TECHNOLOGY AS EXTENSIONS OF MAN: THE USE OF MARSHALL MCLUHAN'S TETRAD OF MEDIA EFFECTS IN AN ANALYSIS OF THE METAVERSE: A MEDIA ECOLOGICAL PERSPECTIVE

by

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I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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> *But by the grace of God I am what I am, and his grace toward me was not in vain. On the contrary, I worked […], though it was not I, but the grace of God that is with me.* ~1 Corinthians 15:10

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SUMMARY

This study explores the implications of Marshall McLuhan's perspectives on the Metaverse, focusing on virtual reality from a media-ecological standpoint and viewing technology as extensions of human capabilities. It delves into McLuhan's concepts of media ecology and the way in which technology changes humanity, thereby affecting the media environment. By applying McLuhan's "laws of media" and his "tetrad" model, the study analyses the Metaverse and demonstrates how it surpasses current technologies by offering a more authentic experience. The investigation posits that as technology evolves, it often supersedes and becomes the content of previous media forms, a process exemplified by the evolution towards virtual reality. The research aims to demonstrate how the Metaverse, as a culmination of technologies, fits into McLuhan’s framework, suggesting a cyclical process where new technologies extend human capabilities and subsequently transform the media environment. The central research theme is encapsulated as an exploration of the Metaverse through McLuhan's tetrad of media effects, considering a media ecological perspective.

KEY TERMS

Media studies; Metaverse; media ecology; media effects; Marshall McLuhan; laws of media; tetrad of media effects; technology as extensions of man; virtual reality; medium as the message; global village

OPSOMMING

Die Studie ondersoek die implikasies van Marshall McLuhan se perspektiewe op die Metaverse, met 'n spesifieke fokus op virtuele realiteit vanuit 'n media-ekologiese standpunt en die beskouing van tegnologie as uitbreidings van menslike vermoëns. Dit verdiep in McLuhan se konsepte van media-ekologie en hoe tegnologie die mensdom verander, wat die media-omgewing beïnvloed. Die studie pas McLuhan se "wette van media" en sy "tetrade" model toe om die Metaverse te analiseer, en illustreer hoe dit 'n vooruitgang verteenwoordig oor bestaande tegnologieë deur 'n meer natuurlike ervaring te bied. Die ondersoek stel voor dat, soos tegnologie ontwikkel, dit dikwels die vorige media vorms oortref en die inhoud daarvan word, 'n proses wat geïllustreer word deur die evolusie na virtuele realiteit. Die navorsing beoog om te demonstreer hoe die Metaverse, as 'n klimaks van tegnologieë, in McLuhan se raamwerk pas, wat 'n sikliese proses voorstel waar nuwe tegnologieë menslike vermoëns uitbrei en gevolglik die media-omgewing transformeer. Die sentrale navorsingstema word saamgevat as 'n ondersoek van die Metaverse deur McLuhan se tetrad van media-effekte, met inagneming van 'n media-ekologiese perspektief.

SLEUTELTERME

Mediastudies; media-ekologie; media-effekte; Marshall McLuhan; die wette van media; die tetrade van media-effekte; tegnologie as verlengstukke van die mens; die Metaverse; virtuele werklikheid; die medium as die boodskap; die globale dorp

ISIFINYEZO

Umbhalo uhlolela imiphumela yemibono kaMarshall McLuhan ngeMetaverse, ikakhulukazi igxile kuqiniso olungokoqobo lwe-virtual reality kusukela ekubukweni kwemidiya-ecological nokubheka ubuchwepheshe njengokunwetshwa kwamakhono abantu. Uphenya ngemibono kaMcLuhan yemidiya ecology nokuthi ubuchwepheshe bushintsha kanjani isintu, sithinta imvelo yemidiya. Ucwaningo lusebenzisa "imithetho yemidiya" kaMcLuhan kanye nomodeli wakhe we-"tetrad" ukuhlaziya iMetaverse, kukhombisa ukuthi imelela ukuthuthuka uma kuqhathaniswa nobuchwepheshe obukhona ngokunikeza isipiliyoni esingokwemvelo kakhulu. Uphenyo luveza ukuthi njengoba ubuchwepheshe buthuthuka, buvame ukudlula futhi bube yiqiniso lwezindlela zemidiya ezedlule, inqubo ekhonjiswa yintuthuko eya eqinisweni elingokoqobo lwe-virtual reality. Ucwaningo luhlose ukukhombisa ukuthi iMetaverse, njengomphumela wobuchwepheshe obuhlanganisiwe, ilingana kanjani esimisweni sikaMcLuhan, iphakamisa inqubo ephindaphindayo lapho ubuchwepheshe obusha bunwetshwa khona amakhono abantu futhi kamuva buguqule imvelo yemidiya. Ithemba lokucwaninga eliyinhloko libekwe njengophenyo lweMetaverse ngokusebenzisa i-tetrad yemiphumela yemidiya kaMcLuhan, ibheka kusukela ekubukeni kwemidiya-ecological.

