitals, military, NGOs, museums and companies are all exploring innovative ways to make the most of it. In the next section, a few examples from (in some cases overlapping) areas of healthcare, education and research are discussed to build an understanding of the wider user of VR outside of entertainment. Where does VR meet humans?

Healthcare

Healthcare might be the most exiting platform for VR. It seems like the possibilities can be endless. VR can for example help to train aspiring surgeons and it can be used by surgeons to practice operations. St Bartholomew's teaching hospital in London claims, that it is now able to train and educate people in larger numbers – also around the world. It is believed that this could also be a solution to address the global shortage of specialist surgeons (Taylor 2018).

VR is often used for distraction purposes. One example of that is the use of VR to relax patients during wide-awake surgery. In the study at St George's hospital in London patients were transported via VR experience to exotic locations across the world while they were having a surgery (NHS 2019). The results have been positive. Also pain management has benefitted from VR. Research has shown that when patients concentrated on a high complexity VR game, the intensity of feeling the pain was reported significantly lower (Piskorz and Czub 2014). Another study has shown how VR can affect a patient's perception of time (Schneider et al 2011). Patients receiving chemotherapy can feel a treatment more tolerable since the distraction VR offers can help them to concentrate on something else and pull attention away from the time passing.

VR can also be effective in rehabilitation training. For example, stroke rehabilitation encouraging functional recovery has widely used VR (Lee et al 2019). Training-based methods can get expensive since they often require special facilities and equipment which should also be variable for the patient to prevent boredom. Research has shown that VR can be a solution since it can be economical and provide multiple sensory stimuli (Lee et al 2019).

In mental health VR has shown promising results for many areas. Treatments of e.g. anxiety disorders, obesity, eating disorders, and schizophrenia have benefitted from VR (Grochowska et al 2019). When applying VR to mental health, two most common modes are exposure-based therapy and behavioural skills training. For example, soldiers that suffer from PTSD have gone through trials exposing them to virtual battlefields (Norr et al 2018). Very recently there was a project done on people hearing malevolent voices, who with the help of virtual reality simulation training program and real-time voice modulation were brough to face those voices they were hearing in hope to lessen the control of those voices over their lives (The Challenge Project, Khora 2021). An example of behavioural skills training can be for example an individual who feels anxiety in certain

social situations. One is able to practice these situations in VR and build up his confidence (Grochowska et al 2019). VR has also been seen as generating opportunities such as travelling, that would not be possible otherwise for the patient. The research done among patients with dementia showed that the possibility to change the scenery to somewhere else from inside the walls of a hospital had a positive impact on patients' lives (Rose et al. 2021)

Education

Educating people, as already mentioned in the case of healthcare, can become a totally different environment due the use of VR. One can actually learn by "doing," although virtually. At schools, students can be taken to virtual field trips to experience for example what might the life have been like back in a history in the different era, they can visit solar systems, they can walk in the rooms of the Louvre or the Met. Difficult concepts like geometric forms can be looked at from multiple perspectives through VR. According to 'Virtual Classroom Market' report (Market Data Forecast 2020), the Global Virtual Classroom market is estimated to reach USD 19.6 Billion by 2024. Certainly, the COVID pandemic showed the usefulness of a virtual class room.

VR as a tool in education is also used in the military for training purposes. The military sector has been a major investor in VR technology (Joshi 2019). It is particularly used to train soldiers for dangerous settings like combat situations where the way one reacts to fast changing situations is crucial to learn (Virtual Reality Society). Flight simulations can be a safe and cost-effective environment for improving skills. Combat simulations can be done in various conditions and can save resources and time and reduce risks. Soldiers can be placed into planned situations where they can practice their awareness of it and gain experience more economically and safely (Artese 2020).

Another form of education is how NGOs use VR to show how other people live. "Out of sight, out of mind" is a saying that can be a factual problem in nonprofit fundraising. With the help of VR, organizations can bring some of the causes to life and show to potential donors how people's lives have been affected by different catastrophes or personal tragedies. One could for example follow survivor working with orphaned children after the Ebola epidemic in Liberia (Waves of Grace, UN 2015). "A Walk through Dementia" takes a viewer to experience the life of person with this

challenging condition (Alzheimer's Research UK). Amnesty International has introduced a VR experience of a civilian life in Aleppo, Syria, where one can explore the risks faced by the locals (Fear of the Sky, Amnesty International UK 2016). The goal is not to just raise awareness but also by putting people into "someone else's shoes" to trigger feelings of empathy in hope of leading to action in the form of e.g. donating.

Museums are also increasingly using VR to engage emotions of a visitor to learn from e.g. a certain time period. The National Holocaust Centre and Museum in the UK launched an exhibit, The Holocaust Virtual Experience in 2020, where one could be immersed into the experiences at a Nazi regime. The CEO of the museum says that the goal of this kind of experience is to engage contemporary audiences better through a new medium. He doesn't see it as a history lesson through VR but a way to make people to question things, to use critical thinking, when the medium is more than just a picture.⁴

Research

Scientific laboratories have become an important domain of application of VR technology. Both healthcare and education areas talked about earlier overlap with research but it can be argued that more can be said about research done with the help of VR. Why is VR such a promising new method tool for research? VR has the ability to give researchers an ultimate control over what participants see, hear and interact with (Jacobs and Anderson 2019). As mentioned before in the case of education, also in the area of research simulations can open a view to someone else's experience. There are interesting examples of either conducting research on VR or of research using VR as a tool.

In Virtual Human Interaction Lab at Stanford University, numerous experiments have been done since its founding in 2003. They for example created a simulation of a slaughterhouse in 2013. They wanted to find out whether people would alter their meat eating behavior if they could experience what a life is like for a cow to be slaughtered. "[Participants] donned a virtual reality helmet and walked on hands and feet while in a virtual mirror they saw themselves as bovine. As

⁴ <u>https://www.youtube.com/watch?v=mryNEsHR8W4</u>

the animal was jabbed with an electrical prod, a lab worker poked a volunteer's side with a sticklike device. The ground shook to simulate the prod's vibrations. The cow at the end was led toward a slaughterhouse." (Mulkern 2013). After the experience, participants recorded what their meals consisted of for a week to see if there was a change. Did they empathize with the animal enough to alter their consumption of meat? The results revealed that technology by itself would not do the trick alone (Ahn et al. 2016).

Another VR experience developed by Stanford and Columbia Universities is "1000 Cut Journey" (Stanford University 2018), a simulation of racial microaggression. In the experience participants embody Michael Sterling, a black male, by experiencing racism in different situations and ages. One goes through disciplinary action as a child in the classroom, facing the police as an adolescent and workplace discrimination as a young adult (Stanford University 2018). By experiencing social realities of the black person, the goal was to make participants to understand racism better.

Stanley Milgram's (Yale University) experiment on obedience on authority in the 1960's tested whether participants would give apparently lethal electric shocks to a stranger if an authority instructed them to do so. They believed that they were administering shocks to real people. This experiment among his other trials caused ethical controversy. It has been said that it is probably one of the most extreme social tests ever performed in the real world. It wouldn't be possible to carry out direct experimental studies like that anymore (Slater et al. 2006). However, this same experiment was recreated in VR in 2006. The participants were at this time interacting with a virtual woman, so they knew that nobody would be hurt. The virtual woman though would respond to the "electric shocks" with protests and discomfort, asking for the test to stop when the voltage kept getting stronger. "Our objective has not been the study of obedience in itself, but of the extent to which participants would respond to such an extreme social situation as if it were real in spite of their knowledge that no real events were taking place," (Slater et al 2006).

This chapter first defined what VR is. It was shown that VR is a powerful and unique technological tool because it provides an immersive experience unlike any other medium where it can influence human behaviour and that environment can be controlled unlike a physical world. It is argued that this places power also to the creators of the VR experiences. It was also argued that VR is powerful not just because it's an immersive medium but because it is today heavily invested in by big tech

companies. There is a lot to lose in this business. Current uses of VR were then explored in healthcare, education and research to get a wider picture of its possibilities outside of entertainment purposes. It was understood that VR is not just about experiencing roller-coaster rides virtually but it can be also used for example in treatment of PTSD or patients hearing malevolent voices, to train soldiers for combat situations or educate people on the experience of racism. It could be argued that when the goals of VR get more serious than just giving people some Saturday night entertainment, when the experiences are meant to feel real through immersiveness in order to influence one's behaviour, when the subject matter can place the user in dangerous, scary situations, ethical questions become relevant. What can we learn from literature research of the ethical concerns on VR? This will be addressed in the next chapter.

Chapter 3: Virtual Reality and ethics

This chapter is mapping out ethical concerns in VR through literature review and discussing about those concerns, and then it explores why ethics is a relevant topic in technological development in order to comprehend more broadly the scope of the problem.

Ethical debates on Virtual reality

- mapping out the concerns

The amount of literature about ethics on VR or XR is not large. For the purpose of this thesis 10 relevant academic articles were identified using EbscoHost, Scobus and Google Scholar, that were trying to pinpoint ethical concerns related to VR or XR. Many of them were referencing each other. It could be argued that Ramirez, and Madary and Metzinger are leading the ethical discussions in academic literature on VR. In order to get an overall view of what kind of issues are talked about every topic mentioned in the articles were first collected. The collection of thoughts can be seen in a

following image (Figure 2). Some of the issues overlap with each other just with the different title but it was still very eye-opening to see such various themes. It became also evident that most of the concerns mentioned are unique to this certain medium.



Figure 2: Mapping out the concerns

In the literature there have been different ways of classifying the concerns. The concerns are for example sometimes divided to whether the issues are about research in VR or about risks for an individual and society (Madary and Metzinger 2016), whether they are about medium or content (Ramirez and LaBarge 2018) or whether they are legal problems (Spiegel 2018).

For the purpose of this paper four overall themes were identified. These can be named concerns of Physical harm, Psychological harm (this includes emotional and behavioural issues), Privacy and data issues and concerns to do with Transparency in the technology. Undoubtedly the largest one of the themes was Psychological concerns, which will be looked more closely. In the following sections the themes are discussed.

Concerns of privacy and data

Privacy issues are the most commonly mentioned ethical concerns in VR. The right to privacy means that one's identity should stay private in any form and not become publicly disclosed, since it could harm the person's wellbeing or social standing (Slater et al. 2020). Data collected by VR systems can be anything from body movements to tracking habits, from location to interests which can then be stored and used for unknown purposes, possibly shared with third parties. These data collection issues are of course known already from other current technologies but there are also some questions and concerns specific to VR and its immersive environment. Let's look at few of them.

Where goes the line of realness in virtual reality? What if a person for example does an act in VR that would be illegal in the real world? If that was recorded it could be possibly used as an evidence of a character of the person in a real world (Slater et al. 2020). Sounds far-fetched? Not necessary. Imagine, if you needed to prove in some legal proceeding that you are not a violent person and then the prosecutor would show evidence how you act aggressively in VR games. That could possibly work effectively against you if allowed.

Identity hacking is also a concern (Slater et al. 2020). If there is a possibility to make virtual simulations of people that match exactly to a real person – because of all the data that has been collected, even of how the person moves – this could lead to very harmful uses. We could be portrayed saying or doing things that we would not actually say or do in real life. Your data could be also used after your death. Would you for example like to be resurrected as a virtual simulation, as in the example of a reunion of a mother and her passed daughter in the beginning of this paper?

One other interesting concern is how employers are introducing VR into their hiring processes. A wide range of biometric data can be collected by HDM's, such as eye-tracking and physical/emotional reactions (Hosfelt 2019). For example Lloyds Banking Group used it for one of their recruiting campaigns to see how people react to certain situations. "The more we allow candidates to reveal their natural strengths and behaviours, the more we can ensure that we align people to roles and teams where they will thrive," said Lloyds' graduate and emerging-leadership development lead about the purpose of using VR (Murray 2018). Do we really want to reveal

everything from ourselves to our future employers? Hosfelt (2019) paints an interesting scenario of an applicant who is interviewed in VR for a job at a company, which CEO has personal religious beliefs that suggest that homosexuality is immoral. The headset would detect nonverbal reactions from the candidate suggesting they may be gay resulting the company's algorithms rejecting the applicant (Hosfelt 2019).

These are just a fraction of privacy and data concerns but they give an idea of a variety of the issues specific to VR that need consideration. How much personal and behavioral data is allowed to be recorded, collected and stored and who can use that information for what purpose? Hosfelt (2019) suggests that engineers and designers incorporate privacy by design – privacy must be first-class requirement, not an optional feature. She also calls for consensus of different experts to mitigate the conflicts of interests.

