

Revealing relevant factors impacting the viability of the metaverse by replacing online collaboration tools for business meetings

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This paper explores factors, mainly social and ethical considerations, that have an impact on the viability and adoption of the metaverse for business meetings. Virtual reality is increasingly used in professional, leisure and educational settings. Considering the impact that the metaverse could have on the future of online collaboration, it is important to know more about these factors. Data is collected by letting teams of 4 to 6 employees from an IT company experience a demonstration in virtual reality. Followed by a setting in the metaverse (Meta Horizon Workrooms) and then concluded by holding extensive discussions (focus groups). Valuable insights are gained in social and ethical considerations, next to the overall metaverse experience, sense of presence (immersion), privacy concerns and impact on (work) life. Overall, the metaverse provides many opportunities for both its users and companies providing the experience. Showing possibilities for improved focus and concentration, better flexibility and customisation per objective, increased creativity, a lower barrier for communication, better team dynamics and more cost effective inclusiveness, in addition to many other benefits. In conclusion, the metaverse has many advantages over popular online collaboration tools, such as Microsoft Teams and Google Meet. Arguments are made that companies, especially ones that frequently hold online meetings, could already consider the metaverse for a more efficient and effective way of communicating.

Keywords: metaverse, Meta Quest, virtual reality, VR, Apple Vision Pro, Meta Horizon, Workrooms, metaverse experience, social considerations, ethical considerations, sense of presence, immersion, privacy concerns, impact on (work) life.

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1. Introduction

1.1 Problem Statement

Virtual reality (VR) is becoming increasingly more popular in recent years. Having all kinds of use cases in professional, leisure and educational settings (Saavedra et al., 2020). In 2023, the total virtual and augmented reality market is estimated to be over 30 billion USD. With strong growth continuing in the coming years, as stated in the analysis report of Grand View Research (2023). Even Apple, the world's most valuable technology company nearing 3 trillion USD in market cap ("Apple Inc. Stock," 2023) is trying to capitalise on this opportunity with the launch of its Vision Pro in early 2024 ("Introducing Apple," 2023). One impressive take of this technology would be the possibility to experience the metaverse. The term metaverse originated in the early 20th century, from a science fiction novel called Snow Crash (Stephenson, 1992). The term is a combination of meta and universe. In this novel, the main character moves in and out of a place called the metaverse, which is a small virtual city that enables its users to have lifelike experiences. Today, many companies are striving to bring that experience to reality. Simply put, the metaverse is a virtual environment that lets users interact with each other and objects in its environment, as it strives to replace certain real life aspects with ones that are seen as better to experience in the metaverse. This is done by enabling users to create their personal avatars and partake in many kinds of activities. For example, holding meetings or setting up social events with friends and family all around the world. Resulting in creating a strong and immersive feeling for users and enabling them to feel like they are together in the same place, while in reality, being far away from each other.

Working from home and joining business meetings online more frequently has already become quite the standard (Dua et al., 2022). What if the metaverse is the next step in the (near) future? With many similarities and differences compared to the current most popular tools to meet online. Namely, Microsoft Teams and Google Meet (*Grand View Research*, 2022). The metaverse is striving to make virtual life as immersive as real life. Meta, formerly known as Facebook, is taking the top spot regarding investments in virtual reality and the metaverse. Their aim is to better the user experience regarding working, creating and collaborating within the virtual world. Meta is striving to achieve this by utilising a combination of software and hardware that, for example, is able to imitate users' natural facial expressions and tracks their every minor movement ("Horizon Workrooms," 2023). This, however, creates many questions that are currently unanswered, especially regarding

social and ethical dimensions. For example, how this technology could impact daily (work) lives of individuals and teams within businesses or looking at its impact on social interactions, character development and norms & values when communicating with one another in the metaverse.

There is an abundance of technological research conducted on virtual reality and its applications in real world settings, including the metaverse. Although, when focussing on academic literature, there is still little known about contributing factors to the viability of the metaverse as an alternative to many forms of social interactions. In this case, regarding business meetings, as this research aims to address. Considering the impact that the metaverse could have on the future of online collaboration, it is important to know more about these factors. Also, to find out what is seen as most important by individuals and businesses regarding the adoption of the metaverse for business meetings. This focus is especially relevant, since the pandemic moved many information economies, such as the Netherlands and the US, to work (partly) from home (Dua et al., 2022). Thus, making individuals use significantly more digital solutions in their daily (work) lives. This global switch came together with many effects, positive and negative, such as more autonomy, yet also more digital fatigue (Reisinger et al., 2022). The metaverse could have a positive impact on these effects from transiting to working from home more often.

Besides the relevant objectives of this research, there are additional valuable insights developed. By mainly focussing on social and ethical considerations, a better prediction could be made on the potential impact on individuals, employees and companies. Next to supporting decision making processes and promoting responsible and morally sound behaviour. Furthermore, applications built to experience the metaverse are currently mostly theoretical or in an early stage of development. Resulting in very few users that are familiar with the total experience the metaverse has to offer. Thus, making it difficult to imagine the metaverse as a fully integrated technology in consumers' and employees' daily lives. By creating a thorough overview of factors that have a significant impact on users of the metaverse, a solid basis for further research is created that could be used as a starting point to improve the metaverse applications. Also, to find a good balance between the virtual and real world regarding daily and work activities. Next to helping the management of companies to make well informed decisions as to whether the metaverse would be a good fit for their company and their culture. Finally, to assess which pros and cons there could be when integrating it into their own and employees' work lives. This way, companies will be able to

make better decisions as to where its use would be appropriate and where it could add value to the working environment.

1.2 Research Objective

The research objective is to map out relevant factors, mainly social and ethical considerations, for the adoption of the metaverse regarding business meetings. Furthermore, additional valuable insights gained from the focus groups to assess the metaverse's viability as an alternative to online collaboration tools, such as Microsoft Teams and Google Meet. Since business meetings are a significant part of many individuals' daily (work) lives, it is considered a relevant and timely objective to research. Especially with a digitalising world in which everyday consumers are planning more activities online and employees are getting used to working from home as mentioned earlier (Ridderstad, 2023). This results in a more familiarised feeling with tech products and services, thus increasing the opportunity the metaverse has in capturing a broad market share. This is also affirmed by the rebranding of Facebook to Meta and their billions of investments ("Meta Investor Relations," n.d.) into their metaverse focussed company called Reality Labs ("Reality Labs," 2023).

One of the first introductions of Meta regarding use cases of the metaverse are Horizon Worlds and Horizon Workrooms. Horizon Worlds is seen as more of a general social setting in the metaverse. Workrooms, however, could be described as a virtual space that brings teams together in the metaverse. By enabling the latest tools for collaboration and making individuals truly feel the presence of their project members. Horizon Workrooms is a solid first step to use for researching relevant factors when using virtual reality to engage in the metaverse with a focus on business meetings. Thus, Horizon Workrooms is used for this research to let participants experience the metaverse in a setting that closely resembles a business meeting. A further explanation about Workrooms and the methods is given in the methodology section.

Furthermore, this research could also help create more awareness of what this rapidly developing technology could mean for consumers and employees' daily (work) life balance, their social interactions, data security, privacy and more factors that will come to light as new insights are brought forward by this research. The best way to research this is through a qualitative exploratory research design with focus groups as its data collection method.

1.3 Research Question

This research is significant and important, not only due to virtual reality and the metaverse's strong trend within businesses and consumers, but also because of the overall increase in technology that is replacing many aspects of the world we are living in (Matyushok et al., 2021). This includes tools for online collaboration, especially within businesses, as they are more focussed on efficiency than consumers. Furthermore, stressing the fact that business meetings are a significant part of many individuals' daily (work) lives, especially in an information economy as mentioned earlier.

However, it is important to acknowledge that the introduction of these innovative products and services for the metaverse often gives rise to significant social and ethical dimensions, particularly the case during the initial stages of adoption. This is especially the case considering the ability of companies providing metaverse applications to collect more extensive data on their users. Furthermore, the potential impact on users' daily (work) lives, next to the increasing possibility of broad integration in regard to virtual reality and the metaverse into society should be taken into consideration. Thus, it is important to explore the associated social and ethical implications, next to other factors that have an impact on the metaverse's viability to be a solid choice for business meetings. Additionally, to assess important factors for the adoption of the metaverse by individuals and businesses, as mentioned earlier.

Therefore, the main research question that this paper seeks to address is:

What are the relevant factors that have an impact on the viability of the metaverse as the next technology for business meetings?

In the following section, a thorough literature review is conducted to explore the main themes and subjects that are relevant in addressing this main research question.

2. Literature Review

A literature review has been conducted in order to have a solid base regarding themes, subjects and theories that are relevant to this research. Starting with a short definition of virtual reality and the metaverse, including its evolution. Followed by an explanation regarding the sense of presence and immersion in the metaverse. Including relevant theories, namely the Social Presence theory, Media Richness theory and Embodied Social Presence theory. Furthermore, ethical theories and considerations are discussed. Consequently, through an ethical lens, followed by a focus on social settings and privacy concerns. Lastly, the literature on privacy concerns in social settings and the potential impact on social relationships and community formation is reviewed. Overall, the gained insights should give a solid basis to build guidance for this paper's methodology and as a base level of knowledge to present new insights from the collected data.

2.1 Virtual Reality (VR) and the Metaverse

Firstly, the topic regarding the definition and evolution of virtual reality and the metaverse is discussed. In recent years, virtual reality has advanced quite speedily, with developments in software and hardware that enables users to immerse themselves in digital environments (Greener, 2022). The metaverse is a term that first was introduced by an author of science fiction named Neal Stephenson. Referring to a virtual environment in which users can interact with each other and digital objects, all happening in real time.

Virtual reality is defined as an environment or simulation in which software generates a 3D environment that enables users to interact with each other and their generated environments. By using, for example, a virtual reality headset. The current (2023) most popular VR product for consumers, developed by Meta, is the Meta Quest 2. While technology in VR has existed for a while, it has become increasingly popular in recent years due to technological advancements in software and hardware. With tracking systems and significantly higher resolutions, for example. Combined with processing & computing power that are able to support these enhancements (Caserman et al., 2018), while keeping virtual reality products relatively affordable. Thus, gradually becoming a viable opportunity for businesses to be directed towards consumer markets. Regarding the metaverse, which is a term that has been used quite frequently in science fiction, it has gained substantial popularity as there are many new possibilities and developments due to advancements in virtual reality. Developers are striving to create an optimal environment that could be called

the ultimate metaverse, Meta being a good example with their Horizon Worlds and Workrooms launches. Meta, which is one of the largest US employers, changed their name in 2021 from Facebook to Meta. As they invested and are investing significant resources into building out the metaverse, accompanied by technological advancements in virtual reality products' specifications and affordability. As an example, Meta is projected to spend over 19 billion USD in 2023 alone on their virtual reality and metaverse divisions ("Meta Investor Relations," 2023).

When considering the number of companies investing in metaverse related products and services, next to the significant number of users that are interested in these virtual reality solutions (Alsop, 2022). It is expected that there is also a strong increase in research that is exploring the implications of this technology. One implication that is relevant to this paper and more so, in general, is the impact of long(er) times spent in digital environments. Namely on its users' mental and physical health, next to its effects on their social lives. There are many more social and ethical considerations to consider as it is safe to say that virtual reality and the metaverse are trends that are here to stay. Considering the significant investments from large companies and the soon to follow Meta Quest 3, next to Apple's Vision Pro launch in early 2024, the industry is expected to grow at a significant rate in the coming years. In the next section, the sense of presence and immersion is taken into consideration.

2.2 Sense of Presence and Immersion

The degree to which users feel they are physically present within a virtual environment would be regarding the concept of presence. When discussing immersion, it is usually meant to what extent a user becomes absorbed in the experience (Dincelli & Yayla, 2022).

Firstly, discussing factors regarding the impact on the sense of presence in the metaverse. The level of sensory stimulation provided by the virtual environment is an important factor to feel present in the moment and within the digital environment. Simply put, as an experience gets more immersive, it is accompanied by a higher sense of presence (Bowman & McMahan, 2007). When a high level of sensory stimulation is achieved within the digital environment, it is often perceived by users as more engaging and believable. In a sense that users have moments in the metaverse in which they do not think about it as having a virtual reality device on. Instead, are experiencing a feeling like they are actually present in that virtual space at that current moment.