Concerns of physical harm

If looking at an individual holistically, physical and psychological issues are often overlapping, but this section discusses the risks of a more physical nature found in the VR literature that can affect a person's well-being. Motion sickness (also known as cybersickness) is often mentioned. It is about the mismatch of what a user sees and how she feels her body's movements. It has symptoms that can include e.g. dizziness, eye-strain, headache but also nausea and vomiting (Behr et al. 2005). "Errors in position tracking, optical distortion, flicker, insufficient refresh rate or resolution, transport delays, or low update rates" can trigger it (Behr et al. 2005).

Bagheri (2019) mentions concerns on long term brain damage as a result of the full-screen immersion. Concerns are based on the fact that the brain is very neuroplastic which means that it has ability to reorganize itself by forming new neural networks in response to e.g. new information, sensory-stimulation or damage (Rugnetta). Biomedical engineer and tech visionary Rony Abovitz famously claimed that the near-eye HMD systems (such as Oculus Rift) can have potential to cause temporary and/or permanent neurologic deficits (D'Onfro 2015). It is also worth of mentioning that he was at the same time developing a competing technology. So far there isn't scientific evidence to prove negative effects for sure, but the impacts of long-term immersion are simply not known yet. It

is though evident that extra cautiousness should be practiced if the VR experience is aimed for children and youth with developing brain. Marientina Gotsis, an associate professor of research at the Interactive Media and Games Division of the University of Southern California, reminds that "Children may not know how to communicate discomfort of any sort, such as visual discomfort or motion sickness, so you don't want prolonged exposure on screen" (LaMotte 2017). Walter Greenleaf, a behavioral neuroscientist, who works with Stanford University's Virtual Human Interaction Lab and who has studied VR in medical settings for over 30 years concludes that VR is tricking the brain and the long-term effects are unknown. His view is that everyone should be very judicious of its use. "I would be concerned for everyone who uses this," he says. "You don't have to have a young brain to have an impact" (LaMotte 2017).

Another ethical issue concerning the well-being of the user is about how the use of HMD render the physical senses, so a user is unable to be aware of what is happening around her (Kabha 2019). It affects the sight since the headset blocks out the real world and also hearing can be affected depending of the device. Gotsis argues that it is mandatory that there is someone watching during the use of VR, since one can fall and possibly get seriously hurt (LaMotte 2017).

Taken all these into consideration it seems evident that physical issues are something to be aware of. Even if there isn't enough research done yet to prove the possible harm such as brain damage it could be argued that the concerns are serious enough to pay close attention to especially when vulnerable groups such as children or people with intellectual and developmental disabilities are concerned. As repeating in the section of the concern of transparency further along, users should be made aware of these issues so they can make informed choices on their behalf of some of the physical risks that may be currently unknown. Ethically speaking, they should be informed out of respect of their autonomy.

Concerns of psychological harm

VIRTUALLY REAL EXPERIENCE

This section was the largest topic in the literature of ethical concerns in VR in terms of variety. It could be said that one of the main concerns is about the idea, that VR can't be harmful because it's not "real." The belief is that in the same way that we can just stop watching a film that feels uncomfortable, we can also snap out of virtual reality. There is however much research telling otherwise based on how people react. Ramirez and LaBarge (2018) argue that VR is capable to produce "virtually real experiences" which distinguishes it from other simulations mediums so the experience of a simulation's subjects is different. This makes the simulations that would be morally unproblematic in other medium problematic in VR (Ramirez and LaBarge 2018). What Ramirez calls "virtually real experiences" are experiences that are treated by the subjects of a simulation as if they were real experiences. "When users [have a virtually real] experience..., they feel that the technology has become part of their bodies and that they are experiencing the virtual world in which they are immersed. Moreover, when they feel present in VR, they react emotionally and bodily (at least to some extent), as if the virtual world exists physically" (Parsons et al 2017). Elise Ogle, Project Manager at Stanford University Virtual Human Interaction Lab concludes how their research has found that users of VR often respond to experiences in ways that are identical with how they would respond in the same situation in the real life (Mahoney 2018). If one is scared of heights, standing on the edge of a high building in VR makes one to react physiologically the same way with increased heart rate. This is also why VR is used effectively in exposure therapy.

Ramirez and LaBarge (2018) discuss what features affect to the realness of a virtual experience. They name key features to be "perspectival fidelity" and "context-realism". VR designers have power to change these parameters and make the experience more real. Perspectival fidelity refers to the degree to which the subjective point of view of the user is accurate in the VR experiment. The elements affecting it include e.g. height of the user, the depth-of-field visible in the VR landscape, the absence of non-diegetic symphonic soundtrack and so on. Context-realism refers to the degree to which the content of the experience is plausible. The more the virtual environment has likeness to the real world's physical and physiological principles and the more the user can relate it to her own lived experience the more virtually real experience it can be for the subject. Apparently though graphical realism does not appear to affect how virtually real the experience is for the subject. It is more to do with for example whether one can suddenly fly in the experiment defying physical laws or whether there is meta-content such us graphical overlays or voice-overs which can make the experience less context real (Ramirez and LaBarge 2018).

Ramirez (2020) argues that to suggest that VR is not real is dangerous both in the scientific community and the public domain. Experiencing the virtual environment presents the same non-physical risks as the actual environment does – simulating traumatizing situations can cause the same psychological harm in VR than in real life. Ramirez and LaBarge (2018) point out to a quote from Skulmowski (2014): "virtual reality allows us to conduct experiments that would be ethically unacceptable to execute in non-virtual environments." To think that VR provides a platform without ethical responsibility to conduct research that wouldn't be done in the real world environment is alarming. A real life example is the earlier mentioned highly controversial Stanley Milgram's Obedience experiment, and how that was repeated in VR placing the participants in an ethically questionable situation. The replication reached the same conclusion as Milgram – so couldn't it be argued that the VR participants then reacted the same way than in the real life version? In the light of this Ramirez and LaBarge (2018) provide "a heuristic device" what they call The Equivalance Principle (TEP) to apply when designing VR experiences:

If it would be wrong to subject a person to an experience then it would be wrong to subject a person to a virtually real analogue of that experience. As a simulation's likelihood of inducing virtuallyreal experiences in its subject increases, so too should the justification for the simulation's use.

Ramirez and LaBarge (2018) conclude that they are as excited as anyone of the possibilities that VR technology can offer but they argue that caution should also be applied. They urge the community of VR creators, the companies that employ them, and the researchers who are using VR to consider the possibility that some virtually real experiences may inflict genuine harm and to use their moral responsibility to prevent such harms occurring using heuristic principles like TEP.

VIRTUAL EMBODIMENT

Another central concern is about the illusions of embodiment, where one has a feeling being embodied in a body that is not one's physical body (Madary and Metzinger 2016). Embodied virtual avatar does not need to match one's own body but it can differ from age, gender, race and

the abilities. Maloney et al (2019) argue that virtual avatars can be extremely powerful in their embodiment and affect users' perceptions, thinking and behavior. Research has shown for example that embodying a superhero leads to stronger prosocial behavior, or if one can see an avatar visibly lose weight while exercising it increases the effort put into an exercise (Maloney et al 2019). Based on the suggestion that avatars can affect one's thinking and behavior also the negative consequences should be taken into consideration.

Maloney et al (2019) identifies three main ethical concerns relating to avatars. First one is about effects of perceptual manipulations. VR can change a user's perception of the world by e.g. violating physical laws or manipulating the body parts to appear somehow different than in the reality. One can maybe run faster, jump higher or even fly. One can maybe gain a body part in VR that is missing in real life. For example, how does a person in a wheelchair react to maybe being able to walk in VR, but not in the physical world? There is talk about how social media today, such as Instagram, leads to higher rates of dissatisfaction of one's body or looks so the same may occur with respect to virtual bodies. Maloney et al (2019) argues that if users are not re-calibrated for the physical world, the experience they had in VR may cause mental and physical discomfort. These problems have been labeled re-entry problems (Behr et al. 2005): "They refer to the tasks of leaving the virtual environment after participation in an experiment, readapting to reality and its physical and social parameters, and differentiating between VR and reality." Behr et al (2005) argues that the fact that re-entry problems occur after the VR experience doesn't release the researchers involved from their responsibility for the subjects. The same could be argued about the responsibility of VR experience creators.

Another ethical concern Maloney et al (2019) mentions is negative effects caused by one's avatar. The avatar one chooses can affect us and our behavior even after the experience. It can cause positive effect as mentioned above with the super hero example but it can also lead to unwanted behavior. One's avatar could be for example overly aggressive or highly sexualized which could affect one's self perception. Informing users from this concern is advisable. Also, other's avatars can cause negative effects. How the avatar is represented can affect on user confirmation of negative stereotypes (Maloney et al 2019). When designing VR experiences consideration should be made of attaching false or negative attributions on a specific group of people. If one had a bad virtual interaction with a representation of a person from e.g. another race or gender it might lead

the participant to generalize beyond the virtual reality experience. What about if one meets an avatar that is a simulation of one's deceased child as in the example in the introduction of this paper? The effects from that, even if in the name of therapy, can be unpredictable. Did the mother get some kind of closure to be able to move on from her grief or would she want to keep having the experience with her daughter over and over again? Is the experience harmful or is it rightful in the name of compassion?

SIMULATION EMPATHY

In 2015 Chris Milk gave a TED talk called "How Virtual Reality Can Create the Ultimate Empathy Machine."⁵ In this talk Milk argues that VR can be used to create empathy. He says: "It's a machine, but through this machine we become more compassionate, we become more empathetic, and we become more connected." As described in the section of VR for education purposes, NGOs are leaning on this feature when they use VR experiences to demonstrate the situations in e.g. warzones. Since Milk's talk however, there have been debates about whether VR creates empathy or rather sympathy, or does it alienate instead.

Ramirez (2020) argues that we should be skeptical of the promises made of VR giving users possibilities to experience of being for example Palestinian, pregnant, homeless or in a wheelchair. Or a cow referring to Stanford University's research experiment earlier in this paper. He says we should worry about the *intersectional* implications of these simulations. Ramirez argues that an individual's experience of the world is shaped by e.g. one's racial, ethnic and gender identities and the whole upbringing and there is no possibility that one VR experience can translate that experience to someone else. "To assume that what it means to be Black or Palestinian (or pregnant, or a cow!) is given simply by the point of view of a camera located in space erases the role identity plays in how we understand and see the world" (Ramirez 2020).

The assumption that VR can make us more empathetic becomes questionable, if it was used for purposes such as rehabilitation for inmates the likes of Virtual Rehab project in the US (Springwise 2017). One of its aspects is empathy promotion. They claim that "the programme works by placing

⁵ <u>https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine?language=en</u>

the prisoner into interactive role play scenarios which reverse the aggressor/victim roles, propelling the prisoner into the skin of an assaulted person with the aim of developing empathy" (Springwise 2017). It would become problematic if this led to e.g. prisoner's early release. But as Ramirez (2017) argues, empathy should be distinguished from sympathy. As he defines it, empathy is something that requires feeling what our target feels when sympathy on the other hand doesn't require this co-feeling but requires that we feel *for* not *with* our target. Ramirez argues (2018) that sympathy is what VR might help us to cultivate, but it fails to generate true empathy, since empathizing with someone involves psychologically sharing someone's perspective. It is also dangerous to say that if a white person is put into black man's shoes in VR, one could then understand the whole social reality of Michael Sterling in the VR experience "1000 Cut Journey" mentioned earlier. For example, I would always build my understanding based on that I'm white female brought up in Finland. I can end up being more sympathetic but I would not empathetically know using VR experience what it is like to *be* a black male in the US.

Michael Haley Goldman (2018) from the U.S. Holocaust Museum has brought up two issues that are concerned with the idea of empathy from using VR in the museum. Either the visitor becomes to minimize their own experiences since they can't be anything compared to the horrors experienced by a Holocaust survivor or the visitor over-empathizes with a Holocaust survivor, thinking that she knows how it feels to be in the Holocaust. To mitigate between these two scenarios Goldman treats visitors as *"engaged witnesses"* where the trauma of others is recognized but they don't take that trauma upon themselves (Thatcher 2019). The museum is not trying to promote empathy with VR experiences but rather to engage visitors' emotions. It's not about providing in-their-shoes experience since surely one can't *know* what it has been like living at a Nazi concentration camp without actually experiencing it. Being though a witness as oneself could generate sympathy. As Ramirez (2020) says, "A George Floyd simulator would be unethical for many reasons but a VR simulation that puts me at the scene of similar violence, where the simulation is structured to make me feel for the victimized, could be a powerful, and ethical, tool for correcting intersectional injustice."

Nash (2018) has given to the "witness" perspective again another view. She talks about "improper distance" that VR as a simulative medium produces. She argues that even if there is moral value in occupying the other's point of view, the experience of "being in" VR is more about "a narcissistic

reflection on one's own experience" (Nash 2018). For example, in the NGOs' VR experiences one is often taken to distant places where the focus can easily move to explore the scenery rather than focus on the story line. One can turn away from the refugee girl telling about her tough reality.

Concerns of transparency

As already described in the other sections, transparency goes hand-in-hand with all the ethical concerns. Being transparent of the possible, even if still maybe unknown, consequences of the use of VR should be made known for the users. Madary and Metzinger (2016) argue that informed consent ought to include an explicit statement that immersive VR might alter e.g. the behavior without a user's awareness. Another concern they raise is false hope regarding for example mental health treatments done by VR. They argue that just because the technology is new, patients may believe that using VR is better than traditional intervention method (Madary and Metzinger 2016). It is important that uncertainty existed is communicated clearly to the patients or participants in a research experimentation.

Another concern Madary and Metzinger (2016) bring up is how the general public is informed by the media of the new developments in science concerning the immersive technologies. Not all the members of the general public are looking for scientific knowledge. It could be argued that only the people who are interested in this topic might be more aware of the different issues. Based on this it would be advisable that namely the people working with the technology inform their users, clients, co-workers about the concerns. Also, scientists making research on the topic and media making news about it need to be transparent with the public about progress in science, especially when VR is used for medical treatment (Madary and Metzinger 2016).

Madary and Metzinger (2016) point out also the possibility of a dual use of technology, meaning that it can be used for other purposes than originally intended to. As it has been discussed earlier, VR could be used to increase empathy. But if it could do that, VR could then also be used to decrease empathy. This could become useful in e.g. military applications in training soldiers to hold less empathy to their enemies, or in interrogations or even torture. Madary and Metzinger (2016) argue though that the scientists and developers of a technology should not police the use of it, but they can raise awareness that there can be potential misuses of the technology.

This section aimed to map out the ethical discussions in VR. It identified four overall themes, Privacy and data, Physical harm, Psychological harm and Transparency. From these it was pointed out that the psychological issues are the largest topic in the discussions leading to a special attention to this area. Those issues were divided further to three parts: virtually real experience which is about the "real" in virtual reality, virtual embodiment which includes the possible negative effects of using avatars and simulation empathy which questions VR as an "empathy machine". It has been understood that there are a number of ethical concerns that are *specific* to VR. This is also why many of the papers reviewed call upon VR creators to become aware of the ethical issues and share that awareness as their moral responsibility so that users can make informed choices. Sharing the knowledge and the scientific development in the field to the public by the people close to the technology would promote transparency. But why should this matter to the VR creators except for testing their conscience? What does it mean exactly when a person is ethical and why being ethical matters in the development of technology? The next section explores that question.

How and why does ethics matter in the development of a technology?

Let's first define what is exactly meant with the term ethics. According to Velasquez et al (2010) ethics is two things: "First, ethics refers to well-founded standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues." Obligations could be for example standards that refrains one from murder. Virtues can be described such as loyalty or honesty. Rights could be e.g. the right to life or right to privacy. Based on this one could think ethics is just a system of simple rules such as "Do not kill" or "Do not lie" and for that reason not applicable to the real world of complex situations. Good in theory but not in practice. Singer (1993) argues that the opposite is closer to the truth: "an ethical judgment that is no good in practice must suffer from a theoretical defect as well, for the whole point of ethical judgments is to guide practice." There are methods for ethical problem solving but there are no automatic solutions. Being ethical is about being able to identify *most* of the important ethical considerations and then *act* on them.

Velasquez et al (2010) continues "Secondly, ethics refers to the study and development of one's ethical standards". Ethics is not a static condition. It's an active process. There are feelings, laws and social norms that can affect one's ethical understanding and there needs to be continuous effort to examine the standards they are based on. This thought can be well applied into the rapid development of technology. People have for example just accepted that there is less privacy. We let our location be tracked, cookies saved to our devices and personal information collected. What has become acceptable can be ethically questionable.

So why does ethical understanding matter concerning technology? Ethical understanding concerning technology is important because our lives are intertwined with technological innovations and we are affected by them. Some of them, like cars or mobile phones, have had and will have significant impact on society. These technologies can be called *revolutionary*. The impact they have on society is so strong that if they were to be removed from our lives enormous adjustments would be needed (Moor 2005).

Emerging technologies, including VR, have potential to be revolutionary. Brey (2017) defines emerging technologies as "technologies that are new, innovative, and still in development, and are expected to have a large socioeconomic impact." Technologies such as nanotechnology, biotechnology and information technology provide humans options that not that long ago belonged only to science-fiction novels. Will there be any consequences though for the society if (some) parents can create their future perfect child by choosing a sex and eliminating defects or abnormalities with DNA modifying? If nanotechnology will detect diseases early, bionic limbs can be created, chips could be implanted into brain to enhance memory – what will be the impact on whom? What about if robots will become common use in hospitals? What if virtual reality can give us experiences that normal life can't? These technologies are developing fast and simultaneously their power on us and a society can grow greater. As a result ethical concerns increase. To put it in the other way according to Moor's Law (2005): "As technological revolutions increase their social impact, ethical problems arise".

Moor (2005) argues that technological revolution proceeds through three stages: *the introduction stage*, *the permeation stage*, and *the power stage*. In the introduction stage technology hasn't yet had much impact on society, its capabilities are still explored and only few people are aware of it.

When a technology develops to the permeation stage it will get standardized as the number of users grow. Simultaneously its impact on society grows. In the final stage, the power stage, the technology is established and readily available. It affects directly or indirectly most people and its impact on society, if it's a truly revolutionary technology, will be significant (Moor 2005).

Why is it important to recognize these stages? The further the technological development is, the greater is the ethical challenge. The more established the technology is, the more difficult it is to open the "black box". Latour (1999) explains black box as "... the way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become." From the ethical point of view, it is harder to start question values and morals when the technology is already settled. Moor (2005) argues that in the later stages of the technology development more *policy vacuums* will arise meaning that there will be a lack of rules or standard procedures in the way how the technology is used in the light of ethical values. He also argues that we might find ourselves in a *conceptual muddle*, when there is confusion what that technology really is, what is the right 'frame' for it.

Moor's (2005) main claim is that we need to be more proactive than reactive in terms of applying ethics into revolutionary technologies. This is where it could be understood the role of the creators of VR experiences becoming crucial, since they can affect their designs early on. According to Kenwright (2018) there has been a debate about corporations involving VR knowing that at some point they are pushed towards more moral and safer designs when regulations and legal liabilities catch up with the technology, but so far they are just waiting. "This attitude can cause significant harm to the public" (Kenwright 2018). It can be argued that it would be better to start thinking about ethical questions straight from the start in the development and also acknowledge that ethics is a dynamic process, and we can't anticipate at once all the ethical issues that will emerge. Trying to solve the issues sooner than later when the damage is already done could also save money. Hosfelt (2019) argues that within the emerging technologies we are still in the position to think through the impact they can have on individuals and a society rather than "retrofit regulations and ethical decision making into technology that's already had billions of dollars invested in it."

Moor, as with other authors discussing about the ethical concerns about VR, also calls for a multidisciplinary approach to improve ethical thinking. "Scientists and technologists need to confront considerations raised by ethicists and social scientists, considerations that may affect aspects of the next grant application or risky technological development" (2005). It has also been argued that it would be for the benefit for the technology developers to be aware of the ethical issues since they could then educate and assist lawmakers about these concerns rather than let people who might not have much of a technological background to eventually write and interpret the laws on them (Hosfelt 2019).

In this chapter, through literature, we first learned about specific ethical concerns on VR. It was also argued that creators of VR should become aware of these issues and share that knowledge. After that it was discussed why ethics matters in the technological development other than testing the creators' conscience offering a broader view on the matter. It was argued that ethical understanding is important because technology has impact both for an individual and for society. It was pointed out that ethics is not just jargon and novel thoughts but it is guiding practice and it is an active process that requires study and development. It was argued that ethics should be taken into technological development at a stage when technology is not yet settled to prevent doing damage both to an individual and society but also to the business itself. Multi-disciplinary approaches are recommended to improve ethical thinking. Lastly it was argued that it would benefit the creators of VR if they educated the lawmakers of the issues, since they might not be technologically knowledgeable.

So far in this paper it has been now pointed out that creators of VR have power in what kind of VR experiences they develop that affect the users and through literature we have learned that there is a call for them to use ethical thinking in the early stages of the development process and also be aware of the ethical concerns and share the knowledge. In the next chapters I aim to find out through ethnographic methods if the creators of VR, whether they are called designers or developers or something else, are already aware of the ethical concerns and how do they see their responsibility on acting on them. First in the next Chapter 4, it is discussed how this empirical journey developed, and after that in Chapter 5, the data gathered is analyzed.

Chapter 4: The conflicts of different roles in the fieldwork

The purpose of this chapter is to explain the ethnographic methods used to contribute to the empirical knowledge production and reflecting on the process.

Normative starting point

As Donna Haraway (1988) argues with her concept of "situated knowledge" how one perceives any situation originates from somewhere and reflects the content. A researcher is not doing research 'objectively' on 'objects.' Knowledge develops from the particular conditions that they are produced in, and I as a researcher have to be aware of the associations between myself, my own lived experiences, and what claims I make.

Scavenius (2011) argues, that a researcher's critical attitude towards her research plays a significant role in scientific research. She calls for explicit discussion, where the normative starting point is openly stated. "The biggest problem of political science is not that it lacks scientific knowledge of objective values, but rather that it does not seek to present and expose the researcher's value assumptions consciously, specifically and explicitly so that they can be exposed to theoretical research and discussion" (translated from Danish, Scavenius 2011).

I have a normative starting point that should not be hidden. My viewpoint is that the developers and providers of technology should practice ethical responsibility in their work. This is based on my own values and rooted on my own personal experiences. When I watched the documentary mentioned in the beginning of this paper, where the mother met the "incarnation" of her dead little daughter in the VR simulation, I was highly affected by it. I reflected as a mother living in a Nordic society, as a designer who has in the past done designs for vulnerable groups such as suicidal young people and people with Alzheimer's, and lastly, as a techno-anthropologist. Would I choose to go through that VR experience if I lost a loved one? What were the motives behind the makers of the

experience? Were all the consequences of that experience thought through? What happened to the mother after the experience?

Living in a Nordic society, technological solutions for different problems and desires are widely available. It is acceptable and common to seek a "remedy" for anything through technology, whether it is an app to make one lose weight or assistive reproduction technology to help having a child. New technologies bring hope and there is hype and excitement around them. Through my own personal experiences with technology and maybe because I wasn't born into the world at time period where technology was a solution for every problem, I acknowledge my skepticism towards the techno-optimism. However, if technology is used, my normative standpoint is that it should not be provided just as a tool but the consequences that might follow from the use of it should be thoroughly anticipated and evaluated.

As a designer I acknowledge that I'm a product of my design education and the company cultures I was situated in my career. In my design education the notion of ethics wasn't touched. Neither did it happen in work life. I also acknowledge that I empathize with the daily work of a designer that is influenced by the time pressures, budget pressures and the pressures to keep the client happy. Sometimes it's easier to just get the job done than start asking difficult questions. Due to my own experiences as a designer, I'm doubtful of the possibility of a designer to be able to think through ethical concerns in the work environment of tight deadlines and other pressures.

A Techno-Anthropologist's role is to contribute to robust and socially responsible technological development by looking at how technology and humans interact with each other and affect each other. Since a Techno-Anthropologist is not an ethicist in the sense of having acquired years of academic training in the area, I first hesitated to take on the issue of ethics. I also hesitated because my presumption was that ethical issues are a too complicated and too large area of study that can't be handled in a time-scale of four months of thesis work. But if I hesitated, how would a designer or developer in a VR company be able to or want to touch the issue? Based on this I argue that in order for ethics to be applied to the work of people who create VR experiences it would have to be made more approachable as a subject – it should be discussed more. The Techno-Anthropologist's role is also to raise questions. If ethical concerns in VR development is a relevant topic to explore, then the questions of ethics should be "translated" from a novel thought to the form that don't seem just

academic jargon. The role of a Techno-Anthropologist is not just to understand socio-technical problems – it is also trying to contribute in making responsible solutions.

I argue then explicitly that it is through these different roles that I have, that I picked this problem to study. Does this also help me, since I'm able to look at the issue from a perspective of a user looking for technological help for a problem, from a perspective of a designer and also as a Techno-Anthropologist? Am I able to bring to view issues that are not often thought of? Hansson (2014) argues that in order to fully understand controversial cases it's necessary to see "both the controversial and the uncontroversial appeals to norms." Is there something that is taken for granted such as a normative stand of a creator of VR defending that ethical thinking should not be their job since they are not ethicists? Am I able to make the uncontroversial norms visible?