Secondly, another important factor is the level of interactivity that individuals have within the virtual environment. When users are able to interact with their surroundings and control how and what they move, including themselves, the sense of presence is usually increased. As an example, the Meta Quest 2 currently has an ability with many of its applications, that it is not required to hold the controllers to track hand and arm movements (“Meta Quest,” n.d.). Creating a more direct link between users’ experiences and what their brains are processing as part of reality. More nuanced, an experience that imitates reality in such a way that it comes very close to feeling natural. Thus, when users have a sense of control within the metaverse, immersion is often reported to be higher as well.

Furthermore, another strong factor that contributes to the sense of presence in the metaverse is the level of social interactions. When individuals are able to interact with others within the virtual environment, thus creating a shared experience, the sense of presence is often perceived as higher. This idea will be further elaborated upon in the following chapters. Additionally, the degree of how user friendly a virtual environment has been designed to be could also have a significant impact on the sense of presence and immersion. To have a positive contribution to this factor, a virtual environment has to be easy to navigate and intuitive in nature. Considering the cognitive load as well. When individuals within the virtual environment have to process a high quantity of information or repeatedly have to perform complex tasks that take away from experiencing the surrounding environment, their immersion and sense of presence might be limited. According to Freeman et al. (2017), their results indicate that a high level of cognitive load could play a significant role in the level of immersion and also on how users enjoy their experience in virtual environments. Thus, it is advised by research that designers and developers create environments that take into consideration how high the cognitive load would be for their users. In order to enable users to fully engage in these metaverse experiences. The next chapters explore relevant theories that have a direct or indirect effect on the sense of presence and immersion.

2.3 Social Presence Theory

Social Presence Theory introduced by Short, Williams & Christie (1976) is a framework that aims to explain how (to what degree) individuals perceive themselves to be present in a mediated communication environment. Simply put, mediated communication is an interpersonal communication using a technological medium of communication, such as the metaverse for example. To experience a sense of sociability with others present in that

environment. Focussing on subjective perceptions of being together with other individuals in a virtual setting, highlighting roles of social cues and interpersonal interactions. Biocca et al. (2003) state that social presence refers to the 'sense of being with another' in a mediated environment. This involves perceiving intelligence, intentions and sensory impressions of others, for example. Characterised by a subjective feeling of interactivity and connection.

As Lee et al. (2006) argue, in virtual environments, social presence is essential for creating a sense of co-presence with other individuals who are perceived as social beings. Co-presence refers to participants in a communication being located in the same physical setting. When thinking about the concept of social presence, it could be argued that it is different in nature from other dimensions of presence. Firstly, telepresence (spatial presence) relates to the extent to which individuals feel present in the mediated environment, rather than the physical environment in which they are (Steuer, 1992). Secondly, self-presence concerns the extent to which individuals experience their virtual self as their actual self, which includes their virtual body, emotions and identity for example (Aymerich-Franch et al., 2012).

Social Presence Theory highlights the importance of social cues and the availability of information about others in order to shape the sense of presence in mediated environments. Suggesting that the quality & quantity of social presence cues could influence the degree of social presence experienced. Social presence cues are therefore not only verbal, but could also include non-verbal. Gestures, facial expressions and voice characteristics for example (Biocca, 1997). Understanding social presence is important for designing and developing virtual environments with the goal to facilitate social interactions. By including elements that enhance social presence. Namely, (realistic) avatars, expressive communication tools and responsive feedback systems, more engaging and immersive virtual experiences could be created (Biocca et al., 2003).

A systematic literature review conducted by Catherine et al. (2018) argues that predictors of social presence in communication could be categorised into three main themes. Namely, Immersive qualities, contextual properties and individual traits. Studies find that communication modalities offer more immersive features. Audio and video cues, instead of text cues for example, promote higher levels of social presence (Kim et al., 2013) Furthermore, studies also argue that the presence of a visual representation, with an avatar for example, significantly improves the social presence compared to communication without a visual representation (Feng et al., 2016). Additionally, how realistic a visual representation

looks and feels has a significant positive effect on social presence as well. Namely regarding behavioural realism, meaning how the representation behaves like an actual person. This positive impact on social presence, is argued by several studies (Pütten et al., 2010; Pan et al., 2008; Bente et al., 2008). Lastly, interactivity is another strong predictor of social presence. Research states that higher levels of interactivity in which individuals feel like they are engaging with an intelligent model that is aware of their presence, generally promote social presence (Biocca 1997; Skalski and Tamborini, 2007).

2.4 Media Richness Theory

Media Richness Theory (MRT) is a communication theory first introduced by Daft and Lengel (1986). Seeking to explain how different communication media vary in their ability to convey information effectively. MRT argues that communication media could be ranked from low richness to high richness. Low richness media would have a limited capacity to convey non-verbal cues and contextual information. While high richness media, such as the metaverse, allows for immediate feedback, including non-verbal signals promoting the exchange of rich contextual information. Furthermore, arguing that the choice of media is not only based on objective measures, but also influenced by social factors, including personal experience, knowledge about the medium etc. (Fulk et al., 1987).

Carlson and Zmud (1999) extended MRT by including the significance of social influence and individual experience on how an individual's perception of media richness changed.

Furthermore, Rice & Leonardi (2014) have extensively discussed factors like accessibility, competency in use, time and cost savings at a more individual level to measure their impact on the overall perceived media richness on communication. MRT suggests that the choice of communication medium should align with the richness required by the task. Simply put, matching the media richness with the information richness of the task in order to maximise communication effectiveness. The metaverse presents an interesting context to explore the relevance of media richness theory. It could help to understand how different communication media within the metaverse could impact the effectiveness of communication and interaction.

Users of the metaverse have different kinds of communication channels available, such as text, voice, virtual avatars, gestures and most important of all, a shared virtual environment ("Metaverse explained," 2023). It could be argued that each of these communication channels has different degrees of richness, understanding each channel's implications could

improve the design and user experience within the metaverse. Simply put, important factors of media richness theory to consider applying to the metaverse would be regarding the richness of communication channels, task complexity, individual communication preferences and contextual factors. Ultimately, Media Richness Theory could help to optimise communication effectiveness and foster social connections. Creating a more immersive and engaging virtual reality experience. Especially when a good fit is created between the richness of different communication media and the complexity of tasks and individual preferences. When done correctly, the metaverse could provide a more interactive environment for users to communicate and collaborate.

2.5 Embodied Social Presence Theory

Another valuable take is the Embodied Social Presence (ESP) theory by Brian et al. (2010). ESP proposes that the body plays a main role in communication. There are several forms of embodied representations. Virtual, physical and imagined, for example. Embodied representations combined with shared activities that are oriented towards a goal, have a significant influence on how users perceive and engage in shared activities. Also, regarding communication in both virtual and real environments.

ESP draws on concepts from Activity theory, which is focused on how individuals gain meaning from their interactions with the environment (Nardi, 1996). This could be through words and actions for example. The Embodied Social Presence theory applies these concepts to virtual environments, highlighting how individuals learn about their environments and others within it (Brian et al., 2010). During communication, both objective and subjective content are passed along. The theory of the mind, central to Social Presence theory (Cui et al., 2013), addressed the challenges of understanding the reality behind the presented communication (Carlson et al., 2013). Activity Theory states that individuals only understand each other through their own subjective lenses, which are influenced by objective and interpretive factors (Roth, 2004). According to ESP, communication activities involve both verbal and non-verbal actions, which are initiated by the mind and manifested through the body. With so called tools, like the individual's body and language, are described as symbols within a context to engage in these actions. Simply put, the body serves as a tool for communication and symbolic interactions, which is similar to how an individual's physical body is leveraged in real word interactions. To make a good first impression, for example.

Embodied social presence theory started by observing that the use of virtual worlds created a stronger sense of engagement and presence for both researchers and users. The shared virtual space and interactions through virtual bodies were seen to be a lot more engaging and dynamic compared to other media. These virtual bodies could be seen as tools for conveying concepts, meaning and symbolism (Brian et al., 2010). This in turn allowed for deeper levels of interaction and better encoding and conveyance of information by individuals.

ESP can be seen as a cyclical process of cognitive engagement. A process that happens again and again in the same order. Involving the recognition of themselves and others within a digital space. Followed by a collaborative engagement with other individuals in the virtual environment, conducted through avatars and their actions. Simply put, the Embodied Social Presence theory highlights the role of the body, both real and virtual. Regarding communication and how shared activities and embodied representations influence users' perceptions, engagement and understanding of their environment.

The embodied social presence theory is relevant for this paper as it provides insights into how embodied experiences, shared activities and social interactions influence users' engagement, presence, communication and overall experience within virtual environments. Taking these into consideration would help designers and researchers towards creating more immersive, socially connected and user friendly metaverse experiences.

2.6 Ethical Theories and Considerations

In order to have a better understanding of ethical and social considerations, firstly, ethics and frequent ethical considerations are discussed. Secondly, followed by a focus on ethical considerations in social settings, such as meetings and social gatherings. Regarding ethics as a definition, some argue that ethics is based on personal characteristics. Meaning an individual's opinion on the discussed topic. While others state that ethics could be seen as a combination or a set of social principles. Simply put, norms and values set within a certain group or a society as a whole. When combining the most discussed ideas of what ethics would imply, it could be stated that ethics is regarded as the study of different sets of norms and values that individuals have, based on many factors, in an individual or group setting (MacKinnon & Fiala, 2014).

The main idea often discussed within ethics (moral philosophy) would be fundamental questions about living a good life. Regarding what is seen as good and evil, better and worse, taking into consideration what is objectively right and wrong. This can be seen as one of the main objectives in ethics, to help individuals decide on these above mentioned questions in life. Referring not only to general ways of looking at these concepts, but also to specific ethical issues (MacKinnon & Fiala, 2014). This would be referred to as normative ethics, which deals with the prescriptive and evaluative aspects of morality. Simply put, it is about the establishment of certain (moral) standards and norms. Creating possibilities to be able to better decide what could be considered the right course of action regarding an ethical dilemma, for example. This could be described as a situation in which an individual or a group is faced with having to make a decision that conflicts with interests, values or principles. In which it is not a possibility to satisfy every aspect of their moral obligations or responsibilities. Thus, making it a difficult decision for individuals or organisations to determine the right course of action (Kidder, 1995). In the next chapter, a deeper understanding is created of ethical considerations specifically within social settings, such as social gatherings.

2.6.1 Ethical Consideration within Social Settings

Accounting for ethical considerations in social settings with a lot of interaction, an important aspect to take into consideration is the risk of inappropriate conversations between parties. Especially when the metaverse becomes popular and widely used for everyday activities, such as in support of educational or business activities. Bullying within the metaverse could be just as impactful as when it happens in real life, due to the level of immersion the metaverse is able to offer. Especially when extrapolating the increased rate of innovation in this space, it is expected to become more and more immersive in the following years. This could have long(er) lasting impact on the mental health of its users, as argued by Kaddoura & Fatima (2023). Thus, requiring developers and designers of virtual reality and metaverse products & services to work together with regulators, educators and other relevant stakeholders. In order to prevent and address bullying when it occurs. Only by taking coherent steps that are directed towards individuals and looking for ways that deal with actual behaviour shaping, effective ways to minimise bullying could be achieved.

Furthermore, research conducted by Nir (2022) shows that there are risks associated with a potential for social isolation and addiction within the metaverse. Arguing that users might become so immersed in the virtual reality experience that they start neglecting their real life

relationships and responsibilities. As mentioned earlier on, the metaverse is well on its way to becoming a significantly immersive experience. Thus, it is expected that these concerns are becoming increasingly more relevant in the long run. So, it is important to have open communications with all relevant stakeholders and find ways to promote positive social interactions. While limiting negative consequences on users' social health within the metaverse.

Additionally, researchers agree with the idea that there is a strong need for equity and fairness to ensure successful outcomes in social interactions within the metaverse (Nir, 2022; Kaddoura & Fatima, 2023). To achieve that, developers and designers of metaverse environments should aim to minimise inequalities and discrimination. Also, ensuring that all users have equal access to resources and opportunities within the metaverse. Next to that, Nir (2022) stresses the fact that developers, designers and stakeholders have a duty to prioritise ethical considerations when running metaverse environments. Ensuring that the metaverse does not contribute to social injustice, such as bullying for example. The next chapter is focused on privacy concerns, also through an ethical lens.