Collaboration and different roles

A chance to collaborate with a VR company emerged. Khora, based in Denmark is a VR and AR production studio developing applications for many different industries, including marketing, healthcare, museums and education. They have existed since 2015, currently employing 20 people and have gained many prestigious awards with their work. My first goal was to get in to their VR development project relevant to ethics, where I could participate in the meetings of different actors to conduct participant observation. With participant observation the aim is to engage in activities that are appropriate to the situation and to observe what is happening in terms of the activities, people, and physical aspects (Spradle 1980). Observing a situation when different stakeholders meet in terms of VR development could contribute to knowledge production. Who are the stakeholders invited to meetings, what kind of questions are asked, and are ethical questions brought up?

Another interest of mine concerning participant observation would have been my own role in it. What kind of role would have I intuitively taken? What kind of role would I have given? Since I wasn't granted access to any specific VR development project due to the relevant ones being already at full speed, I can only imagine scenarios for the sake of preparing for situations in the future where I would possibly act as the one with ethical goals in mind. Since I have never taken part of designing any VR experiences or been involved in VR production, I could be seen as an outsider, somebody trying to intervene with questions of ethics that could be uncomfortable, possibly slow the production or maybe even scare the client off. At the same time I'm an insider with my designer background, understanding the business mindset and the reality of working with tight deadlines and demanding clients. How do I navigate in a scenario where I understand that there is a business to think about, but simultaneously be confident about the relevancy of including ethical thinking into the process, since I don't think they exclude each other? How to balance between '*emic*' interpretations as a member as a community studied and '*etic*' ones as an outsider (Naaeke et al. 2010)? What could my role be?

Let's consider the term "Interactional expert" by Collins et al (2017). An interactional expert is somebody who can be fluent in the spoken language that the practice involves. As Collins explains in other words, if the people involved in the practice know how to walk the walk, the interactional expert knows how to talk the walk (2017). Being interactional expert requires that one has acquired enough tacit knowledge to interact with the practioners in the same level. Would my background be enough to act as an interactional expert in order to raise relevant questions in the field of VR concerning applying ethical thinking into the design process? Would that be enough to make the company view me and accept me as an insider?

Shilton and Anderson (2017) use "Values advocate" as a term for a values facilitator that can bring expertise on ethical questions into a design team as an interventional method. The advantage of including a values advocate in the design process would not just be about bringing in knowledge on ethics but also about having a "translator" who can be "making bridges between abstract social values and concrete technological affordances" (Shilton and Anderson 2017). It is important to note that it is not about bringing expertise of *correct* values for design but to inspire talking of values, as Shilton and Anderson conclude. They also argue that another benefit of values advocate would be that the *interdisciplinarity* would be increased in a design team and this way encourage values conversations. Finally, what a values advocate can do is to highlight the moral ecology that already exists in the team. As Shilton and Anderson (2017) say, this ecology can be less visible because standards and norms are usually tacit knowledge, so adding outside perspectives can question those norms.

One of the challenges Shilton and Anderson (2017) mention concerning intervention of a value advocate can come with a list of values that could possibly limit the values that are considered. The team can just concentrate on the values offered by the value advocate without better knowledge which will make the value advocate as "the single authority on ethics in design." The second major challenge mentioned is time. As Shilton and Anderson (2017) say, the time that it takes to build trust between the advocate and the design team would take substantial length of time, something that can't be measured in months.

I argue that it is impossible to anticipate what my role would have been if I had got in to do ethnographic methods inside the team. This is exactly why empirical experience matters; the results would have brought another perspective to contribute to knowledge production.

Challenges in including actors

Since I wasn't able to get access to any specific development project, I was then introduced to the idea that is still just in a thought level. My key informant at Khora, Head of Healthcare, Thomas Saaby Noer, is considering creating Innovation Center for Immersive Technologies in order to share knowledge between the actors in the field in Denmark. In his view, there is a great amount of knowledge in the field and if the actors shared it with each other the whole industry in Denmark would benefit. It was suggested that I could think about the corner stones for this center. Since for the purpose of this thesis it was more meaningful to concentrate deeper on one corner than describe the whole possible playground, I kept the theme of ethics. As has already been discussed in this paper, the ethical concerns on VR are highly important because VR can have a huge impact on individuals and society.

I then wished to start my ethnographic fieldwork by interviewing designers at Khora and facilitate a workshop for them. With the interviews I would have wanted to learn about their experience and their understanding of ethical issues concerning their work. With the workshop I would have wanted to first raise conversation among the creators of the VR experiences about ethical issues I had mapped out of VR. The plan was to introduce scenarios such as already discussed in the ethical concerns section, which could act as *provotypes*. "Provotypes expose and embody tensions that

surround a field of interest to support collaborative analysis and collaborative design explorations across stakeholders" (Boer and Donovan 2012). Since the scenarios created from the ethical concerns in VR are something that have not happened yet and can arguably offer a drastic storyline they should provoke conversations. Do they see their power in taking the design decisions? Can they see the impact the design can have on an individual and society? Do they think the ethical understanding is important in their work? It also interested me whether my designer background would make me lose my explicit awareness of an ethnographer and to miss something because I might be too "understanding" of the barriers to implement ethics, for example different pressures such as time or client demands. Would I be able to obtain a "native's" point of view, or would I be biased because of my professional background? One might see only those parts of social reality that make sense based on the earlier experiences of a researcher (Eriksen 2001).

Another workshop could have included people also from a management level. Would there be interest in forming ethical principles to guide their work? Could the company commit themselves to ethical thinking? Or maybe they have already. Ultimately, I did not get permission for the interviews with the designers or facilitating workshops due to a fear of it taking too much time in the busy period that they were under. I argue that better planning much earlier in the process from my side could have given me more time to persuade them to give me permission to do interviews and workshops, but at the same time the period of four months that is allocated to this thesis is a short time to build a rapport. The refusal could also imply that exploring ethical issues wasn't their top priority, which was also suggested by my key informant. He admitted that ethics was not "a hot topic" for him and he didn't come across with it with his daily work with his clients. I realized that I had already failed obtaining native's point of view since I just assumed that of course ethics must be a highly relevant topic for a VR company. The key informant himself was anyway open and willing for interviews and to discuss about the topic, so at the end my ethnographic fieldwork at the company included his participation solely. He also gave me access to two separate clients of his that both were working in the field of physical disabilities, whose interviews contributed to the general knowledge of the views on VR.

Learning through constructive conflict

Since I had understood by now that the issue of ethical concerns wasn't necessary the highest priority in the daily work of the creators of VR experiences, I was looking for a dialogue method that I could use in my discussions with the key informant to produce useful knowledge for the purpose of this thesis. I was acting as what could be called a values advocate (Shilton and Anderson 2016) on ethical concerns on VR and my key informant was trying to make business on VR so there was a diversity of perspectives. Cuppen (2012) introduces constructive conflict as "a mechanism to enhance learning in stakeholder dialogue." The basis of this is understanding that there exist wicked problems in business. Wicked problems refer to social or cultural problems that might involve incomplete or contradictory knowledge involving number of people and opinions and there is no ready-made template to follow when tackling the problem (Wicked Problems). Based on the fact that the effects of VR experiences are still unknown in many ways, and there is indeed incomplete and contradictory knowledge, I argue that the issue on hand is exactly that – a wicked problem. Cuppen (2012) claims that since the nature of wicked problems is about different perspectives and different problem definitions, the focus of a stakeholder dialogue should be on problem definition rather than problem solving. This makes sense when talking about ethical concerns in VR since ethics is, as we have learned earlier, an active process. It can't be solved at once. It is not a static condition.

The point of the idea of constructive conflict contributing to learning between different stakeholders is that competing ideas and knowledge claims are openly explored and evaluated to create new insights (Cuppen 2012). Cuppen also points out that the conflict needs to be cognitive rather than affective in order to learn from it in the sense that in the stakeholder dialogue it should be about the conflict about disagreements between ideas rather than between personal disagreements causing tensions or annoyance.

The fact that the dialogue between the key informant and I do include only two of us makes the diversity of views limited. It can be stated that the selection of the stakeholders is weak in this dialogue. It would have been interesting to include different actors from the company to hear their thoughts as well to see if there are differences of opinions inside a company on the relevancy of ethical concerns. There could have also been a larger group discussion involving other relevant

actors such as users of VR, or people deciding on regulations, or healthcare professionals, but that would have rather been about general opinions of the concerns than guiding me in what I wanted to find out at that point, how ethical concerns are involved in the development of VR and how they see their responsibility towards them. Based on my preliminary interviews, I argue that it wouldn't have brought up much more new knowledge than that ethical concerns on VR are yet not widely thought about or known about.

The next step after selecting the stakeholders to the dialogue is articulation of perspectives. In this case I sent beforehand the selection of ethical concerns on VR that I had mapped out to the key informant in order for him to have time to think them through and formulate own opinions on them. Cuppen (2012) says that emphasis should be on making implicit elements of perspectives explicit so that "learning about how different people look at reality and how they define a problem can be enhanced." This step in the large group of stakeholders could also take the form of a report articulating the different perspectives in order to clarify the different arguments.

The third and final step in this method is confrontation of claims and ideas. The different perspectives would be confronted and compared in the dialogue to stimulate reflection and rethinking (Cuppen 2012). The key informant and I went through together the selection of ethical concerns and discussed them through and the key informant could make counter-claims, which he also did. The whole point was to create an open dialogue where we could learn from each other. It was emphasized in the beginning of the dialogue that we were allowed to disagree and a dialogue would not have to reach to an agreement. The reason to use this kind of method and to emphasize what the method is about was to make it clear that me pointing out ethical concerns is not about arguing against VR or trying to "make trouble," but rather constructively present different viewpoints. Based on my experience with the key informant I argue that openness can be answered with openness and this kind of method has possibility to be a productive learning experience.

I argue that my normative standpoint was shown mostly on this part since I tried extra carefully to act "neutrally." I recognized that there might be conflict in different viewpoints so I purposefully was looking for a method promoting a productive way to handle that conflict.

What was missed

I argue that more could have been learned through a case-study if I had access to some specific projects. As Flyvbjerg (2006) argues, research on learning has shown that if people are to develop from beginners to experts, it is necessary to gain context dependent knowledge. A case-study concentrating on one project could have produced that situation. Flyvbjerg (2006) also states why case study in real-life situations opening up the richness of details is important. First, the nuances in reality, including in human behavior, are something that one can't grasp by just reading a theory. The second point Flyvbjerg (2006) points out is about distance and proximity. If there is too much distance to the object of study, it can lead to a "stultified learning process" lacking feedback and losing the sight of the usefulness of the research. I argue that since there were quite a few conversations with the key informant, the relevance to reality wasn't lost but being able to observe the VR developer-client-user relationships and to listen the conversations would have given a deeper understanding of what is going on in terms of ethical discussions. Even if the informant says that the topic of ethics doesn't come up with his clients, maybe there are still values that are talked about, even if the term "ethics" isn't directly mentioned.

In this chapter, the ethnographic methods used to contribute to knowledge production were explained. The normative standpoint was first discussed and revealed in order to clear out that the knowledge is always situated. Different roles that a researcher interested in ethics could possess were discussed in terms of collaboration with a VR company and in terms of producing knowledge. It was also acknowledged that there is a balancing act between emic and etic perspectives – being an insider and outsider. It was then argued that ethical concerns in VR is a wicked problem which supports using constructive conflict as a basis of a dialogue to enhance learning. In the end it was concluded that knowledge production would have benefitted from a detailed case-study.

In the next chapter the interviews of the key informant are analyzed to gain knowledge on how ethical concerns are involved in the development of VR and how he sees his responsibility on acting on them.

Chapter 5: Ethical concerns vs views from the actors

This chapter is first analyzing the key informant's view on the ethical concerns in VR to see what is the level of consideration of them in real life VR development. It has been understood already that ethical issues are not top concerns for the business. Does learning of the issues change anything?

"But would I do anything differently?"

When going through the ethical concerns on VR that were mapped out from literature review, the key informant's first comment was that when he read through them his thought was that would he actually do anything differently based on this knowledge. Is it that he knows the concerns but don't give them focus or don't see them relevant for his work, or is it that he doesn't understand or just not have thought of the ethical issues? Where are the concerns acknowledged and where is there a conflict?

Concerns of privacy and data

When going through the matters of privacy, the key informant's view was that this would be the concern to prioritize. He argues that this is because of Facebook, that is the biggest industry driver in VR. It acquired e.g. the Oculus VR headset brand in 2014. "Facebook is building the largest platform and invests the most money in hardware, and we all know that their business model is harvesting data from the users. The users are actually the product, as we know from Facebook itself, and I think that is a huge concern." In his view the way Facebook profiles people and predicts their next movements or actions become much more powerful in VR.

The key informant told how the company has gone around Facebook's tracking by e.g. creating fake gmail accounts when Facebook has required signing into an account when using Oculus headsets so the user could not be identified. Currently Khora only identify headsets they use with a serial number and they don't track any additional data from the users. However, third party data

gathering is not the only concern they have. It is also illegal if they were to track data from public sector client e.g. the patients from a hospital. In Khora's case they only care about data that tells them how many times the headsets have been used, how often they were used and the duration of the use when used at a hospital. Tracking data is not their business interest, and neither they want to get involved with it. The key informant said that he wants to just avoid the whole conversation of data tracking with clients as long as it's not absolutely necessary in order to "not make mistakes". "I'd just say we don't track anything. Then I have my back."

It could be argued that it is not necessarily ethical thinking that is guiding preventing data tracking but rather a worry to get into middle of messy lawsuits. It could be then argued that maybe avoiding harm in short term is more in the mind of a VR developer than long term thinking of consequences of privacy issues. On the other hand, if avoiding gathering any unnecessary data is already in their agenda, the other concerns of the use of data is not relevant to them.

Concerns of physical harm

In the section of the concerns of physical harm it was mentioned that there are concerns of VR possibly causing brain damage. Although there is no scientific evidence supporting it, there is also no evidence yet proving the concern is without merit either. It has to be remembered that VR is quite a young medium, so more research should be done. The informant said that he was surprised by these claims. "The only thing I have heard is that if you have not developed your eyesight completely, e.g. as a child, if you haven't developed your eyesight so that you can focus correctly, you can get cross eyed." This is why the company itself uses VR only 10-15 minutes at time for children based on some expert advice. In his view the physical concerns would apply mostly for children when the concerns for adults would be more about the effects of the content. It is understood from the views of the informant that he thought something would be a real concern if it was already based on evidence.

Does this mean that if there is no scientific evidence yet of the concern it is not relevant? It could be argued that a question of expert knowledge can be raised. If for example we go back to the argument in the ethical concerns section, where a behavioral neuroscientist working at Stanford University's Virtual Human Interaction Lab who has studied VR in medical settings for over 30

years was referenced. He argued that the long-term effects of VR are unknown and that he would be concerned for everyone who uses VR (LaMotte 2017). Should this not be taken into consideration based on the precautionary principle? "The precautionary principle enables decision-makers to adopt precautionary measures when scientific evidence about an environmental or human health hazard is uncertain and the stakes are high" (European Parliament Think Thank 2015). Should VR development also practice precautionary measures? Who is expert enough to be heard concerning ethical concerns?

Concerns of psychological harm

When talking about concerns of psychological harm of VR, the response was more personal. The key informant told about his own experience trying a VR application where a man standing next to him at a bus stop is beaten up to death. He says that the experience felt very real and it "set in his body" afterwards. He doesn't deny at all the possibility of VR traumatizing a person. He explains that due to this concern there is always a trained person, such as a psychologist, present for example in exposure therapy treatments. The company provides a manual that comes with the product of how to use the software. But is a technical manual enough? How knowledgeable is the mental health professional of the ethical concerns on VR? If the company providing VR places the responsibility on the mental health professional in for example VR exposure therapy and if that professional is not familiar of all the aspects of VR then, who has the ethical understanding what is happening? It could be argued that for the purpose of this thesis it would have helped if I could have been in a project from the start observing e.g. meetings between different actors such as the company and the healthcare professional so I would have a better understanding if any ethical issues are touched in the process.

It was argued in the concern section that users might have re-entry problems when they come back to the real world, that can last long after the experience. The informant acknowledges that this is a good point. "Giving someone something and then taking it away – that is really problematic." It could be argued that this "re-calibrating" is something that could be designed to the technological process itself. VR experience with "built-in" aftercare could possibly reduce the unforeseen harms.

The key informant argues that ethical issues are brought up now, because VR is a new medium. "I'm sure that these discussions were there when the television came along, when the radio came, when the newspaper came. All through history." He continues: "We will maybe shake our head in 20 or 30 years that we are having this discussion, but it is because it's a paradigm shift that is taking place." Surely yes, every medium raises new discussions, but none of these mediums could do what VR can do with its immersiveness. The point is that VR provides us "virtually real" experiences as Ramirez and LaBarge (2018) calls them, which is unique.

When questioning the ethicality of claiming VR as "an ultimate empathy machine," the key informant argued against the concern. "I think you can make people feel like a refugee feels, or how a black woman feels. I think that is actually possible." In his opinion it would be okay to use both methods, an experience where one is *embodying* somebody else in order to experience a situation, or when one is *witnessing* a situation. Based on the points mentioned in the concern section this is for me problematic. Let's imagine a current scenario where a VR experience would be created where one could be embodied as a Palestinian in Gaza. I claim that just based on VR experience I would not know how it *feels* to be a Palestinian since I have not grown up there, or currently live there in the middle of the existing conflict. I might feel sorrow, I might feel fear depending what is happening in the experience but how could I possibly *relate* to that experience from my own Nordic background. The key informant argued that the experience depends on how empathetic one is and how good they are putting themselves into somebody else's shoes. It could be argued that the key point is missed here. Maybe some NGO can get more donations when a VR experience brings Gaza "closer" and one can learn about the current physical environment Palestinians are at by being able to walk around in the battle field. Maybe one donates more money after seeing children crying in the VR experience. But the ethics of reducing one's whole life into a VR experience and claiming that somebody else can now know and feel exactly like you, can be dangerously misleading. I might feel fear in the experience since the sounds of bombing but I would not feel the fear knowing that my home is in ruins and I would have to escape my country. It is like claiming that an experience where I should only live with 1 euro in my pocket and sleep outside for a day would make me know how it is to be a homeless person.

This also works another way round. Think about a scenario where one can experience in VR what it would be like in a wheelchair. Surely it is a difficult situation to be in a wheelchair but at the same time people are really good at adapting. This is called 'disability paradox,' where there can be a life of high quality that is against all odds (Albrecht and Devlieger 1999). An able-bodied user can

relate only from an able-bodied ethnocentric point of view maybe feeling how frustrating it is when there are barriers in movement or feeling that there is something missing. Silverman explains it simply with an example of when people blindfold themselves in order to understand what could it be to be blind. This "blindness simulation" misleads people because it is then about "the initial trauma of *becoming* blind rather than the realities of *being* blind" (Silverman 2015). In the research of the same situation few participants had actually spontaneously said remarks such as "thank God I'm not blind" when they were let to remove the blindfold. The participants also projected the negative feelings that rose from the experience onto blind people estimating that blind people experience feelings of fear, anger, confusion, and distress more on a daily basis (Silverman 2015).

Concerns of transparency

Through the answers of the informant it could be argued that he understands very well how powerful VR can be. There is no doubt about that. But in ethical issues he admitted himself that he wouldn't be the first to push the agenda of them: "I should not make problems that potentially are not there yet." He sees that he should be ready to answer ethical questions with collaboration partners but as the industry their first job is to "push the boundaries of what the technology can be used for." The informant agrees though that they should guide clients and make them aware of the most critical concerns that could harm the users and to tell what should absolutely not to be done. In his view though, the client or the collaboration partners should have the most responsibility because "they are the ones that know the user group." He also places responsibility on outside powers such as laws and technological developments, and the strategies of "the tech giants."

The informant agreed on the need of multidisciplinarity in the ethical discussions, that some of the articles were promoting for. In his view these discussions should be done in combination of the industry and the academia. He also pointed out that "regulators and ethical discussions can never keep up with the tempo of how the technology is developing." He argues that it often seems that lawmakers wait for problems to arise and then try to fix them. His view was in fact that this thesis rising the ethical concerns in VR would be valid for lawmakers like The Danish Council of Ethics, or the Danish Health Authority, or a spokesperson for the political parties within e.g. Healthcare so these instances would be able to better understand the technology in order to regulate it and "to be ready for when it is actually more implemented in society." In his view, the implications of VR

technology for e.g. the healthcare sector would have an effect in 10-15 years, so these actors should start working on that now. "They are not prepared."

"It gives you power"

Since the key informant pointed out the client's responsibility, let's explore what views they have on VR. The selection consisted an informant 1 who had chosen to try VR for the patients with physical disabilities he works with and an informant 2 who had both interest for VR through his job working with people with physical disabilities but had also personal experiences using VR.

What was evident was how the thoughts of ethics and responsibility were either not in their mind or not considered greatly relevant. There was rather a sense of excitement linked to VR and the possibilities of new innovative technologies in general. Informant 1 saw that technology can give *freedom* to his patients to do things that they being physically disable might not be able to do otherwise, such us switching lights off or closing curtains or changing channels on television. "Life will be easier, and they will feel more independent." The role of VR was for him something that would bring possibilities to *improve life* in another levels: "What else would be nice (to do) in life, what else would be good to be able to do like everybody else can do?" With the help of VR patients with physical disabilities can e.g. throw a ball in a game even if their hands are not functioning and simultaneously have a physical and cardio training. Both of the informants' main point was indeed that VR could help people with physical disabilities to do the same things that everybody else does. As informant 2 said: "It creates the illusion that you can do whatever you want." Informant 2 said that VR is an "amazing" experience to anyone, but even more so for people who can't move their body: "It gives you *power*".

Questions arise from this. When e.g. people with physical disabilities can't do in real life what they can in VR, will there be a conflict when re-entering to the real life, as talked about in the ethical concerns section? Should they be aware of this concern, so that the patient can for example be closely monitored after the experience? Informant 2, who has tried VR himself argued that ethical discussions in VR follow the same themes than when talking about violent gaming: "I've tried a VR experience where I jumped out of a 50-storey building and killed myself. That was a game and it

was fun and *I would never do it in a real life.* I had the experience of falling from a 50-storey building and that was crazy but that doesn't mean I will go crazy or that I would want to experience that in real life or that I'm not aware that my situation is different." In his view people's ability for rational thinking should be trusted and technologies shouldn't be restricted because of a fear of negative outcomes. Can people's ability for rational thinking be trusted though? As mentioned before, VR's immersiveness can create an environment where it can affect the user's behaviour without them being aware of it, and it has been shown that simulating traumatizing situations can cause one to react physically the same in VR than in real life. It's not about whether one has a rational mind or not.

Informant 2 saw also VR's possibility to show able-bodied people what it is like to live with disability in terms of physical barriers. However, he did not mention it concerning creating empathy but rather in practical terms, such as how architects could understand better how to create a space for people facing physical problems in movement.

Another point that came up was the idea that people should have autonomy to choose what they want, also concerning technology. Informant 1's example was how they use feeding machines to help their patients at meal times. "I can still hear people discussing if it's good or bad for them, for the people using it, but we wouldn't use this machine for people that didn't want it. We use it for the people that think this is good for them." Here raises the thought, outside this particular machine they are talking about, that do people always know what is good for them? For people to make a decision about what is good for them, they should be aware of all the aspects of the consequences e.g. in the case of using VR.

Summary

This chapter looked into the results of the interviews with the informant working in a VR development company in order to find out how he, working close to the technology, sees the ethical concerns and also where he thinks the responsibility lies. It was learnt that the privacy issues were his first concern but they were actually already taken care of because of the fear of "making mistakes" that can be understood of acting against the laws. The company is not interested in

collecting any extra data not relevant to the projects in hand. Regarding physical concerns, the informant was interested in concerns that are already evidence based, although he mentioned how in the case of children, he follows some specialist advise.

Should the concerns be taken into consideration by the precautionary principle? On the topic of psychological concerns, the comments the informant made were somehow conflicting. On the other hand, he completely agreed that VR can cause psychological harm such as trauma, but at the same time he saw the ethical discussions coming up now because VR is a new medium. He compared it to the emerging of e.g. television – the concerns that were stated then seem amusing now. It seemed that *believing* in the unforeseen concerns would not necessary lead to *acting* on them – mainly because there isn't evidence on them yet. He saw that the ethical responsibility should be mainly on the client side since they know the user group the VR experience would be targeted for. He also argues that the regulators should start preparing now for the possible consequences of VR. But shouldn't the creators of VR too?