2.7 Ethical Considerations and Privacy Concerns

Using multiple sensors is an important feature of the metaverse in order to be able to collect significant amounts of data that are required for a smooth experience (Xiong et al., 2021). As all these inputs from sensors play an important role in creating a better user experience by increasing the level of immersion. Additionally, these sensor inputs are formed together into a single model or image, creating more possibilities to engage users within the virtual environment. This is referred to as multi-sensor fusion (Zhao et al., 2022). Four categories that are of relevance to the metaverse will be discussed within this segment, namely regarding personal (user) data, social activity and communication, scenarios and digital goods.

2.7.1 Collection and Use of Personal Data

There is a lot of personal data being stored in order to be used to improve the user experience and increase the level of immersion. This includes, but is not limited to, physical, biometric and social data. Users of these products and services might not even be aware of how personal this data could be when combined (Falchuk et al., 2018). This could raise privacy concerns. As with any technology becoming popular and widely used, data leaks are not a risk that could be written off easily. Possibly having substantial consequences to the

security and privacy of its users (Liu et al., 2019). Thus, the personal data of metaverse users should be protected with a high priority in order to guarantee their safety. Next to parts of their life that they would not want to be public.

2.7.2 Social Activity and Communication

Furthermore, the metaverse consists of an environment that has a high degree of social activity and includes many interactive aspects (Allam et al., 2022). Effective communication is required to be able to build trust between individuals. To share information with each other and to collaborate, for example. As mentioned earlier regarding user information, even when these components are not in the picture, users are often still not willing to share information that is seen as adequately personal. Preferring to keep their personal data to themselves, as the content might be perceived as private and sensitive. Thus, an important aspect regarding this point of focus is to secure communication in a way that makes sure that bystanders, for example, are not able to access or recover communication content. All while still allowing for legal communications to take place freely.

2.7.3 Scenarios within the Metaverse

When considering scenarios within the metaverse, it is quite possible to experience similar security and privacy challenges, as compared to real life scenarios. Since the metaverse is a digital environment that closely resembles aspects of real life. According to Zhao et al. (2022), two main aspects should be considered. Scenarios on itself and avatars of users. When focusing on scenarios, there are not many alternatives to choose from regarding virtual reality products that are used in order to experience the metaverse. Thus, its users are bound to have a varying degree regarding their understanding of cultures, norms & values, different views on religion et cetera. Meaning that these environments might not serve an overall significant part of their users and confusion within the community could not be excluded. When environments that fall under the metaverse idea become increasingly more popular, there is bound to be a rather small, but still likely a significant part of the community that uses their avatars for more spiteful reasons. Such as insulting their fellow participants, as an example. This concern has been a lasting issue within other digital environments as well, such as (online) competitive games (Fox et al., 2018).

2.7.4 Digital Goods; Creation, Trading & Ownership

Regarding goods, the metaverse is an environment that has many possibilities for customisation and personalisation by often having a significantly high degree of imagination,

creativity and independence. Enabling users to build products based on the needs and wishes of individuals. Examples include character modelling, appearance and customised buildings within the metaverse. Also, decoration, such as art and avatar cosmetics. Creating opportunities for communities to generate revenue and gift their friends and family. To be able to provide users with a smooth experience regarding the creation and trading of these goods, users should be protected. In a way that data about rights and ownership is securely stored and can only be accessed by the appropriate users. Also taking into consideration which goods could be seen as the original, keeping in mind that copyrights are still an important aspect to credit authors. Just as it would be the case in the real world. Regarding the metaverse, NFTs could be seen as a viable way to create such controls and to keep privacy and security concerns to a minimum (Yilmaz et al., 2022). In the next chapter, privacy concerns within social settings will be further elaborated upon.

2.8 Privacy Concerns within Social Settings

Research conducted by Adams et al. (2020) shows several privacy concerns that could be relevant to virtual reality devices and metaverse environments. Firstly, regarding data breaches, as virtual reality uses a decent amount of personal data that could even include behavioural data on an individual level. Thus, it could cause sensitive information to be exposed. Secondly, regarding identity theft, as there is a lot of personal data collected and used. When data is in some way easy to scrape, it could lead to an effortless way for hackers to pretend to be another person (Adams et al., 2020). The risk of identity theft is even higher in the metaverse than with social media, due to the vast amounts of personal data being used and the way it is interacted with. Thirdly, regarding unauthorised surveillance, as seen with, for example, TikTok. Since their employees have access to any user account and are able to visualise detailed statistics on an individual level. This risk is also significantly present with virtual reality users experiencing the metaverse. Thus, a strong level of security has to be built to prevent any relevant party from using personal data in a way it is not meant for.

The Meta Quest Pro, for example, is already able to track eye movements and facial expressions (Meta, 2023). Leading to more and more sensitive data about individuals being collected and used. This risk will likely only increase with time and with every new product & service launch. Lastly, tracking and profiling should also be considered. This could be argued as somewhat of a grey area, as virtual reality products could track users' movements and behaviour better than, for example, cookies on apps and (web)sites. Enabling the ability to

create extensive user profiles that in turn could be used for unethical ways of advertising and other forms that could unfairly manipulate customers (Adams et al., 2020). Then again, it could also be used for good. As in creating advertisements that users feel are more relevant to their needs and wishes, thus creating a better overall user experience. Ultimately, this point of focus depends on how users perceive these advancements. As a last point, the impact on social relationships and community formation is discussed in the next chapter.

2.9 Social Relationships and Community Formation

Virtual reality enables many new forms of digital environments in which users not only interact with each other, but could also socialise and play (casual) games like they would be able to do in real life (McVeigh-Schultz et al., 2019). With many possibilities within this virtual realm, users engage in creating new friendships within the metaverse (Zamanifard & Freeman, 2019). Find ways to virtually enjoy activities (Maloney & Freeman, 2020) and games together with and within teams (Maloney et al., 2020). An argument could be made that the metaverse is similar to MMOs (massively multiplayer online games). Although having similarities, the metaverse has a significantly higher sense of presence and immersion. Since users are experiencing it through virtual reality products. Thus, creating many new opportunities in what would be called embodied interactions that have been discussed earlier in the literature review. The current level within the metaverse represents many ways for interaction and collaboration.

A solid comparison would be to MMOs, which are known for promoting social relationships and community formation. MMOs often vary in size, from several players bonding together in a guild, to many hundreds of players creating different types of social interactiveness between members (Nardi & Harris, 2006). A guild meaning an officially formed group of players that strive to achieve the same overall goal. When these groups are adequately organised, they often develop personal and highly dynamic relationships between users (Ducheneaut et al., 2006). This also would be the case when taking the metaverse in perspective, as these strong bonds that are formed could go further than solely the objectives of a digital environment. Creating activities that are unrelated to the time and place users find themselves in. Thus, resulting in the creation of friendships, intimate relationships and more forms of strong emotional bonds (Freeman, 2016). An argument could be made that the metaverse is another effective way of fostering social relationships and community formation. This paper should shed more light on what ethical and social

considerations arise when using virtual reality to engage in this rapidly developing technology and product called the metaverse (Maloney et al., 2021).

Furthermore, avatars within the metaverse are already quite advanced compared to other popular virtual environments, namely MMOs. Users experience a better link with their virtual representation (avatars) by moving with a more natural connection between body and avatar. Instead of using controllers with buttons or mouses & keyboards. This new way of controlling movements may further increase the social aspect of the metaverse, as a better link between an individual and their avatar could be achieved (Ducheneaut et al., 2009).

Concluding Literature Review

To conclude the literature review, the most prevalent themes and theories that recent research has shown, are listed below and shall be used as a reference point for the data collection.

| | |
|--------------------------------------|--|
| Overall Metaverse Experience | A seamless blend of real and virtual experiences. Enhancing creativity and collaboration. |
| Social Considerations | Fostering new forms of digital social interactions, blurring boundaries between real and virtual |
| Ethical Considerations | About ownership, control and access to virtual resources and experiences |
| Sense of Presence (Immersion) | Heightening the sense of presence and feeling of immersion. Creating lifelike virtual environments |
| Privacy Concerns | Increased ability for personal data collection and use. Safeguard and protect against misuse. |
| Impact on (Work) Life | Improving life, work and productivity by enabling endless possibilities for individuals and teams |

Table A - Focusses that emerged from the literature review and by researching their current relevance to this paper's objective.

3. Methodology

In this chapter, the data collection and analysis methods used in this research are discussed and explained. Including the reliability and validity of this paper.

3.1 Research Design

This research is qualitative and exploratory in nature, as the overall objective of this paper is focused on finding out and explaining ethical and social considerations, next to additional relevant factors to assess its viability over popular collaboration tools, such as Microsoft Teams and Google Meet. Furthermore, to create insights on its adoption by individuals and businesses. As mentioned earlier, it is regarding the use of virtual reality to engage in the metaverse with a focus on business meetings. This research is considered qualitative, since it aims to gain a deep understanding of a particular phenomenon. Furthermore, it is about subjective experiences, as it involves diverse perspectives, opinions and emotions of individuals engaging in the metaverse.

Exploratory in nature, since it is based on a topic that is yet to be fully explored, as the metaverse in its current form is a relatively new concept. There is little to no existing literature on factors, including social and ethical considerations, of using virtual reality to engage in the metaverse with a focus on business meetings. By laying the groundwork and generating new knowledge in this emerging field, a significant contribution should be made to fill the academic gap that is currently present. When considering products and services to focus on within this research, there are several providers that would be relevant. For this research, the Meta Quest 2 has been chosen as the most viable option regarding the virtual reality headset. In the next section, a further explanation is given about the motives behind this decision.

Firstly, the Meta Quest 2 is seen as one of the most affordable solutions to experience VR and the metaverse, with a price starting from 399 USD. It is also the best selling VR product currently on the market, which launched in 2020 with an estimated number of over 10 million sales and 3 billion USD in revenue. Secondly, Reality Labs with Meta as its parent company, has invested significant resources in the metaverse and will continue to do so in 2023. More than 19 billion USD in 2023 alone. According to their latest earnings call, Meta stated that approximately 20% of their total revenue would be spent in regard to the metaverse ("Meta Investor Relations," n.d.). Thus, it is safe to say that, regarding the metaverse, this product

should stay relevant. Thirdly, after a short, but thorough, review of current services (applications) available that most strongly represent ideas of the metaverse, Meta Horizon Worlds and Workrooms came out on top. With the latter having a focus on bringing the metaverse experience to personal and business meetings (“Meta for Work,” 2023). Thus, it has been chosen as the main environment in which this research takes place. A further explanation about Workrooms is given later on in this paper. Additionally, as both the product and the service are made by the same company, there should be no issues regarding compatibility.

Furthermore, a literature review was conducted by doing thorough research on relevant themes and subjects by using Google Scholar and ResearchGate as the preferred databases for scientific journals. This was done in order to set a baseline of knowledge with theories and concepts that support the explorative nature of this study and to understand what prior research has contributed so far to the main factors behind this research. Additionally, it is used as a support tool towards the end of the focus groups in order to promote critical thinking in participants about the themes and subjects that were seen as most relevant for this study.

3.2 Sampling Strategy

Taking exploratory research that is qualitative into account, purposive sampling is chosen as the sampling strategy (Denieffe, 2020). This decision is made, not only due to the nature of this study, but also to create an environment that is meant to extract the most insightful, reliable and relevant data from the study subjects. Accounting for representability as well. To achieve that, the intent was to recruit employees from a small to medium size enterprise (SME), since this research looked for participants to collaborate in a setting that is more relevant for businesses. Two teams were recruited to participate, in order to gain solid insights and to be able to compare results that are collected from the focus groups. Taking the available Meta Quest 2 headsets into account, together with a suitable number of participants for effective focus groups, the aim was to find teams that consist of 4 to 6 members. In order to do so, the researchers and the University of Twente’s network were used. Criteria for inclusion was that the team had not yet experienced the metaverse, Workrooms in this case. As participants should be able to give their honest opinions about the experiences by minimising the probability that their ideas, experiences and opinions are influenced by external factors that are not presented within this study. Additionally, teams that have already worked (collaborated) with each other via other forms of meetings,

Microsoft Teams for example, are preferred. Since it will likely lead to a more effective meeting in Workrooms, promoting more valuable insights to be gained from the experience.