The client side of view was also gathered in order to find out what is the level of consideration of ethical questions to see how much it makes sense to place the responsibility on that side. It can be argued that there are many different types of clients, so this selection didn't necessary catch the whole truth. It gives a one point of view, which is that ethical concerns are not really thought of. VR was rather first and foremost seen as providing experiences that would not be possible otherwise. The opinion was that people know what they want and they should be allowed to use the technology. An argument was also that it should not be restricted because of fear of negative outcomes.

Based on this, it could be argued that the possible serious consequences for an individual and society are not really known or understood and there should be more awareness of the issues in order for people to make informed choices. This points back to the creators of VR experiences, the designers, and the developers. They develop the technology, so what is their responsibility? In the next chapter a theoretical perspective on a creator's, or a designer's (as called in the theoretical papers in the following section), power in the ethical development of a technology is discussed. Postphenomenological Mediation theory and CTT's Instrumentalization theory are first compared

to explore different point of views in the issue and then it is briefly discussed what is currently the state of the ethical education for designers.

Chapter 6: Designer's role in ethical development of technology

This chapter is comparing Postphenomenological Mediation theory by Verbeek and Instrumentalization theory by Feenberg based on Critical Theory of Technology (CTT) in order to explore what is a theoretical view on designer's role concerning ethics in technological development. These two theories were chosen because they provide opposite views and especially concentrate on design process. The point of this section is to start building a base of different perspectives on whose responsibility it should be to take the ethical issues into consideration. Haug's arguments on educating ethical designers are also considered at the end to understand the term 'ethical designer.'

Postphenomenology - Mediation theory

Postphenomenology, that is rooted to Phenomenology, was chosen in order to explore the issue of ethics because it is a contemporary philosophical analysis of human-world relations interested in moral actions and decisions. Contemporary in the sense that it focuses on *technology's* central role as mediators in those relations rather than them being separate objects there to do a task. Postphenomenology and namely its mediation approach originating from the work of Don Ihde are used as one of the lenses to explore the topic exactly because this thesis is not about what technology itself can do in the sense of a technique but what can be the *effects* of it and who should take responsibility for those effects.

In a Postphenomenological view, technology mediates how humans relate to their surroundings. "The one choice I do not have is the choice not to make a choice" said Don Ihde (as cited in Verbeek 2001). This can be interpreted that because technology creates new options for us and also makes us more aware of the options we might have, it essentially forces us to make decisions. It forces us to choose. This Ihde calls "decisional burden" (Verbeek 2001) that changes our culture. All the new choices that technology generates place also more pressure on one's responsibility to make a "right" decision. Verbeek (2008) uses obstetric ultrasound as an example, where the technology mediates the relations between the parents and the fetus. The parents become decisionmakers regarding the life of the baby. Without this technology they might not have the knowledge that they base their decisions on, for example to terminate the pregnancy.

The way technology mediates in the constitution of subjectivity and objectivity can be the basis of the argument that it is directly relevant to ethics (Verbeek 2008). Postphenomenology argues that there is no "prime mover," a human subject, in decision-making but it is always a matter of the coexistence of humans and technologies that shape each other. This is why the responsibility of moral actions should be also placed on technology. It is technology hybrids, human-technology *associations* (Verbeek 2008), that have *moral intentions* that can have ethical consequences. To explain this simply, when a man carries a gun he becomes *a gunman* – a technology hybrid. This is one reason from the postphenomenological perspective, why ethics is connected to technological mediation. This blurring of the boundaries between technologies and humans is also why it makes the application of ethics into technology challenging. Concerning this paper, this is one view why ethical awareness is relevant to technological development of VR. Think about for example the concerns of using Avatars in VR that has been discussed earlier. A person can with the help of VR technology to become something that she is not in real life – a technology hybrid.

Verbeek argues that this doesn't anyway mean that ethics should be implemented because 'humanity' needs to be protected against 'technology.' He explains it with the work of Foucault, who makes a distinction between moral codes (rules and precepts) and ethics. Foucault suggests that ethics is "the form that freedom takes when it is informed by reflection, and by this he means that freedom consists in reflectively informed ascetic practices or practices of self" (Robinson). Verbeek (2008) defines "ascetic" here as a form of ascesis, in which one takes a distance from what determines them in order to relate to it. He argues that this distance implies that one is aware of these technological powers in subject constitution and is actively reshaping it. Verbeek sees that from Foucaltian perspective the technological mediation doesn't have to be seen as a threat but something that constitutes the subject. This is also not just a situation that we have to accept, being a subject in a technological culture, but with ethics we can carefully assess and experiment with technological mediations and how they shape us (Verbeek 2008).

Another point from postphenomenological thinking concerning ethics is the way designers of technology can inscribe their *intention* to a technology in hope that it works in desired way. This intentionality is however compromised because technologies are multistable. The meaning associated with a technology is context specific and can change depending on how and where it is used. For example, the use of a hammer is not inevitably tied to a nail, but it could be also used as a murder weapon. Technology has the potential to mediate human experience in multiple ways which is why designers have ethical responsibility over their designs. This is what we look at closer next in order to understand the role of a designer in designing mediations and this way affecting ethical consequences.

Designing mediations

So far, I have argued from a postphenomenological point of view, how technologies help to shape human actions and how one can make moral decisions based on the mediations provided by technologies. This placed a partial ethical responsibility of moral actions on technology. But what is an ethical role of a designer in a postphenomenological perspective? Verbeek argues (2011): "If ethics is about how to act and designers help to shape how technologies mediate action, *designing should be considered a material form of doing ethics*."

Verbeek points out that because of the blurring of the boundaries between humans and technology there needs to be new ways to do ethics of technology. There should be a move away from "assessing" technology towards "accompanying" their development, implementation and use (Verbeek 2013). In Verbeek's view, rather than assessing if a technology is morally acceptable or not the focus should be in a more productive model of "helping to shape good hybrids," to cover the intertwinement of humanity and technology. This is where the designer's role would be crucial. Verbeek (2015) sees that designers can take mediation into account in their design work in two ways. First, designers can try to *anticipate* mediations by using their imagination and then try prevent the unwanted ones. Another approach is to *design* mediations into the products. The aim would be "to design products that explicitly have an impact on people's experiences and practices" (Verbeek 2015). An example would be for example a speed bump on the road slowing one down or a password one has to type before getting an access to a phone. Another example has been presented by Rosenberger (2017), who pointed out how benches in the public areas have been designed with seat dividers because that prevents homeless people sleeping on them. Whether ethical or not, this demonstrates well the power of a design, and a designer.

Smits et al (2019) have with the contribution of Verbeek created a new methodology that uses Mediation theory as a basis to integrate ethics in design practices: Values that Matter. They argue that Value Sensitive Design (VSD) that has acted as a key approach in understanding ethics of technology and design research lacks a clear methodological framework and it assumes that usertechnology-value dynamics is stable. We can see though just with an example of a mobile phone how using the technology has changed our behavior. Values that Matter approach seeks to understand the value dynamics that mediation theory provides and attempts to systemically "anticipate technological mediations of interpretations and actions at the individual and social level, as well as the technological mediation of normative frameworks" (Smits et al 2019).

Values that Matter approach in practice

This section looks at the Values that Matter approach (Smits et al 2019) based on Mediation theory in order to understand how does it aims to apply ethical thinking in to designers' work. VtM consists of four phases: *explore*, *conceptualise*, *anticipate*, *test* (Figure 3).



Figure 3: Values that Matter approach

In **the exploration phase**, the important *actors and values* are identified by mapping out the context of the problem. Anyone who is involved with the design problem and will interact with the solution is a relevant actor. All these actors have different take on the design problem, which results in different needs, preferences and values. It is the design team's task to find out what matters to the actors through some qualitative analysis and make a hierarchy out of the results. What is important here to understand is that "actors reason from their current context" (Smits et al 2019). When the intertwining of the technology and users happens, the context might change and new values might rise. Smits et al (2019) argues "Only the designer is able to anticipate these additional values." They suggest brainstorming about values, literature reviews and also reviewing of similar existing design solutions to help the designer in this task.

This exploration phase seems a thorough process if done well. I argue though that the "design team" should consists of several team members from different backgrounds since understanding and finding values is a key process here. Putting all the trust on a designer seems a bit excessive. How good are the research techniques they would apply? It would benefit from a multidisciplinary team, or rather an interdisciplinary one, which is more about *sharing* knowledge than just putting individual views out there. If this phase is not identifying values properly, the whole approach fails. I also argue that examples of values should be also included to inspire the value identification.

After the preliminary value framework is done, **the ideation process** starts, aiming to result in a *concept*. This concept will be developed further in all the following phases until the design problem is solved whilst also embodying the important values of the different actors. If there are value conflicts, they should be able be solved by the help of the defined value hierarchy.

Now we continue to **the anticipate phase**. This phase aims at understanding the effects of the value conflicts defined earlier with the help of mediation theory. Smits et al (2019) argue that *this* phase can be explored by a multidisciplinary team, where also the range of actors concerning the design problem can be involved. I argue that this multidisciplinarity comes too late and I would also rather use the term interdisciplinarity as mentioned earlier. It should be applied straight from the beginning in order to have different views contributing to a common goal.

The phase consists of three steps. In the first one the mediation analysis is done by the design team concentrating on the human-technology relationship between the actor and the concept - how technology is mediating the perception and action of the actor herself and how she perceives the world around her. Also technology mediating the relationship between different actors is analysed, because a concept might have some influence on how one actor perceives another actor and acts towards her. The second step on the anticipate is *redefinition of the values* that matter with the help of the mediation analysis. When the concept is introduced it affects the preliminary list of values. This is a good point. As learned earlier in this paper applying ethics is not a static process. The third step is to start the mediation of values analysis based on the mediation analysis and the list of values that were redefined. The design team should identify the effects of the concept compering that on the different values that matter labeling the values with 'threaten,' 'enhance' and 'transform'. The threaten label means that the concept will affect negatively the value and the enhance label implies improvement. The transform label is about "the mediation of moral frameworks" (Smit et al 2019). The content of the value is changed by the concept, for better or worse. After this labeling the design team can analyse their concept again and either return to conceptualise phase or continue to test phase. (Smits et al 2019)

I argue that to understand this phase properly a few different examples would be needed from the process. Doing some mock-up analysis rounds could prepare for the real-life process that are often time limited.

In **the test phase** the concept that embodies the values anticipated should be ready and tested by different actors. The design team can try to find out for example what is the real technological mediation of the concept, do actors appreciate some values over the others or what kind of effect does the concept have on the values that matter. Is the concept ready from this round and the final one to put it out there to the society? Is there still threat to the different values? As Smit et al (2019) says "Designers should aim to find the best balance between 'what we think is good for the actor' and 'what the actor thinks is good for them.'" I argue that this is a valid statement. There can be a difference between the two. A product should be ready when it optimally improves both the values anticipated and the values of subjective experience. The process goes through iterations between conceptualise, anticipate and test phases until the result reaches the optimal goal.

Although Smits et al (2019) conclude that their approach is "a first attempt to provide a systematic philosophical framework for designing and anticipating value dynamics" it could be said what becomes evident from this is the trust they place on designers. They assume designers have an ability to understand the mediation of technology resulting to different values and to anticipate design's effects. I argue that sometimes people can become blind to their own work and sparring from actors from different fields would benefit the process. Also, designers are not one homogenous group with the same education or intentions.

Critical Theory of Technology - Instrumentalization theory

Critical Theory of Technology (CTT) was chosen to explore the issue of a designer's role in ethical development in technology because it believes that transforming society requires transforming technology. "What human beings are and will become is decided in the shape of our tools no less than in the action of statesmen and political movements" (Feenberg 2002). This implies that CTT is relevant to ethics since it emphasizes technology's impact on society. As mentioned earlier with Moor's Law (2005): "As technological revolutions increase their social impact, ethical problems arise." Feenberg also argues that technology is always part of a context. It matters who made it, the way it was made and what was it intentioned to be used for. The process of designing technology is important.

Technologies embody designs and underneath the design is what Feenberg calls "technical code" (Feenberg 2005). Technical code consists sociogram referring to social requirements and technogram referring to technical requirements, the terms that are originally introduced by Latour. Feenberg (2005) explains that "a particular technical configuration reflects the influence of a particular network of actors. A precise definition of a specific technology can therefore only be found at the intersection of the two systems." So CTT argues that technologies are not neutral tools but shaped by different requirements, values and costs, interests and opinions by *particular* actors, meaning that there might be other actors which values are not included. The desire of CTT is that socio-technical configuration is challenged by subordinate groups who impact design so it will be transformed. In dialectical approach, which is one of the central concepts of CTT, contradictions can be exposed by considering different viewpoints. In this view, the need of interdisciplinary

teams in design process, which was mentioned in this paper, fits to this idea. This way different values by different actors can be better identified helping to lead to the development of more responsible technology.