3.3 Data Collection

Within this section, the research design and methods are explained. The research method is divided into three parts that consist of a) the VR demonstration b) the metaverse experience and c) the focus group.

3.3.1 Research Design

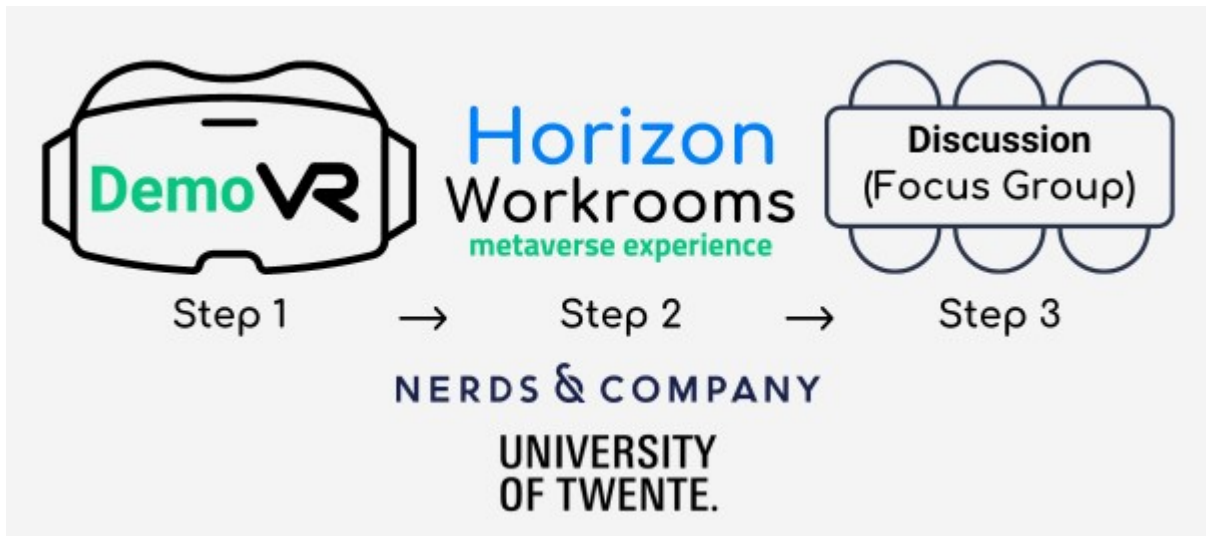
A Focus group is a popular qualitative technique to learn more about or investigate a particular theme of interest. After thorough research and considering the most suitable research designs, focus groups came out on top. This design is a strongly established form that is often used in many disciplines, especially within social studies in order to generate an extensive understanding of a complex idea in its authentic context (Gill et al., 2008). Focus groups are seen as the best option for this research due to the promotion of group interactions, allowing participants to go back and forth on discussing ideas, experiences and opinions. Thus, the aim is to generate discussion and interaction between participants. Enabling the emergence of different perspectives and opinions regarding business meetings in the metaverse with the goal of generating new knowledge and understanding.

Furthermore, since the study participants in this research are employees of the same company, a focus group is better suited to exploring shared meanings. This is an important factor when researching factors that have an impact on the metaverse's viability, especially on social and ethical considerations. By doing so, it will become clear what factors influence the users' social and ethical considerations, sense of presence (immersion), privacy concerns and impact on (daily) work life. Next to the overall metaverse experience. These insights could then be used to assess the viability of the metaverse compared to popular tools and arguments could be made about its overall potential for adoption by individuals and businesses.

3.3.2 Research Method

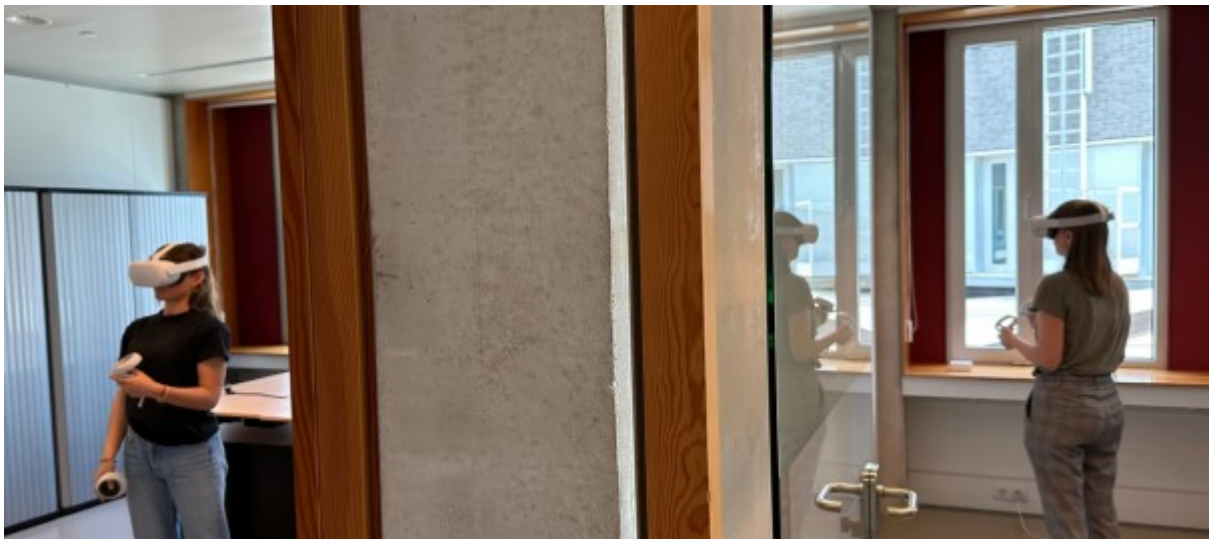
New insights will be acquired by conducting a focus group, after letting the participants experience the metaverse with VR headsets. The research design is divided into three parts that are explained in further detail in this chapter. Furthermore, the research method (focus group) is done twice, in order to improve the reliability of the gained insights and in order to

be able to compare the results. Resulting in stronger argumentation for further research done on this topic.



Part one - Meta Quest 2 Demonstration

Firstly, a demonstration is given regarding the use of Meta's Quest 2 Virtual Reality headsets, combined with a short and concise explanation of Meta Workrooms. This is done to familiarise the participants with the basic functionality of the application that is used to hold business meetings in the metaverse.



As an illustration of the VR demonstration. 2nd event with in total 5 members from Nerds & Company

Part two - Meeting in Meta's Horizon Workrooms

Secondly, after a short break, the experience takes place. A team from Nerds & Company of 4 to 6 members that have little to no experience with virtual reality will hold a meeting, while considering all elements that are shared during the first part of this activity. More about who Nerds & Company is and what they do in the next chapter. The participants are located in separate rooms at the University of Twente, which is the university of the researcher and

supervisors of this paper. The choice for separate rooms is made in order to eliminate any distractions and to enable the participants to freely and clearly communicate with each other at their own preferred volume. This part should approximately take 15 to 20 minutes, as to allow participants to create a solid first impression about how business meetings in the metaverse (Workrooms) feel and looks like. Enabling participants to elaborate on their experiences and share thorough opinions during the next phase of this design, the focus group. In the next section, an explanation is given about Workrooms and why it has been chosen for this research, before continuing with describing the setup.

Workrooms could be described as a virtual space that brings teams together in the metaverse, by enabling the latest tech trends for collaboration tools and making individuals actually feel present with their project members (“Horizon Workrooms,” 2023). The scenario, a meeting in Workrooms in this case, is chosen based on an idea that promotes an immersive experience, while also striving to stay as close to reality as possible. The goal of this meeting is to create an environment that would closely resemble a (physical) meeting in a company. Workrooms is provided by Meta as well, the same company that develops the virtual reality (Meta Quest 2) product. This ensures an optimal connection between product and service to experience a metaverse application. By enabling participants to have an extensive discussion with team members in Workrooms, not only an immersive experience, but also one that would resemble real life is achieved. Additionally, enabling the research to be done with the latest available technology. This ensures that the results of this research are relevant, timely and reliable.



As an illustration of the metaverse experience. 2nd event with in total 5 members from Nerds & Company

Part three - Focus Group

After the session of approximately 20 minutes for experiencing virtual reality for a setting (business meeting) in the metaverse, a focus group is conducted. It is also held on location in a conference room at the University of Twente. The duration of this focus group should take about 30 to 40 minutes. First, participants are encouraged to think about the overall themes and discuss their experiences and opinions with each other. When the focus group is nearing the end, the researcher shall make sure that most themes are covered, focusing on answering the most prevalent questions that have come to the attention of the research done earlier. In order to be able to answer the main research question of this paper and provide new insights for consumers, businesses and providers of the metaverse.

3.3.3 Themes, Subjects and Questions for Focus Group

After freely letting the participants share their perceptions, ideas, experiences and opinions, questions on subjects and themes from the literature review could be asked towards the end of the focus group. Depending on the flow and coverage during the focus group, which is done at the discretion of the researcher present.

3.4 Data Analysis

The focus group is conducted with two teams from a small to medium size company, which in this case is Nerds & Company. A short introduction about Nerds & Company is given at the beginning of the results section. The aim of the data analysis is to gain deeper insights into the participant's experiences and perspectives on factors, including social and ethical considerations, of business meetings in the metaverse. In order to assess the metaverse's viability over popular collaboration tools, such as Microsoft Teams and Google Meet. Next to additional insights about the potential for its adoption by individuals and businesses. The data analysis starts with the transcription of the focus group, using a verbatim transcription method to make sure that the participant's nuances and meanings of the conversation are captured. After that, the transcripts are carefully reviewed for accuracy and consistency, as to make sure that no errors have been made during transcription. Next, relevant quotes are extracted and grouped per theme. The themes are listed in the table towards the end of the literature review, but for convenience are repeated here. 1. Overall Metaverse Experience 2. Social considerations 3. Ethical considerations. 4 Sense of Presence (Immersion) 5. Privacy Concerns 6. Impact on (Work) Life 7. New insights.

This would be considered deductive reasoning and is conducted to easily and accurately present the results based on the relevant themes (Bengtsson, 2016). This is then used for the discussion by further identifying themes, patterns and concepts from the results and presenting them as overarching themes (main ideas) in an easy to read table. This way, exploring complex and nuanced phenomena, as would be the case with the participant's experiences, is done in a structured way to ensure that the data analysis process is done rigorously.

3.5 Limitations, Validity & Reliability

One limitation of this study could be that the company chosen to participate is likely to be closely located to Enschede, which is where the University of Twente is located. Thus, likely to have a Dutch culture. Although, it is believed that this should not have an impact on the generalisability of the results. Even so, it might have a slight impact on the insights gained from the focus groups. Furthermore, it is likely that more tech savvy companies that already use a high level of technology in their workflows would sign up to participate in this study. However, this is preferred, since the aim of this study is to maximise new knowledge and understanding regarding relevant factors. Since more tech savvy employees should have an easier time to fully grasp the total picture and demonstration setting. While employees of companies that are less familiar with technology in their every day (work) life might have slightly different experiences, ideas and perceptions. Mostly in regard to the social and ethical considerations arising from using virtual reality to engage in the metaverse. This possible variation in results could also serve as a future research suggestion. However, variation caused by this factor should be minimal, if at all, ensuring that the validity and reliability of the results are still solid.

4. Results

The company that was chosen for this collaboration with the University of Twente was Nerds & Company, an IT company located in Enschede (The Netherlands). Nerds & Company offers solutions for everyday issues that involve digitalisation. With their driven designers and developers, Nerds & Company develops impactful software with strong & multidisciplinary teams and are in the business for more than 20 years already. They are very keen on new trends and are constantly looking for and researching new opportunities within the digital realm. Thus, a perfect fit for this research. To ensure that the discussion had a good flow, individuals from both teams are familiar with each other and have worked together before.

The key insights are described by each focus group, based on the main themes and subjects that have come to light from the literature review conducted earlier on in this paper. Thus, the results for each focus group are structured as follows: overall metaverse experience, social considerations, ethical considerations, sense of presence (immersion), privacy concerns and impact on daily (work) life. The discussion started by letting participants communicate open and freely. Towards the end of the focus group, the researcher went through a list of important themes and subjects to make sure that everything was addressed. Thus, a chapter is included that shows valuable and relevant insights that do not fit within one of these focuses, ensuring that all relevant results are presented accordingly.