Shifting focus

What is the role of the designer then in CTT's view? Feng and Feenberg (2008) argue, that even if designers have substantial influence and can control the outcome of the design there is too much focus on them who are closest to the design process which can result in missing the larger cultural and political-economic structure. Feng and Feenberg (2008) question design as purposeful activity and the extent designers' intentions can shape the technology.

Feng and Feenberg (2008) explain that there seems to be three perspectives on the intentionality of design. A view that design has strong intentionality where designers are seen powerful such as the view of postphenomenology, a view that design has weak intentionality meaning that designers are constrained by variety of factors and lastly a view that questions intentionality. The last approach sees that "design is not only a strategic contest between interested actors and social groups, it is also a function of the way in which things appear to be "natural" to the designer" (Feng and Feenberg 2008). This is what Instrumentalization theory, developed by Feenberg, is leaning on.

What does that mean if something is "natural" to a designer and why does that matter? First, we need to understand the two levels of technology that Instrumentalization theory argues the analysis of technology must be done: "the level of our original functional relation to reality and the level of design and implementation" (Feenberg 2005). The first level, also called primary instrumentalization, is about a pure technical insight where the technology is stripped to its functional qualities. Secondary instrumentalization then proceeds by placing the object into a social context – the way the technology becomes socially acceptable (Feng and Feenberg 2008). Instrumentalization theory is interested in the broader cultural values and practices, *cultural resources*, that surround a particular technology and how design choices are made under those influences – and seem 'natural' to a designer (Feng and Feenberg 2008). Let's think for example of a bike as technology and as a cultural practice. In Denmark, cyclists are culturally accepted to use

the streets so this becomes "a background condition" when designing a technology. Bike lines would be taken into consideration when designing streets. In the US though, the same would not happen because it is the cars, not the cyclists that dominate the streets and that is "natural" in that culture, something taken for granted. "No implementation of a technical element is possible without some minimum secondary instrumentalization contextualizing it" (Feng and Feenberg 2008). The secondary instrumentalization's role grows further in the line in the development in technology and even after its already circulating in a society (Feng and Feenberg 2008).

Feng and Feenberg (2008) call *design space* the scope where the *technical elements*, meaning the technical ideas and implementations that go into building devices or creating technical operations, can be combined from all the possibilities to create the new technology. The design space is not neutral. The cultural resources, the influences surround the technology. They take two forms: the lifeworld and its everyday beliefs and practices, and historical choices on technology that has led to culturally biased knowledge (Feng and Feenberg 2008). The design space is already filled up by practices, world views, and assumptions by its predecessors. Some of the design options for a technology are not even looked at because there are taken-for-granted assumptions of them. Feng and Feenberg (2008) argue that "designers do not work in a vacuum" but they have to accommodate themselves to the world surrounding them. This passive coercion can prevent seeing the alternative design possibilities. CTT's view is that it is exactly these background assumptions, the taken-for-granted cultural beliefs that should be questioned when designing technology. Based on the Instrumentalization theory the outside forces are more powerful than a designer. This implies that it is not just matter of a social influences that exist, but it also matters what is the company culture where a designer works.

Has designer power on technological development?

When comparing postphenomenical Mediation theory and CTT's Instrumentalization theory it becomes apparent how Mediation theory concentrates on individual's design impact opposite to CTT that is interested in the broader cultural values and practices that influence design process.

Mediation theory puts ethical responsibility also on technology, that mediates one's reality, because it sees that moral actions are done by human-technology hybrids. It could be argued that in this view the design process of technology becomes even more important, since technology itself is partly responsible of the outcomes. Verbeek also argues that ethics is about distancing and reflecting oneself from the technology so that one is able to be aware of its power and actively reshape it. From the view of Mediation theory, it is a designer who can help shape the mediating action of a technology and ethics should be part of it.

Istrumentalization theory questions this important role of a designer. It doesn't deny that a designer can influence design but it wants to take the focus off from individual actors. Instrumentalization theory sees technology having two sides, the side that is about its technical functionality and then the side of socio-cultural conditions influencing it. It could be argued that the point that Instrumentalization theory makes, "designers don't work in a vacuum," is a very valid one. A designer has power but doesn't the environment she is in has more power over her? Meaning, if there should be ethical discussions in a design process, shouldn't that start from the company culture level?

Smits et al (2019) with a contribution of Verbeek present a Values that Matter approach based on Mediation theory. Here the emphasis is in the designer's ability to identify and anticipate values. They also argue that this approach is unique because it assumes that values are not static but they change when interacting with technology, when new values appear. Smits et al (2019) argues that *"Only the designer is able to anticipate these additional values."* Can they though? Can we just assume that designers are this homogenous group with the same skill set?

Ethical designers in making

Haug (2017) provides a view on this idea of designers as homogenous group and education on ethics. He argues that there are two problems in educating ethical designers today. First, even if sustainable design education is considered a core in many courses of design, it is often focused on

environmental issues rather than social issues and sustainable behaviour. Socially sustainable⁶ technology for example would mean that it contributes in improving lives of the people. Second, the focus is often in providing skills and knowledge for creating sustainable designs but some design educators neglect ensuring that design students actually apply this knowledge. Haug argues that design students need to be also taught of "three dimensions of ethos in Aristotelian virtue ethics, i.e., phronesis, areté and eunoia," being 'the right design abilities,' 'the right design intention' and 'the right design goodwill.' He explains that 'the right design abilities' refer to the ability of a designer to consider the effects of designs in different dimensions of well-being of humans, animals and environmental aspects. 'The right design intention' refers to the ambition that designers should have to push the design to the sustainable direction and 'the right design goodwill' refers to designers' ability to engage the client in sustainable solution. Haug argues (2017): "The reason why many designers create unsustainable design objects is probably not a complete lack of knowledge about how to create more sustainable solutions but rather a lack of ambition to do so or an inability to convince others to join them in this endeavour, not the least clients." Based on this it could be pointed out that from the start individual designers might not have the same ambitions or abilities in ethical designing (Haug 2017).

The purpose of this chapter was to evaluate theoretical perspectives in the understanding of the ethical role of a designer. Based on postphenomenology, technology has a central role in mediating how people relate to their surroundings, and technology and humans together, as technology hybrids, have moral intentions that can have ethical consequences. The designer's role is to help to shape good hybrids. Postphenomenology places trust on a designer's ability to anticipate value conflicts in the technological development. CTT then wants to shift the focus from the designers to the cultural resources that influence a designer and which are more powerful than one individual. I argue that it is dangerous to assume that designers are this homogenous group that is able to or wants to think of ethical consequences. Designers are situated, they are influenced by a society, company culture and education. This is why I argue that there is a need for interdisciplinary teams to fill gaps in knowledge, attitudes and opinions to be able to develop ethically responsible technology for the common good. In the next chapter the different levels of responsibility are discussed to dive deeper into the issue.

⁶ "Social sustainability is about identifying and managing business impacts, both positive and negative, on people" (UN Global Compact)

The problem of many hands

When something goes wrong in technological development the question that comes up is about who is responsible. It was already talked about how according to postphenomenology designers have ethical responsibility over their designs. But can an individual be held accountable if e.g. a user is traumatized after an VR experience? Or is it a collective responsibility in a sense that there is more to a problem than just a sum of responsibilities of an individual actor? Why is it even important to figure out where the responsibility lies?

There are many theories about responsibility but here I'm going to discuss about "the problem of many hands" (PMH), a term originally created by Dennis Thompson (1980). The PMH is about a problem, that had contribution from a lot of people, therefore if an undesirable outcome surfaced, it is difficult to place the responsibility of it on someone in collective settings (Van de Poel et al 2015). It could be argued that the scenarios that have been discussed in the section of ethical concerns would be the result of actions between many different actors. There are designers, company managers, users, clients, law makers and so on involved but is any of them alone responsible? A VR company makes experiences, which are partly influenced by the creators of VR, the clients, the users, and the lawmakers. Is this then a case of PMH? "The problem of many hands (PMH) occurs if a collective is morally responsible for φ ." (Van de Poel et al 2015). Let's look at what is meant by this exactly, and why does it matter.

PMH is partly a practical problem – how to identify and prove the responsibility? Who contributed to what, who could have prevented a certain outcome, who knew about a problem or could have known about it (Van de Poel et al 2015)? Was there a lack of communication? Different actors might concentrate on different areas of responsibility, and not one aspect e.g. safety as a whole. If using the same example of VR causing a trauma to a user, the scenario could have been that a designer concentrated on getting the experience done in time and a manager concentrated on getting it done within the budget but nobody anticipated what psychological consequences could be

involved. Also there can be different desires such as to make a mind-blowing immersive experience, which pushes boundaries without regard to negative impact.

Van de Poel at al (2015) argue that PMH is also a moral problem, since it may turn out that in the end nobody can "reasonably be held morally responsible." This becomes morally problematic for two reasons (Van de Poel et al 2015): first, people such as victims, design community, public etc. can see the outcome morally unsatisfactory if nobody can be held responsible. Secondly, if nobody is held responsible of the mistakes made, how can we be sure that in the future the same mistake will not happen again? So attributing responsibility is also about learning from mistakes. It could be argued that this is crucial. If different actors push responsibility to somebody else how do we know where the problem lies if things go wrong?

Van de Poel at al (2015) defines two types of responsibility in PMH: backward-looking responsibility and forward-looking responsibility. Backward-looking responsibility refers to e.g. the impossibility to make one individual accountable retrospectively. The scenario is arguably filled with ideas of "should have, could have." Forward-looking responsibility refers to the problem that the *prevention* of blow-outs lacks organized action, so at the end no one is responsible. The theme of ethical concerns in VR discussed in this paper is mostly about concerns that are in a "what if" stage. Still, the prevention of them are not organized - it could be argued that there is lack of organized thinking of them. There might somebody somewhere (such as the writer of this paper) who pays attention to those concerns but nothing productive can be done by the individuals alone. When looking at individual responsibility and collective responsibility it could be argued that there is discrepancy between them (Van de Poel et al 2015). What is a knowledge of one individual of a problem might differ from the summary of the knowledge from an entire group of actors. Twisting it around, one employer might not also be able to e.g. warn a client about an issue, but that freedom can be in a manager level who might not know about it. Also, one person's act might be acceptable but on a collective level it might be a problem. As an example, if I eat meat once a week might not be a problem, but all the meat eaters together contribute to the existence of the meat industry which is bad for the planet in many ways. But can we blame the collective if the action is not intentional? That is exactly why it is a *problem* of many hands, since the individuals of the collective might not be responsible of the harm (Van de Poel et al 2015).

If dealing with ethical concerns in VR is at the moment a PMH meaning that there is a collective moral responsibility, what can be solutions for it? Van de Poel et al. (2015) mention different type of responsibilities that can be applied. One is "responsibility-as-obligation." It could be argued that since it seems that none of the actors have currently supervisory duty on the ethical issues there is PMH. But if the attribution of "the responsibility-as-obligation" would be distributed somehow within the collective, such as a company, would the problem of PMH disappear? Van de Poel et al. (2015) argues that if a duty of a supervisor comes with responsibility-as-obligation, it would help to deal with uncertainty. They also argue that in this case it is important that the distribution of the responsibility is fair and hopefully taken voluntarily. Shilton et al. (2016) introduce the idea of *moral exemplars*, who would be members, such as designers, of a team that, who simultaneously would act as ethical experts. In this way the ethical decision-making would be an integrated part of making technical decisions. Shilton et al. (2016) argues that "this may be the most efficient and sustainable model for practicing design ethics."

Another point is that PMH is less likely to take place "in institutional settings that encourage individual responsibility-as-virtue, including the taking of initiative, the exercise of judgement (practical wisdom), care, moral imagination, and the willingness to reflect and learn" (Van de Poel et al 2015). "Responsibility-as-virtue" was something mentioned also in the section of "Ethical designers in making," where it was discussed about virtue ethics that design students need to be also taught e.g. "the right design intention" referring to the ambition that designers should have to push the design to the sustainable direction.

Another point Van de Poel et al. (2015) brings up is that if in the collective there is internal coherence the PMH is less likely to occur. This could be understood that if there is an agreement, maybe e.g. company rules etc., the responsibilities are more clear. Van de Poel et al. (2015) also point out that even if distributed supervisory-role with "responsibility-as-oblication" can be effective, preferably independent supervision, meaning not obligated one, would result to properly carried out supervision in case there are conflicts of interest.

Inconvenient democracy

Now we have discussed about individual's responsibility versus collective responsibility but what about society's responsibility? We know from this paper already that implementation on VR into society is moving fast, and it is finding its way to areas like healthcare in a public sector. There are already some regulations that are concerned with privacy and data, but what about the psychological effects from VR experiences that are still unknown? There can be risks and side-effects that become visible only with time and by then it might be too late for regulatory and political actions to undue the effects they might had on society and human culture (Strand & Kaiser 2015).

I argue that as it has already discovered in this paper, VR is heavily invested by the tech giants such as Facebook, and because of that it might be that it affects the political decision making. It has also been argued that "democratically organized societies are too cumbersome...they act neither in timely fashion nor are they responsive in the necessary comprehensive manner" (Stehr 2013). The democracy becomes inconvenient (Stehr 2013). But what to do with that? Stehr (2013) mentions "empowerment and enhancement of knowledgeability of individuals and groups." As mentioned before, would transparency and education of the public on the ethical concerns of VR push also political decision making to act? "Human knowledge and human power come to the same thing, for where the cause is not known, the effect cannot be produced," as Sir Francis Bacon (1620/1994) said.

We have already discussed about anticipation of mediations of technology in design process. *Anticipation* is something that should also be part of regulatory and political action. An STS concept 'Sociotechnical imageries' by Jasanoff and Kim (2009), "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects" would be a valid appliance to act on the development of VR as well. In order for VR to fulfill its potential as a positive technological tool responsible governance of the possible negative side-effects it might cause to society should be also properly investigated. As said before, it is better to act proactively that reactively.

Chapter 8: Discussion

This paper concentrated on finding out what are the ethical concerns of VR, why do they matter, and whose responsibility is it to act on them. This chapter is discussing the meaning, relevance and importance of the findings.

Why do ethical concerns of VR matter?

It has been argued that VR is a powerful tool because it can offer an immersive environment, that fully replaces what people see and experience by virtual information that can be completely created and controlled. This immersiveness makes it a unique medium, different from any other which also makes the ethical concerns unique. It has been argued that when the use of VR has expanded from entertainment purposes over to areas such as healthcare, education and research, issues of ethics become even more relevant. When the goals of VR get as serious as treating patients with mental health problems, training soldiers or educate about racism, it becomes crucial to understand ethical issues, because there can be consequences not just for an individual but also for society.

It was argued that implementing ethical thinking into the development of technology, should be done in the early stages (Moor 2005). It would be harder to start questioning values and morals when the technology is already settled. Not just because of the damage it can possibly do to individuals and society but also to industry. VR is heavily invested in, so it would benefit from proactive corporate risk management rather than trying to retrofit ethical decision making in the later stages in the development of the technology.

I argue that based on these points ethical concerns should be one of the top priorities to understand and act on in the development and also use of VR. However, it became evident from the interviews made about the theme of VR, that the ethical issues were not either a top priority or worrying issue for an informant depending who you ask. I argue that the ethical concerns that were mapped through literature review are serious enough to pay more attention, raise awareness for and have more research done. For example, an informant argued that what he chooses to do in VR, he "would never do that in the real life." Maybe not, but one of the key points of the ethical concerns were that one can be affected by them without knowing. The idea that because VR experiences are "not real," so therefore without consequences fails according Ramirez and LaBarge (2018), who argue that VR is capable of producing "virtually real experiences." Based on research the users of VR often respond to experiences in ways that are identical with how they would respond in the same situation in the real life (Mahoney et al 2018). That is why it is argued that what could for example cause trauma in real life can as well do it in VR. This also make the simulations that would be morally unproblematic in other medium problematic in VR.

I also argue based on the interviews that there is a certain hype around VR, since it offers people opportunities to do things that they can't do in real life. Trusting the new technology to make life better, that was highlighted in the informants' interviews, is an important factor to ignore the concerns, since the hope for an improvement on whatever issue needs fixing can be stronger. Based on this I argue that it is important to make sure by the providers of the technology that all the aspects of it, also the possible negative consequences are brought up for the user to be aware of, so informed decisions can be made.

The literature review called for the creators of VR to become aware of the ethical issues. The key informant, a VR professional, admitted that he would not be the one to push ethical issues forward since the problems might not actually exist. There is still not enough evidence-based knowledge of them. In his view handling ethical issues would mainly belong to the client side, since they know the target group the best. But as revealed earlier, even if the client knows their clients, they might not have the full understanding of the ethical concerns of VR. Whose responsibility is it really to take ethical concerns in the consideration in the development of VR? Individuals such as designers? Collectives such as companies? Or is it a social responsibility in the levels of laws and regulations? This is discussed below based on the findings from this paper.

Individual responsibility

Postphenomenology and mediation theory argue that technology mediates how humans relate to their environment and this is why the responsibility of the moral actions that can have ethical

consequences should be placed on both the technology and the human. They act as technologyhybrid. Verbeek (2011) argues that since designers help to shape these hybrids, designing should then be considered as "a material form of doing ethics." I would like to point out that a term "designer" can be also thought of in broad sense of a term covering many job titles. We could think that whoever is taking part in designing a technology, whether it is about visual issues, content or a purpose is a designer of a technology in some level.

Smits et al. (2019) provided the practical approach Values that Matter to guide designers to understand value dynamics and to systemically anticipate mediations. I argue that it should be "translated" to "working language" and make more approachable in order to bring value to a design team. When it was suggested to the collaboration partner, the VR development company, that designers would be interviewed shortly about the topic of ethics and then workshops would have been facilitated on the same issue, the access was denied based on busy schedules. It seemed that the topic of ethics wasn't crucial enough at that moment for the company to allocate time from their designers. Based on this I don't know if any of the designers in the company are actually interested in the topic of ethics and do they use ethical thinking in their work. My key informant can be seen as developer of VR, being a Head of Healthcare in the company, so I would argue that he also takes part in designing the VR experiences in some level. As mentioned earlier, he was aware of some of the ethical concerns but he admitted that he wasn't pushing the topic forward, hence the uncertainty if the concerns are real.

It could be argued that postphenomenological ideas about design are greatly about awareness and anticipation. Let's twist the issue around with this question: why shouldn't the people working close to the development of technology, whether designers or other, be aware of the ethical concerns there are of a technology they are designing, or be in some level able to anticipate the consequences of it? Is the answer about time limits, budget limits or cognitive limits since one's focus can't be in many places simultaneously? Is the answer about not wanting to "make problems," as the key informant mentioned? This is something that could be researched further.

I argue that individuals have different ambitions, they focus on different things, they prioritize different issues and these are *influenced* by a collective, such as the company where they work at. This was also CTT's point. The focus should be in broader cultural values and practices, *cultural*

resources, as Instrumentalization theory calls them (Feng and Feenberg 2008). Design choices are made under those influences. I don't argue that designers are just puppets of their employers, surely they are capable of incorporating ethical thinking into their work if they want to, but I'm arguing that it can't be expected if the environment they are working at is not supporting and motivating those thoughts. If thinking how this might work in practice, let's imagine that we have an ethically orientated designer who would, as suggested by Ramirez and LaBarge (2018), change the parameter of "context-realism" in VR experience by adding some graphical overlays in order to make the experience less context-real. This decision would most likely needed to to be approved by somebody else, maybe somebody in the management level. One can't act ethically alone, it becomes productive only in a collective level. Also as mentioned earlier, education of designers should include dimensions of ethics as virtue, as Haug (2017) argued, so they would be able to consider the effects of design in different dimensions or to engage a client in sustainable solution.

Collective responsibility

It was argued in an earlier chapter that the issue of ethical concerns of VR is The Problem of Many Hands. It means that in the development of VR multiple actors are involved, therefore if an undesirable outcome surfaced, it is difficult to place the responsibility of it on someone in collective settings (Van de Poel et al 2015). It was argued that this is a problem for example because if not knowing where the responsibility lies it prevents to make the same mistake again. I argue that the issues of ethical concerns in VR lacks forward-looking responsibility (Van de Poel et al 2015). The *prevention* of harmful consequences lacks organized action. I argue then that this is something that a company developing VR should pay attention to as a collective. As Van de Poel et al (2015) suggests, "responsibility-as-obligation" or "responsibility-as-virtue" could be applied in a company setting. For example, a supervisor duty that comes with "responsibility-as-obligation." I argue though that "responsibility-as-virtue" would be a more sustainable choice in the long run since it refers to encouragement of individuals in e.g. exercising judgement, care and moral imagination (Van de Poel et al 2015). If a company is committed to acting ethically, if that is part of the company culture, individuals are more likely to follow that lead.

CTT's views on designer's ethical role was also supporting the idea of collective encouragement as mentioned in the last section. "Designers don't work in a vacuum" but they work in a design space that is already filled up by practices, world views, and assumptions by its predecessors (Feng and Feenberg 2008). Their design decisions are influenced by the environment they work at. I argue that in terms of ethical concerns of VR it is a company's responsibility to become *aware* of the issues and *educate* their employees, their clients and collaboration partners to contribute on responsible development in VR to prevent harm to individuals and society. It can be done by involving actors from different disciplines to bring knowledge from broad spectrum to the team to look at the concerns from different perspectives. As mentioned earlier, ethics is about ongoing education, it's not stable. New ethical issues and results of research *transparency* about them should be practiced. It has also been argued that it would benefit the industry if they took part in educating the law makers about the technology they are developing, since they should be the ones that are the most knowledgeable of it.

The key informant's idea of an Innovation Center of Immersive Technologies is a productive idea in this respect. Combining knowledge from different actors in the field would also contribute to the ethical thinking and responsible development of VR if these aspects will be included to the foundation. Committing to the safe design of the technological applications would be for the benefit of not just an individual but for society. "From perilous to purposeful" as The IEEE Global Initiative on Ethics on Extended Reality mentioned in the beginning of this thesis called for. I argue that if the information would be gathered to a one place and it would be easily accessible, maybe that would also lead to at some point, when the Center becoming known, to researchers to send their latest findings to the Center. I suggest as a further action that findings and conclusions relating to ethical concerns and responsibility in VR from this paper could be summarized and used supporting the funding and development stage of the future Innovation Center of Immersive Technologies. This paper supports the collective action in terms of the awareness and education on ethical concerns in VR, which the Center would be able to contribute to.

Social responsibility

Even if it is argued that companies as collectives should be responsible for including ethical thinking into their work, it should be remembered that they are also products of the cultures where they operate. This is why it is also the responsibility of the different instances that regulate or could regulate the development of VR to be better prepared to the impact of VR. As the key informant argued, they are not prepared yet. This paper would have been benefitted from also learning what is the view of the different instances that do regulating. As a further suggestion to contribute to the responsible development of VR concerning ethical issues, there could be workshops facilitated between different actors, such as VR companies, healthcare professionals and legal authorities to learn from each other. Anticipation should be part of regulatory and political action and not reacting after the problem is already out of hand. As it has been said before, it is better to try to apply ethics in the early stage of the development of a technology. The further the technological development is, the greater is the ethical challenge. The more established the technology is, the more difficult it is to open the "black box."

Chapter 9: Conclusion

This study aimed to identify ethical concerns of VR, to understand why they matter and explore the notion of responsibility in relation to them. Based on literature review it can be concluded that there are ethical concerns of privacy and data issues, physical harm, psychological harm and issues of transparency, that are unique to VR and can lead to significant consequences. It was argued based on literature review, that ethical concerns matter because if ethical understanding is applied to the technology in the early stage of the development it can prevent causing harm to individual and society. The interviews from actors indicated that the ethical issues were not their highest concern. Taking into consideration the seriousness of the concerns and the use of VR broadening out to for example healthcare sector it was argued that it is important to understand where the responsibility

of addressing them lies. Individual, collective and social levels of responsibilities were explored through Mediation theory by Postphenomenology that argued for a designer's moral responsibility on her designs and the ability to anticipate the effects of the technology and through Instrumentalization theory by CTT that emphasized the influences of cultural resources for a designer. Further on the Problem of Many Hands was looked at which also put pressure on the collective responsibility which resulted to as the conclusion of this paper to place the responsibility to the collective setting, such as a company, to understand and act on in relation to ethical concerns. Legal authorities in the level of social responsibility was also found responsible since interdisciplinary team work with the industry would benefit the ethical development of VR.

As a conclusion and supporting the idea of ethics-in-practice I argue that a foundation of commitment on a collective level should be formatted to principles to guide a company developing VR in applying ethical thinking to be a part of a company culture. Since every project is different it is not possible to do a very detailed guide. I suggest the following general statements for the ethical development of VR based on the findings in this paper:

We are committed to an ethical development of VR that promotes

awareness of the ethical concerns research and knowledge sharing educating our employees, clients, collaboration partners and law-makers transparency between all the actors working together for the common good

VR is a technology that can achieve great things benefitting both individuals and society. It can be used for good and bad – the choice is ours.

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