4.1 First Focus Group

The first focus group consisted of 4 participants of which most, if not all, participants had not experienced virtual reality before. Furthermore, all participants were considered tech savvy and had worked together before, ensuring a good team dynamic. Checking off all requirements that were set in the sampling strategy.

4.1.1 Overall Metaverse Experience

Regarding the overall metaverse experience, several valuable points came to light. Starting off the discussion with a participant that felt that their focus was mostly on how the metaverse, Workrooms in this case, looked and argued that you would have to be accustomed to the environment in order to use it for more serious activities. *"I think that you really need to get used to it before you start using it seriously."* As another participant pointed out that due to the experience being new and not like anything else, you are faster to play

around. This might also be due to the environment looking more like a game, but others jumped in that it could just be about getting used to it, as mentioned earlier.

Another point would be regarding technology acceptance. When everything, including the interaction with the environment in Workrooms or other applications, would work more instinctively, it would already be a significant improvement regarding the overall experience. *"I think it just takes getting used to. It also has to do with a piece of technology acceptance."* Participants pointed out that they are too busy trying to figure out how everything works, but nevertheless, really liked the options that were presented in Workrooms. That you are able to colour/draw/copy & paste, for example. Especially regarding the customisations that you could make, as one participant pointed out that their logo was visible in Workrooms and argued that this could bring a lot of value when meeting with (potential) clients. Pointing out that at some point, when users are accustomed to the tech and environment, it could be a more viable and faster alternative than moving rooms in real life, as you could just change the setting you are in. *"Quickly change the environment without changing the environment."*

Furthermore, regarding the total cost, participants noted that it would not really be a point. Although, the fact that the parties that you want to interact with also are required to have a virtual reality headset and everything set up accordingly, might prove to be a difficult effort. Nevertheless, they pointed out that it could be a very interesting product, especially when you could make rooms suit a certain client or type of meeting and leave everything as it is. So, you could simply return whenever you require to be reminded of what has been discussed and what has been shared on sticky notes and/or the whiteboard etc. However, although part of the social considerations as well, several participants put question marks regarding how serious these conversations could be. Focussing on the fact that you are interacting with a cartoon, but stating that this might be less of an issue in the future when they are more used to it. *"That you can't have a serious conversation one on one because you are looking at a cartoon."* Finally, the participants agreed that it is more likely to be used internally within the organisation, but with employees that are not at the office, because they, for example, live abroad. That is currently already seen as a viable option to use the Meta Quest 2 or any other type of VR headset with applications like Workrooms. For other settings, the team agreed that it is still far too early.

4.1.2 Social Considerations

Regarding social considerations, many valuable points have been mentioned. Firstly, stating that it does not really matter how a person looks, thus a virtual environment with an avatar should be perfectly fine. *"It doesn't really matter what a person looks like, does it?"* Another participant talked about how this tech would be decently simple to use for younger generations, but older individuals might really struggle with the use.

Another valuable point that came to light is that the style (cartoon) could be a positive contribution because with other communication platforms, like Microsoft Teams, you might be too focused on how you look in front of a camera, taking away from your ability to focus on what is really important. Within the metaverse, with your personalised avatar, this annoyance is taken away. *"With Google Meet, you always see your own face, a bit confronting. You do not have that here (VR), you only look at the others and not at yourself."* Although, this made it harder for some to know who was talking, especially when sitting in a collaborative setting with many users (avatars) close to each other. Furthermore, the limited emotional expressions that are available in the current form of Workrooms made it harder to have genuine interactive conversations, stated a participant. Additionally stating that it makes you feel less like a coherent team and that it becomes quite difficult to know when it is appropriate to make jokes or be less formal at times, which is argued to help build trust between team members.

The discussion continued with a participant mentioning that it would be quite weird to meet an individual for the first time in a virtual environment, as an avatar. Their colleague quickly jumped in to mention that it could be a strong point, as it doesn't matter how a person looks. *"Because at that moment it's not about what that person looks like."* Arguing that you rate them on how they communicate. Although, countering that point by mentioning that it does indeed make the interaction less personal, which is undesired in most cases. *"Just like you are on a video call with a person who has their cam turned off. then it is a little less personal."* Finally, participants argued that the group dynamic is often different between online & offline participants. *"You always notice that there is a different group dynamic with people who are physically together."* Stating that in a social setting like a presentation, the metaverse would work perfectly fine. As everyone is equal in such a scenario, instead of one person sitting behind their screen, while the others are physically present.

4.1.3 Ethical Considerations

As Ethical considerations are considerably more difficult to think of and address during one discussion, these considerations are often discussed in a broader scope. Starting with a participant really stressing the fact that they are feeling an empty spot and are somewhat missing the person that they are communicating with, instead of looking at an avatar that in this metaverse appears in a cartoon style. *"I miss, when you talk about that ethical part, that you really see the person you are talking to instead of some avatar."* Stating that when this tech and its products get further developed, it would be a significant improvement when an individual's appearance could be closely resembled by making use of a 3D facial scan, for example. This would, according to the participant, make interactions more realistic, limiting the issues that can arise from misunderstanding each other or making incorrect assumptions based on just a voice and muted facial expressions. Compared to having all the information that one would have when talking to an individual in the real world.

Furthermore, participants really question what kinds of meetings would be appropriate to hold in virtual reality. Not having a clear view of what would be a fair and good way to use it or the opposite of course, a (really) wrong way that takes away from what makes an individual an individual. Lastly, another point that was elaborately addressed by participants was regarding the idea that by using facial recognition, companies are able to see how you react to anything. Making it a great opportunity for marketing purposes, but also a significant threat regarding one's control over their personality by possibly getting shaped unconsciously over time. *"From a marketing point of view that is of course a huge opportunity, but also a very big threat. In terms of personalisation and things like that."*

4.1.4 Sense of Presence (Immersion)

Regarding the sense of presence, participants started out by stating that they loved the possibility to customise your avatar to resemble yourself and that you actually have arms & hands to make gestures. They came to the conclusion that it would be very hard to resemble real life individuals and were positively impressed by the level of immersion these avatars are already able to deliver. *"You are right in the middle of it."* Although, one participant noted that there is still a significant difference when moving around and writing something on a piece of paper and, for example, sticking it to a wall. Arguing that virtual reality and the metaverse setting still lacked the tactile experience. *"That somehow when you are all in a real space, physically, it feels different than digitally."* Another participant followed up by arguing that by getting used to it and getting the feel of it, it's rather immersive already. Furthermore,

when talking again about what kind of conversations could be held within the metaverse, Workrooms in this case, the majority agreed that meetings would be based on lighter subjects. Since several participants still held onto the idea that the current representation of avatars is not at the level of immersion yet. Meaning that you would not think twice about holding a meeting that would, for example, be about closing a Million Dollar deal. *"When you have to start striking deals for millions, then you do not sit and talk to such a cartoon avatar."*

Additionally, participants stated that they were very pleased with the facial movements, although less apparent on the Meta Quest 2 in comparison to the Meta Quest Pro. It was argued that it already had a significant impact on the sense of presence. Stating that it is important to see some form of facial expressions and to know when a person is actually speaking. *"I especially like seeing facial expressions and when someone says something, you see that the person is talking."* When the discussion shifted more towards the environment in general, one participant mentioned that perhaps avatars were not needed at all. Another quickly countered that by stating that an immersive experience would require an 'embodied' feeling and that means that you have to be able to see the individuals. Finally, the idea of having a 3D scan that would resemble a real person with high accuracy was taken very positively and would likely significantly contribute to the level of immersion. *"Just a real 3D model of yourself, that would be cool!"* Although, stating that a wide range of customisations for the current appearance of the avatar would already go a long way.

4.1.5 Privacy Concerns

When privacy concerns became the focus of the discussion, the participants stated that Facebook, which has changed its name to Meta, stays Facebook. Implying that due to past events concerning privacy infringements, the participants were sceptical about how the company would deal with their (personal) data. Stating that when the metaverse collects lots of different types of data, the whole idea about it changes and the conversations held within the metaverse would be different than otherwise. *"If a lot of data is extracted, then it is of course a different idea. We are going to have different conversations, so to speak."* Another participant jumped in to say that privacy related concerns would not even cross their mind when using virtual reality and metaverse applications. following that up by mentioning that it might not be different from, for example, Microsoft with their Teams software. Additionally stating that one has to accept the terms of service to be able to make use of the product or service and that you could never be sure either way whether your data is handled responsibly. *"You always agree to certain conditions."* Although, since the topic of discussion

is the metaverse, the participants do however agree that some conversations would have to be held in real life as opposed to within Workrooms, for example. *"Then you wouldn't have some conversations in such a virtual space, but you would meet face to face to discuss certain things to mitigate the risk."*

Then the focus shifted towards the possibility to copy one's personality, as another participant pointed out that this privacy risk could be minimised by (slightly) altering one's avatar and identity traits. *"You could always make your avatar/identity slightly different."* Furthermore, a point of discussion was about how one would be able to impersonate another person, so there should be at least checks in place that would ensure the user that the individual they are talking to is in fact the person they claim to be. Arguing that this concern is different for individuals you have already met before. As when meeting a person for the first time within the metaverse, you would not be able to connect the dots of their personality, since you do not know them yet. Overall, stating that privacy concerns are really dependent on what kind of information you are sharing and the possibilities that you have in the metaverse. Stressing the fact that it is important to know to what degree your avatar in the metaverse could be linked to a real person. *"Depends on what kind of sensitive information you are going to discuss and what you can do with your digital personality."*

4.1.6 Impact on (Work) Life

When the discussion started focussing on the impact of virtual reality and more specifically the metaverse on daily (work) life, the participants stated that these products and services could have a strong positive effect on employees living abroad. Since they would feel more included at meetings and are able to quickly change environments to suit what is needed for that specific moment. *"Then you can switch environments very quickly."*

Although, another participant stated that it would only be useful occasionally, as they argued that it would drive them 'insane' when this way of communicating and working would be the standard. *"If I had to work like this all the time and never come to the office, I think I would go completely nuts."* Other participants unanimously agreed that we, as humans, require that social human aspect. Thus, the participants did not yet see that the metaverse could replace certain activities in real life, but could sometimes act as an alternative for the time being.

4.1.7 Additional Insights

Several additional valuable points came to light during the focus group that do not fit well within one of the main themes/subjects, as mentioned before. Thus, are stated within this section.

Firstly, when thinking about virtual reality and the metaverse, a participant raised concerns that these products and services are introduced for a relatively low price or are made free at first. Afterwards, once everyone is hooked in and the providing company has sufficient data on their user base, you suddenly have to pay significantly more. On top of being locked within their ecosystem. *“Not something that we, as a company, often go for.”* This might prove to be an even greater issue with the metaverse, due to its intention of replacing certain real life activities with ones in the virtual realm.

Secondly, another point that was raised was about a publication that team members who blur out their backgrounds are perceived as less trustworthy. This might also be relevant regarding the metaverse, since individuals are somewhat ‘hiding’ behind an avatar. Possibly negatively impacting the whole experience and what the metaverse could potentially stand for and replace. *“Because it makes it look like you're hiding something, I think.”*

Lastly, a participant argued that within a social interaction in a virtual environment, an individual is mostly reflecting on what they have learned (norms & values) in an actual setting in real life. *“In such a virtual meeting you reflect on how you normally interact with each other in a normal meeting, especially if you put yourself as an avatar first.”* When you do not have that reference and meet others in Workrooms, for example, it might prove difficult to know how to act and behave appropriately. Especially when it would become the standard for meetings and other social interactions.

4.2 Second Focus Group

The second focus group consisted of 5 participants, also from Nerds & Company as mentioned earlier. Just as with the first focus group, the second focus group included a lot of insightful data. Next to the enrichment of results from the first focus group, it could be used to further strengthen arguments made by participants and to take a closer look at differences between both groups.

4.2.1 Overall Metaverse Experience

First of all, participants stated that they really enjoyed the experience and the feeling of being closer to each other, as they usually work remotely. Also mentioning that the concentration and/or focus is significantly better in the metaverse setting, since you are not able to be distracted from your objective. *"I think the concentration/focus is a lot better, because you are in the same room, you can't do anything else."* Then a participant moved on to mention that it really feels like a game, questioning how effective it could be for meeting with their team members. Another participant jumped in to say that this might only be due to the experience being new for them and, while admitting that they played around a lot, it should be easier to take it more seriously when they are more used to the overall experience. *"Everyone likes it, in the beginning, to play around."*

Furthermore, the participants noted that it is really nice that the environment in Workrooms can be changed, as to suit any kind of meeting they might want to hold in the metaverse. Mentioning that the addition of customising rooms with logos and art is a great addition to the environment. *"It is cool that you can customise it."* Additionally stating that it would be great when they are able to completely reproduce their current office in the metaverse, admitting that would take a lot more possibilities in regard to customisations. Although, when that would be possible, the company would see a future in virtual reality and in this case, Workrooms, to use it to interact with clients. Further mentioning that it would also depend on how user friendly it is, not only for internal, but also external parties to browse and join rooms with the possibility for authentication by a password for example, or by invitation etc. *"It also depends on how easy it is to join rooms and whether there is protection or something."*

Then participants talked a bit more about the avatars in a general sense, noting that it might be a lot easier to take the cartoon style more seriously when characters (avatars) could look more realistic. *"When it looks more realistic than the fun fact is going down and it's more serious."* Although, stating that a high degree of customisation, to design an avatar as close as possible to how a person looks in real life, would already help significantly. Also, for recognising each other. Another participant noted that, even though the metaverse experience took relatively little time, their eyes were getting fatigued and questioned whether it could be used for important meetings in which you need to be focussed for longer periods of time. *"I noticed that my eyes got tired. So I wonder, if you want to do an important meeting, how long can you be focused?"* Finally, participants agreed that it's about pros and cons.

When thinking about pros, virtual reality, in this metaverse setting, could be a great addition to the current setup when employees are working from abroad. As to have a feeling that you are working together, while actually being far away from each other. *"Everyone can basically work remotely, but still work together."* Stating that it could not yet serve as a replacement for physical meetings, especially since you are not able to accurately see each other. Although, mentioning that there are lots of possibilities and even though it is too soon to implement into the office now, it might be a different story in the future. *"I think in the longer term, we could also use it with clients."*

4.2.2 Social Considerations

Regarding social considerations, participants started by mentioning that the metaverse (Workrooms) could really work as a social setting for brainstorming, also by using the whiteboard available to everyone. *"For brainstorming or things like that, it can be nice to be in the same room and write something on the wall."* Mentioning that for focusses like these, it would be sufficient to be able to customise avatars, to be able to recognise each other. Really stressing the fact that compared to other communication tools, like Slack, the metaverse is a welcome addition. Since you can immediately see whether a colleague is available and can just start a conversation with them, mentioning that the barrier to talking to each other is lower within the metaverse. Although, the focus was mostly on internal use. As the participants questioned the ability of many clients to be able to join meetings in the metaverse and all agreed that this would be quite the barrier currently. *"It would already be one thing, if we could use it as Nerds. Sometimes clients are not able to join Google Meet. So, no way that they are going to know how to use this."*

Moving on to a different topic. A participant mentioned that, for example, when everyone is present physically, but one colleague is joining the session online. So, being in a hybrid setting, it always leads to a feeling of distance with the person joining online. Seeing the opportunity to, in those cases, use the metaverse instead. *"I think that it could help with working together with colleagues that are on the other side of the world and just being equal to each other in a room."* Another participant then somewhat jokingly mentioned that they could perhaps, together with their colleagues abroad, celebrate Christmas or other holidays in the metaverse. Since it feels a lot closer than calling via FaceTime, for example.

Furthermore, participants mentioned that when virtual reality and its metaverse applications become more realistic, it could really help fight loneliness. Since there are moments which

make you feel like you are really present at that moment in the metaverse. *"If they get used to it as well, it feels like you are really there."* Adding the idea that it would cost you only a few minutes to visit your loved ones instead of travelling for many hours, for example. *"So it makes it easier to visit your grandma for 30 minutes, it could save some time in real life."* Resulting in individuals making the decision more often to get in contact with each other. Finally, when talking about cartoon style avatars, the participants mention that it would be harder to make a good first impression. In real life, there is a lot that one could do with their body language, which is currently not possible within the metaverse. Additionally mentioning that when you have a social room or meetings in which you have not met each other before, you do not know how they look and whether the avatar resembles what the person looks like in real life. Creating fewer opportunities to immediately build trust after the first time meeting each other. *"The first impression is really useful, I think."*

4.2.3 Ethical Considerations

Regarding ethical considerations, which have been more extensively discussed during this focus group, the participants started out by mentioning that there are endless possibilities in the metaverse. Since anything that you can imagine somewhat becomes possible all of a sudden. Stating that it could also create a lot of newly introduced problems, because when the provider of the virtual reality products and the metaverse applications strive to be inclusive, they have to be really inclusive, mentioned a participant. *"You have to have it all inside the meetings and the environment."* However, still being confident that the many possibilities would be a positive. Although, regarding meetings and the general environment in the metaverse, the participants noted that it should be done right and in balance with all stakeholders. As, for example, when creating an environment that has not included everything, it could be an easy target for conversation. *"If you create an environment and you didn't include everyone or everything, it can be a discussion again."* So, I think that's something to look at as well. Thinking about gender, the colour of skin, available activities etc.

Another participant continued by mentioning that once the metaverse involves actual digital value, currency that you could spend not only on virtual, but also on physical items, the environment could change quickly into one that has actors participating in bad faith. Trying to scam or find ways to steal your belongings for example. *"Reminds me a little bit of Habbo Hotel. Everybody tries to steal everything, not everybody, but yeah.."* Furthermore, the idea of getting targeted by interested parties for marketing activities came to light. One participant stated that it already happens with their search results or messages sent via messaging

applications. That the words used might appear as relevant ads on other media at a later time, which already gives a strange feeling of not being in control of your purchasing behaviour etc. and that the potential in the metaverse might be stronger in this regard.

“Create rooms where everything is filled with ads etc.”

Lastly, the participants mentioned that, however having many options to customise your avatar and look the way you would want to, this also poses a risk in regard to impersonating or behaving considerably different than how they would be in real life. Suggesting that it could lead to shifted norms & values and the risk of spill over in different aspects of one's personal or work life. Although, another participant jumped in with the positive side on this aspect, as avatars could lead to meeting an individual really for who they are, not being biased by their looks or from what culture they originate from. *“It can also be like you really meet a person for who they are.”* Another participant stressed the fact that this mostly depends on the character of an individual, as to whether they have a bias based on the factors mentioned earlier. Additionally, the participant mentions that the bar for interacting with many kinds of individuals in the metaverse could be seen as way lower than in the real world, which positively contributes to the social aspect.

4.2.4 Sense of Presence (Immersion)

Regarding the sense of presence, participants started off by discussing how nice it would be to see an actual accurate representation of themselves in the metaverse. Instead of looking at avatars, which are made in a cartoon style. *“It would be nice if it were really us.”* Although, several participants stated that it still pleasantly surprised them how realistic it felt, more than they would have imagined. *“I really felt like a person standing next to me and I was really looking at them.”* However, regarding the actual (haptic) feedback participants received when writing on a virtual whiteboard, for example, they agreed that improvements had to be made. As one participant mentioned that it took quite the effort to move sufficiently close to an object, a whiteboard for example, in order to write on it, without actually getting feedback or feeling when the position is correct. Which made it more difficult to interact with the virtual environment. *“When you want to write, you expect that you feel something you are writing on.”*

Furthermore, participants stated that, while not knowing whether it was accurately moving, you could see an avatar's mouth move. Which they mentioned really helped to make it more realistic and interactive. *“It feels more interactive.”* Additionally, while not being able to see legs (yet), the participants had a positive remark about the possibility to move their arms &

hands. Making it easy to point to something to let others know what they were focussing on. Finally, several participants mentioned that they experienced short moments of delay/lag, which negatively impacted the sense of presence and made them more aware that they are not actually present in the metaverse. *“Like I was setting a step backwards or something. So it was feeling really weird for myself, because I was just standing still.”* Although, overall having a very positive experience regarding how smooth the movement generally was within the metaverse.

4.2.5 Privacy Concerns

Regarding privacy concerns, many valuable insights came to light. First of all, participants mentioned that even though the communication might be clear as to what is collected and for what purpose, they would not necessarily believe Meta on their word. *“That’s what they always say at Facebook, but I never trust it when Meta says something like that.”* Although, stating that they also use WhatsApp and other communication tools that are data sensitive. So at first thought, it would not be an issue. Furthermore, the participants mentioned that the degree of privacy concerns would depend on the type of meeting that would be held in the metaverse, on top of when you would use it internally or with potential clients for example. *“It is also different if you are doing it with clients you are not really familiar with.”* Mentioning that, while they are more aware of the information shared, the metaverse would make them even more aware of the fact and would make them think more about what kind of information they would share. *“It probably happens all the time right now, but in an environment like this, it makes you more aware to think about the information you are sharing.”* A participant continued by stating that this is not exclusive to the metaverse, but with every new tech, giving an example of smart home products. Mentioning that, early on, they are more careful towards sharing information and once it is a known product that is widely used, it does not cause a reason for concern anymore.

Another participant continued by saying that once a product is very useful and you are using it frequently, possibly combined with the network effect of friends and family also actively using the product or service, the privacy concerns become less relevant. *“You use it daily and you cannot do without it, then I think that you’re going to use it.”* Another participant followed up by stating that, at that point, it does not cause a reason for concern anymore. *“If this is the default, then you are also going to use it, I think.”* Although, arguing that it is, of course, dependent on what kind of data the providers of virtual reality and metaverse applications are able to collect. Stating that it is a difficult subject, since users are usually not kept in the

loop regarding what companies are collecting and whether they are transparent about it. While admitting that there are organisations that check on these companies, it stays a concern as to whether the company is following the rules. *“That is the discussion all the time, if they are following the rules or not.”* Still concluding that it most likely will not defer them from using the product or service. *“You like it, so you are going to use it.”* Lastly, concluding with the privacy concerns regarding avatars that would become more realistic, an actual representation of the real person. That would, according to the participants, create slightly more difficulties in trusting what they are doing with your data. Although, stating that it would still be a welcome and desired improvement to avatars.

4.2.6 Impact on (Work) Life

When discussing the (potential) impact on the participants’ daily (work) life, a participant started off by stating that the virtual reality experience caused them to get a headache, while another confirmed they had the same issue. Mentioning that this might be due to them wearing glasses and also experiencing that the virtual reality headset was rather heavy, which would especially become an issue for longer periods of use. *“I experienced a headache after the experience and I think it is a little bit heavy on my head.”* The discussion then shifted towards living more in the metaverse, which takes away time from the real world. Participants argued that they might be using their rather valuable time on activities in the metaverse that would not be very productive. Stating that the providers of these environments would likely want individuals to stay as long as possible in order to gain more revenue from advertisements, for example. *“If you start living more in the metaverse then you are spending less time in the real world and maybe you are wasting a lot of time doing useless stuff.”*

Apple’s Vision Pro got mentioned as well, as the participants have watched the announcement a day before having this discussion. A participant started by mentioning that the impact on one’s daily life would be rather significant in moments that you should be actually present in a family moment, but have a headset on, thus not fully committing yourself to that moment. Which might end up being a valuable memory that is somewhat clouded due to the divided focus. Stating that the see through feature of Apple’s Vision Pro might create more distance in moments that are not directly seen as a potentially important memory. *“The scene where the father was playing with a ball is weird, because there seems to be more distance than if he was just there in the room with his kids, without the Vision Pro on.”* Another example mentioned by participants is when watching a movie together in a physical

room, but both with these Vision Pro headsets on. Stating that you are more into your own thoughts, gradually creating more social distance. *“Even when you are just watching the same movie, both with the Vision Pro on.. You are more into your own shell.”* Ending this subject with a positive note, as a participant mentioned that it could be a great addition, while cooking a recipe for example. Overall, the participants were very enthusiastic about the future possibilities of virtual reality and what the metaverse could bring to improve their daily (work) lives. *“I see enough possibilities to use it in the future.”*

4.2.7 Additional Insights

Participants shortly discussed that they could become anyone that they would like. Joking about how plastic surgery is not required anymore to feel satisfied with your looks. *“You mentioned avatars and I was thinking that you can also become anyone you want. You do not have to do plastic surgery anymore, it is way cheaper.”* Furthermore, after thinking deeply about all the possibilities in the virtual realm. A participant mentioned that they tried to hit another individual in the metaverse, but it did not result in anything meaningful.

5. Discussion

In this chapter, a deeper meaning is given to the results, by explaining and evaluating the collected data and linking it to the literature review. Including its importance and relevance in the overall conclusion of this research and most importantly, answering the main research questions of this paper. Firstly, the viability of the metaverse to replace current popular online collaboration tools, such as Microsoft Teams and Google Meet is discussed. Secondly, a broader view on valuable insights is given per theme, as shown in Table A. Thirdly, a conclusion is given with regard to the metaverse's adoption. Lastly, future research suggestions are provided, followed by practical considerations, practical contributions, scientific relevance and social relevance.

Viability of the Metaverse

Overall, considering the insights from the literature review and building upon them with insights gained from the focus groups, several valuable points have emerged that are relevant to making a strong argument for whether the metaverse could serve as a viable next step in online collaboration.

Firstly, in terms of social considerations, it became clear that an individual's appearance is less relevant in this setting. However, the ability to express verbal and non-verbal cues, as stated in the Embodied Social Presence Theory (Brian et al., 2010) is seen as important by teams within businesses when conducting meetings in the metaverse. Additionally, a strong argument in favour of the metaverse's viability is that avatars in the metaverse eliminate a self-consciousness that many participants experience on online collaboration tools. This is in regard to their appearance, as these tools rely on immersion by turning the camera on, while the metaverse enables many more features to immerse individuals.

With personalised avatars for example, the metaverse allows participants to fully focus on what is truly important, which could be seen as a strong factor favouring its viability over tools like Microsoft Teams and Google Meet. Furthermore, another factor that has been received very positively and adds to the viability of the metaverse as a solid alternative to online collaboration tools is the ability to use productivity tools in virtual meeting rooms, such as sticky notes and whiteboards. After a business meeting focussing on a specific objective is finished, new environments for different objectives could be created within seconds. Additionally, if there is a need to recall or modify something that was discussed or

done in an earlier meeting, the metaverse provides an easy way to locate and interact with data from past meetings.

When accounting for ethical considerations, it could be argued that although the metaverse provides an immersive feeling and a high sense of presence, achieving a good fit between the communication medium and information richness is important. This refers to the Media Richness Theory, first introduced by Daft & Lengel (1986). According to the results, there is still a dynamic missing compared to real life business meetings, particularly regarding body language. This is also supported by the Embodied Social Presence Theory, which emphasises that body language plays an important role in communication. When communication between individuals does not include an adequate number of non-verbal cues, as with body language, there might be a risk of understanding each other incorrectly. For example, when an individual is joking about a topic that is considered sensitive by others. Thus, to be able to make a better consideration on whether what has been communicated was in good faith or could actually be considered unethical.

Furthermore, the metaverse's ability to inclusively incorporate different themes and subjects in virtual environments, is considered a positive aspect for its suitability in hosting business meetings. Especially with clients from diverse cultures. This opens possibilities to make clients feel more comfortable and respected, surpassing what collaboration tools like Microsoft Teams or Google Meet are able to offer. However, when it comes to meetings in which participants meet each other for the very first time, there is a recurring risk highlighted in the academic literature that came back during the focus groups as well. Namely regarding impersonation or significant deviations from how an individual behaves in real life, which is also argued by Adams et al. (2020). In combination with the limited perception of body language, as mentioned earlier, this could have some impact on how businesses would assess the viability of the metaverse in using it for business meetings. However, with complementary software that ensures that the individual entering the business meeting in the metaverse is in fact who it is expected to be, this risk could be considerably mitigated as well. A potential partner that is well known for providing custom solutions regarding authentication would be Nedap, with their Identification Systems ("Nedap Identification," n.d.).

Continuing with the sense of presence and immersion. Taking all aspects into consideration, the overall perception of the sense of presence in the metaverse has been very positive.

Strongly contributing to its overall viability as a replacement for current ways of conducting business meetings. The metaverse strongly resembles the sense of being with another person in a mediated environment, as stated by Biocca et al. (2003) in relation to the Social Presence Theory (Short, Williams & Christie, 1976). Especially when compared to other methods, the metaverse is perceived as significantly immersive. This would be further enhanced by achieving a better alignment with users' bodily movements, such as including legs, which has not yet been introduced by Meta for Workrooms. However, it is likely to be announced in the near future (Navlakha, 2022).

Furthermore, regarding the environments available for holding business meetings, there was a strong indication that the immersive experience was sufficient and did not create any real disadvantages for the participants in terms of viability over real life meetings. However, doubts arise when it comes to conducting business meetings involving large sums of money, as the current view of avatars is not yet seen as sufficiently mature for these kinds of meetings. Nevertheless, by ensuring that avatars have a high degree of expressions, both verbally and non-verbally, the perception of the current maturity of avatars in the metaverse could be considerably mitigated. This is in accordance with the Embodied Presence Theory as well. Furthermore, there should be strong improvements in how realistic avatars look in future iterations of the metaverse, enabling users to choose a suitable style for the kind of activity they are looking for when turning to the metaverse. Apple already made a strong case with their soon to be launched Vision Pro, in which a 3D facial scan is made in order to create a realistic model that could be used virtually (Roth, 2023).

Lastly, when considering privacy concerns, it could be stated that this factor also has a quite significant impact on the viability of the metaverse as a replacement for online collaboration tools. While participants understand and accept that they are already dealing with large organisations that collect a significant amount of personal data (Goswami, 2020), the metaverse creates an environment in which the ability to collect and use data becomes significantly stronger. This indicates that the metaverse could more actively utilise collected data to shape the behaviour of individuals as compared to Microsoft Teams or Google Meet. This is partly due to the immersive nature of the metaverse, which likely has a stronger influence on individuals in terms of advertisements and marketing campaigns, for example. Next to the availability of multiple sensors that are able to track every minor movement, to see whether you have a positive reaction to something happening in the metaverse, for example (Zhao et al., 2022). However, in general, companies may not fully comprehend the

personal nature of this data when combined, nor the kind of influence it could have on shaping behaviour (Falchuk et al., 2018). Therefore, this factor is also highly dependent on the demographic and how tech savvy a company is.

In the next section, an overview is provided with the main themes (focusses) and its key insights that emerged from the results, followed by a broader discussion on all themes.

| Theme (focus) | Key insights that emerged from the Results |
|-------------------------------|---|
| Overall metaverse experience | Familiarisation and Adaptation, Technology Acceptance, Total Cost and Technical Requirements, Concentration and Focus, Customisation and Replication, Realism and Avatar Representation, Internal and External use |
| Social Considerations | Interaction and Collaboration, Hybrid Settings and Inclusion, Realism and Emotional Connection, First Impressions and Trust, Accessibility and Age Differences, Communication vs Appearance, low barrier to communication |
| Ethical Considerations | Authenticity and Realistic Interactions, Appropriateness Virtual Meetings, Privacy and Personalisation, Inclusiveness and Stakeholder balance, Avatar Customisation and Expression, Theft, Targeted Marketing, Shifting norms |
| Sense of Presence (Immersion) | Desire for Accurate Representation, Realistic Avatars, Facial Expressions and Movements, Positive Experience with Gestures (hand & arm), Impact of Delay/Lag, Haptic Feedback and Interaction, Customisation and Appearance |
| Privacy Concerns | Trust and Scepticism towards Meta, Information Awareness/Sensitivity, Familiarity with Clients, Transparency and Rules, Frequency of Use, Altering Avatars and Impersonation Risks, Different types of business meetings |
| Impact on daily (work) life | Positive Impact on Employees Living Abroad, Physical Discomfort, Time Spent in the Metaverse and Productivity Concerns, Impact on Personal Moments and Social Distance, Future Possibilities and Enthusiasm |

Table B - Relevant themes (focusses) with key insights that emerged from the results.

Overall Metaverse Experience

Starting with key results from the overall metaverse experience. Firstly, a valuable insight would be that participants felt a high concentration and focus in the metaverse, compared to Teams for example. This could be seen as a factor that has a positive effect on company objectives and could relate back to the embodied social presence theory (Brian et al., 2010). This states that a better connection in the sense of presence, combined with an increase in immersion, could lead to improved communication. By improving communication, tasks could be taken care of with a higher level of productivity, likely contributing positively to company objectives (Rajhans, 2012). Secondly, regarding the effortless changes in virtual environments and the many customisations available to suit specific needs and wishes. The

flexibility that the metaverse is able to provide should also have a positive impact on the bottom line of companies. Since more potential clients become available, due to increased possibilities in following up on opportunities. Next to reproducing entire offices in the metaverse, which could have a significant impact on the cost picture of running a company. Especially as a solid alternative for employees that live and work from abroad.

Thirdly, the results indicate that users of the metaverse would prefer to have a representation as close to reality as possible regarding their avatars. Although, cartoon style avatars are sufficient to create an immersive experience, there is likely a significant improvement in the sense of presence and immersion when avatars become more realistic. This is also supported by the Media Richness Theory (Ishii et al., 2019), which states that matching media richness with information richness results in optimal communication effectiveness. Finally, health issues, like eye strain (fatigue) and headaches become quite prevalent. This could likely be linked to the refresh rates and the resolution of the screens. This should have a significant impact on the sense of presence and immersion as well, as the refresh rate could be directly connected to latency and the smoothness of motion. When the refresh (frame) rate increases, meaning a decrease in latency, virtual environments begin to look and feel more like the real world (Butler, 2021). As stated in the literature review, the refresh rates and the resolution of virtual reality products are improving at a significant rate. Thus, it should not be a significant issue in years to come. The same would count for headaches, which could likely be attributed to how heavy virtual reality headsets currently are. The next model of the Meta Quest is already announced to be approximately 40 per cent lighter than the current model (Meta Quest 2). Thus, this issue should also be a lot less significant in the long term.

Social Considerations

Continuing with the key results on social considerations. Firstly, a valuable insight would be the compatibility of the metaverse to be used for creative sessions, such as brainstorming for example. By incorporating many collaborative and productive features, like quickly swapping sticky notes and switching between whiteboards. This is already seen as a viable option for using the metaverse and could have a significant impact on the speed of adoption. Furthermore, the metaverse is seen as a great alternative to more general communication tools, as participants are able to quickly see who is currently present. Resulting in a lower barrier to starting a conversation, compared to Slack for example, where one has to initiate a text chat or send an invite to a call. In the metaverse, one could just walk

up to an individual that is present within the same environment. This lowering of social barriers, mainly the ease of striking up a conversation, could have a positive effect on company culture and team bonding (Zamanifard & Freeman, 2019).

Another valuable insight is regarding the team dynamic. According to the results gained from this research, the metaverse is able to provide a strong feeling of equality. Especially when the alternative is a hybrid setting. Meaning that some employees are physically present in a meeting and some are joined online. Arguments are made that this setting creates a feeling of distance, which is not the case in the metaverse. This is also supported by research conducted by Freeman (2016). Next to that, the possibility to hold holidays together with employees, friends and family from abroad is a welcome addition to the social aspects of the metaverse. This is likely going to become more relevant, as more use cases and possibilities are introduced by designers and developers. Furthermore, when avatars become more realistic, the metaverse could significantly reduce the feeling of loneliness (Oh et al., 2023). Since, when a virtual reality device is available, it is very easy to visit the metaverse and really feel present in the moment. Adding to that is the opportunity that the metaverse creates with visiting your (elderly) loved ones. Especially ones that might be limited in moving around in the real world due to health issues. The metaverse is enabling this improvement in social settings, all while significantly decreasing the time it takes to get to what matters most, the social interaction. Especially in comparison with the real world alternative. This contributes positively to the social aspect of society as a whole, as it reduces the barriers that hinder individual interaction.

Ethical Considerations

Moving on to the key results from ethical considerations. Starting with the possibility to have anything that one could imagine available in the metaverse. This is a great addition regarding a supportive way to all different kinds of communities (Baker, 2023). Since the metaverse makes inclusiveness easier than ever. Also, while implementing different kinds of features that are suited to specific communities, it will likely have a significantly lower impact on other communities. Since everything can be done in different environments in the metaverse. Thus, with a lower risk of communities that collide with each other based on norms and values, for example. Another valuable insight is regarding ownership rights. Requiring control measures and a good balance between the flexibility to allow for creation and trade, while keeping a firm control of ownership rights. When done accordingly, the metaverse could greatly improve economies that are less fortunate and would offer participants many

opportunities to make a living. As mentioned in the literature review, NFTs could be a solid starting point in realising this (Yilmaz et al., 2022). When a good balance is struck, it should also lead to less of a risk for parties to take advantage of metaverse users by presenting deceptive advertisements for example.

Furthermore, valuable insights came to light about impersonating or displaying significantly different behaviour from the actual self based on customisations that are possible with avatars. Although, this should be less of an issue in the future, as avatars become more realistic and a better representation of the actual person (Roth, 2023). On the contrary, the many customisation possibilities with avatars could lead to individuals feeling better about themselves. Resulting in using more of their potential in communicating with others, compared to limitations that could hinder their ability to interact in the real world, such as insecurities about looks.

Sense of Presence (Immersion)

Following up with valuable insights on the sense of presence and immersion, starting with avatars. When avatars become increasingly more realistic, it could have a strong impact on the sense of presence and immersion felt within the metaverse. Becoming a better representation of how an individual looks and acts in real life. Thus, creating a more balanced view in the metaverse in comparison to real life aspects that better enables the tricking of individuals' minds into actually feeling physically present in a virtual environment (Bowman & McMahan, 2007). Furthermore, the ease of how individuals are able to interact with objects within the metaverse would further increase the level of immersion and presence. As individuals are able to get to a point in which they are not actively thinking about their controllers and how to pick up, interact or let go of virtual items in the metaverse. In turn, reducing the cognitive load (Freeman et al., 2017). An important factor, that is still somewhat missing, would be regarding (haptic) feedback. Since this could actively remind participants in the metaverse that the experience is not as real. However, this proves to be a difficult factor to improve, as virtual reality providers are currently more focused on improving the headset, controls and controllers. Thus, do not have an innovative answer yet, that is also cost efficient, to significantly increase the ability for haptic feedback.

Another factor that strongly contributes to the sense of presence and immersion is regarding facial expressions. When this improves in future versions of the metaverse, a more realistic and interactive feeling could be achieved. Combined with virtual reality devices that are

capable of better registering expressions, a further increase in the sense of presence and immersion could be realised. Furthermore, as noted in the focus groups, there are still moments when virtual reality or its applications are not keeping up with fast movements, causing short moments of delay/lag. This creates an immediate response to awareness that individuals are actually not present in the metaverse. Taking a hit on the experienced sense of presence and immersion. When this is further improved upon in future releases of virtual reality products and metaverse applications, the immersive feeling in the metaverse could become even higher (Wang et al., 2023).

Privacy Concerns

Regarding privacy concerns, the importance of a company's image was stressed. It is of significant value that the company providing the metaverse is perceived as trustworthy, more than is the case with other companies working on online collaboration tools, to facilitate business meetings for example. Since there is a strong increase in the metaverse regarding the possibility of collecting and using personal data, as argued by Adams et al. (2020) as well. Additionally, participants in the metaverse are also more aware of what they are willing to share, compared to more general communication tools, such as Microsoft Teams and Google Meet. Especially when avatars become more realistic and are a closer representation of the actual person.

However, most individuals are more focused towards how useful a product or service is, than on its privacy concerns. This feeling is further strengthened by how many colleagues, friends and family are active in the metaverse. When a strong network effect is in place, privacy concerns should not lead to any significant issues in the rate of adoption of the metaverse. Meaning that when individuals perceive the metaverse to be more valuable due to colleagues, friends and family actively participating, a lower priority could be put on privacy concerns. Since individuals would more likely want to participate in it as well, thus are easier to brush off any negative consequences. This was also in line with the results gained from the focus groups. Although, stressing the fact that the company providing the metaverse experience should not have a history of breaking privacy laws. This, in order for their users to have a fully immersive experience in the metaverse that is not limited by their actions and behaviour based on privacy concerns.

Impact on (Work) Life

Regarding valuable insights gained on the impact on (work) life. Firstly, a valuable insight that was revealed was that participants are more sensitive to the time spent in the metaverse. When discussing business meetings in the metaverse, participants wanted to ensure that their time is spent in a productive manner that is not (indirectly) impacted by companies providing the metaverse experience. By staying longer than necessary and getting distracted from their task at hand due to possibilities presented in the metaverse, for example. The argument here is that there could be a conflict of interest, as the companies providing the metaverse would likely want users to overall spend more time on activities in the metaverse, as opposed to activities in the real world. In order to gain more data about its users and revenue from advertising, for example. This idea likely comes from the perception of consumers of the metaverse, as it is often thought to be a replacement for real life activities, instead of a technology that could also serve as an additional advantage in certain scenarios, for example.

Secondly, an impact that virtual reality devices could have on individuals' (work) life is regarding their overall focus on real life activities. Participants made the argument that this should remain the highest priority, as it is perceived by many that humans are meant to be social and real memories hold more value. There is quite some concern from participants that the balance could be impacted negatively. As an example, Apple's Vision Pro announcement was considered ("Introducing Apple," 2023), in which the father of two kids had a moment with them in real life, while being occupied with recording via Apple's Vision Pro. Arguments were made that this balance could be risky, due to the divided focus and limits on how individuals could balance these two realities in a healthy way. Lastly, virtual reality products were enthusiastically received when considered as a supportive product in everyday tasks, such as cooking a recipe or looking at the nutritional values of available items in the fridge. By suggesting a recipe based on what an individual currently has available at home, for example. This concludes the broader key insights gained from the results. In the next section, recommendations are provided for each main stakeholder.

5.1 Recommendations

Several main recommendations are listed that are based on the valuable insights gained from this research. Divided into three main stakeholders. Firstly, the management of companies. Secondly, the users of the metaverse. Thirdly, the designers, developers & providers of the metaverse.

5.1.1 Companies (Management)

Several recommendations could be made based on the results and insights gained from this research. Starting with recommendations for companies that are open to exploring the possibilities that the metaverse has to offer, namely for business meetings. The management of companies should take the metaverse into consideration when having employees that work together, but live far away from each other. Since the metaverse enables a strong feeling regarding the sense of presence. Thus, improving the equality experienced between team members and achieving a higher team dynamic. Especially when compared to hybrid settings in which some employees are present physically and some are joined online, as mentioned in the discussion.

Furthermore, when a setting is required with high concentration and focus, the metaverse could prove to be useful. Since there are fewer distractions compared to other collaboration tools. It should especially be considered when focusing on creativity, such as brainstorming sessions. As the metaverse enables many collaborative and productive features, enabling participants to easily add additional whiteboards and swap notes, for example.

5.1.2 Metaverse Users

Moving on to recommendations for users of the metaverse. When focussing on business meetings, it would be recommended for users to create avatars that are as close as possible to their actual selves. In order to maximise the current ability of the metaverse to provide users with a sufficient sense of presence and immersion, next to ensuring that it is easy to know who is speaking, thus improving recognition. Additionally, to assess what kind of business meetings would be well suited for the metaverse, taking into consideration whether that could be internal, external or both. Especially in companies that are involved in providing products and services that are high in contact points, legal services and business consultancy for example. A strong use case is seen to also involve clients in the process of creating value by providing them with an immersive feeling that the metaverse enables companies to do. More than would be possible with Microsoft Teams or Google Meet, for example.

Furthermore, to critically assess whether the company behind the metaverse is ethically sound. Since virtual reality products and the metaverse allow for more personal data to be collected and used. By setting control measures in place and carefully considering what pros and cons companies providing the metaverse experience possess, a more informed decision

could be made on who to collaborate with. Thus, ensuring that individuals' personal lives remain private where preferred, next to making sure that information about competitive advantages of businesses does not become public knowledge, for example.

5.1.3 Metaverse Designers & Developers

Lastly, several recommendations are made for the designers, developers and companies behind metaverse environments. It would be recommended to carefully take the health concerns that could be caused by the metaverse into account. These include, for example, addiction, social exclusion and impacts on mental health by bullying through inappropriate conversations. By building in measures that safeguard users from these potential risks, providers could ensure a smooth experience that benefits everyone. Improving the overall experience and creating better opportunities for the metaverse to become widely used in the (near) future.

Furthermore, to strike a good balance between the flexibility provided to metaverse users in regard to the creation and trade of items and the ownership rights. In order to create a fair playing field that limits bad actors who, for example, are trying to scam users out of their belongings. This especially holds true when the metaverse becomes more broadly used, meaning that an increase is seen in the value of digital items. As mentioned by earlier research, NFTs could serve as the basis for this aspect.

5.2 Conclusion

To conclude, the findings provide valuable insights into social and ethical considerations, next to the overall metaverse experience, sense of presence (immersion), privacy concerns and the impact on (work) life. Meta Horizon Workrooms, as a metaverse application for holding business meetings, has many advantages over currently popular online collaboration tools, such as Microsoft Teams and Google Meet. Especially when looking at its impact on social aspects of business meetings. Workrooms already possesses many, if not all, features and functions that are required by employees for holding business meetings, next to possibilities that are seen as favourable and advantages that are yet to be explored. It is important to note that Workrooms is still in beta and should improve in due time, also increasing its functionality. Not only due to the fast pace of developments in this space, but also the resources committed by Meta to improve its overall use case for individuals to work together in a convenient way.

Regarding the adoption, even though the applications could be considered at an early stage, the basic functionality that is required for most participants is already there. Thus, it would mostly come down to how well Meta and other companies that are involved in this space are able to market the metaverse products and services to interested parties. Since many companies are not yet aware of the possibilities the metaverse has to offer, there is a strong growth prospect to be realised here. By getting several large organisations to publicly advocate for the metaverse and its already viable applications, a solid start could be made in the adoption process. An effective way to do this would be to partner up with large organisations and focus on communicating how viable the metaverse is in improving business objectives, both in efficiency and effectiveness. Especially considering businesses in which meetings are frequent, such as with legal and business consultancy services, law firms for example. Consequently, this should further increase the interest in the design and development of the metaverse by more companies than are already working on it and increase the chances of innovation taking society yet another step forward in productivity.

5.2.1 Research Limitations

One limitation of this research would be that, however a great fit for this research objective, one company has participated in the data collection. In this case, Nerds & Company. Furthermore, as mentioned earlier in the limitations of the methodology section, this research had a limited scope in regard to the cultural aspects. Although the teams that participated did include international individuals, such as one from Brazil, a more diverse team in terms of culture could further increase the representability of this research. Lastly, the results of this research are based on the virtual reality demonstration and the metaverse experience using the Meta Quest 2. Future releases of virtual reality headsets might have quite an impact on some factors that have been included in this paper, mainly with regards to the sense of presence (immersion) and possibly on the impact of daily (work) life.

5.2.2 Future Research Suggestions

Overall, the findings highlight many aspects of the metaverse, providing valuable insights for its future development. Suggestions for future research would be as follows.

- 1) To repeat the design of this research with companies in different sectors and different cultures. In order to map the similarities and differences. Especially in regard to social and ethical considerations, which might be quite different in various cultures.

2) To repeat the design of this research with the Meta Quest 3 which should be widely available in early 2024. In order to see what the impact of higher resolution and faster refresh rates would be on the feeling of presence and immersion, especially when advancements are made in how realistic avatars in the metaverse are presented.

3) To have a stronger focus on applications for businesses, as this research mostly explored the possibilities within business meetings. Perhaps a compelling next step would be to repeat this study with a focus on quarterly earnings calls of large corporations. By leveraging virtual reality and the metaverse, there exists a significant opportunity to enhance the experience for both company management and shareholders.

4) To repeat this research design with a more quantitative focus on hybrid teams that work together via online collaboration tools, such as Slack. In order to see whether the hypothesis of improved social presence and team dynamics is indeed significantly present compared to a setting in which team members are both physically and remotely present.

Thank You

This concludes the paper on *Revealing relevant factors impacting the viability of the metaverse by replacing online collaboration tools for business meetings*. By Hakan Bektas from the University of Twente, with Robin Effing and Matthias de Visser as supervisors. A special thank you is in order for these supervisors, next to Nerds & Company for participating in the data collection process. Lastly, appreciation is expressed for the University of Twente. For enabling research in this very exciting topic by making six Meta Quest 2 headsets and two Meta Quest Pro headsets available, in addition to openly welcoming companies on campus and making rooms available for students to conduct research in.

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