AMAGAMA ASEMQOKA

Izifundo zemidiya; i-ecology yemidiya; miphumela yemidiya; Marshall McLuhan; imithetho yemidiya; i-tetrad yemiphumela yemidiya; ubuchwepheshe njengokunwetshwa komuntu; i-Metaverse; uqiniso olungokoqobo lwe-virtual isiteshi umlayezo; Idolobha lomhlaba

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LIST OF ABBREVIATIONS

2D	Two-Dimensional Space
3D	Three-Dimensional Space
4D	Four-Dimensional Space
5D	Five-Dimensional Space
AGI	Artificial General Intelligence
AI	Artificial Intelligence
AR	Augmented Reality
BBC	British Broadcasting Corporation
CEO	Chief Executive Officer
ChatGPT	Chat Generative Pre-Trained Transformer
DVD	Digital Video Disk
ER	Extended Reality
ERP	Erotic Role Play
GPS	Global Positioning System
HMD	Head-Mounted Display
MR	Mixed Reality
NASA	National Aeronautics and Space Administration
NFT	Non-Fungible Token
NPC	Non-Player Character
TV	Television
US	United States
USA	United States of America
VR	Virtual Reality

CHAPTER 1: CONTEXTUALISTION AND ORIENTATION

> "Environments work us over and remake us. It is man who is the content of the message of the media, which are extensions of himself. Electronic man must know the effects of the world he has made above all things" (Logan 2016b:136).

> "My purpose is to employ facts as tentative probes, as means of insight, of pattern recognition […] have no fixed point of view, no commitment to any theory – my own or anyone else's" (McLuhan 1995:236).

1.1 Introduction

We are at the dawn of unprecedented progress in technology. One such technology, with the potential to change our lives profoundly, is virtual reality (VR). The idea of virtual reality, which is at least as old as the parable of Plato's caves, runs through modern culture with equal amounts of promise and threat. The immense popularity of *The Matrix* films demonstrated the significant influence of virtual worlds on our collective imagination – whether it manifests as Utopian or, in this case, extreme Dystopian. Huge commercial efforts are underway to make virtual reality central to our lives, with companies like Meta and Nvidia investing vast amounts in these initiatives.

In such times, it is important to have access to knowledgeable guides to help probing the concepts and implications at play. In this study, the researcher uses Marshall McLuhan as a guide, since his ideas have been central in understanding the way in which technology influences media, the media landscape and users. This investigation will explore the implications of McLuhan's perspectives on the Metaverse (i.e. a virtual reality/world created by Meta). The study will look into virtual reality from a media-ecological perspective and consider it from the perspective of McLuhan's ideas of technology as extensions of man.

The researcher will focus on McLuhan and McLuhan's (1988) laws of media in the form of their proposed tetrad to analyse the Metaverse. This will show the relevance of the perspective of tetrads, media-ecology and technology as an extension of man.

The study commences by investigating McLuhan's (1964) idea of all technology being extensions of people. This investigation will be contextualised in the theoretical framework of media-ecology – that introducing any new technology (in this case, the Metaverse) disrupts and changes the existing media environment, analogous to the introduction of a new species to an existing ecosystem.

In *Laws of media* (1988:129), McLuhan and his son, Eric, summarise their ideas about these effects in a concise "tetrad of media effects". The "tetrad is a means of examining the effects of any technology on society by dividing its effects into four categories and displaying them simultaneously". This investigation will attempt to analyse the Metaverse, a culmination of technologies, in terms of the tetrad of media effects.

The ontological and epistemological stance of this study makes it suitable to a more personal approach. The immersive, qualitative and exploratory nature of the study lends itself to this approach and, as a result, the researcher will employ the personal pronouns, "we", "us" and "our".

1.2 Problem statement

The investigation brings two of McLuhan's notions together: technology as extensions of man, and media ecology. The argument is that technology changes man and, as the technologically extends, man navigates through the media environment, changing and disrupting it by his own demands. Media ecology is the context in which this will be examined.

In his book *Understanding media: the extensions of man*, McLuhan (1964) explains that, in the evolution of media, where one medium evolves and is replaced by another, the previous medium often becomes the content of the newer form. For example, there is a general tendency for man to expect the media environment to be as close to reality as possible – black and white images to colour to movement to 4D to virtual reality) – or to simulate reality as closely and as personalised as possible (Zhu 2022:86). We can see virtual reality as the natural limit of this process.

The study will use the Metaverse as an illustration of the foregoing notion. Using McLuhan's tetrad, which composes the research questions of this study, we will attempt to illustrate that the Metaverse replaces several existing technologies and moves to a more natural experience than that involved in previous technologies. This is echoed in a quotation from the founder and CEO of Meta, Mark Zuckerberg, on the Lex Fridman (2023:15) podcast:

> "There are a lot of social and psychological things that go along with that experience that was previously only physical presence, right? I think that there's an intimacy, a trust. There's a level of communication because so much of communication is nonverbal and is based on expressions that you're sharing with someone when you're in this kind of environment. And before, those things would've only been possible had I gotten on a plane and flown to Austin and sat physically with you in the same place. So I think we're basically short cutting those laws of physics and delivering the social and psychological benefits of being able to be present and feel you're there with another person, which I think are real benefits to anyone in the world".

We can view this as a cyclic process, in that the changed media environment will bring about new technology in the end, which, in turn, will extend man further. We will assume that technology serves as an extension of man's senses, body and mind. The question that arises, is:

To what extent and in which ways can the Metaverse be seen as an expression of the extension of man, from a media-ecological perspective?

Based on this question, the research topic of this study can be formulated as

Technology as the extensions of man: a deductive analysis to explore and describe the Metaverse in terms of Marshall McLuhan's tetrad of media effects: a media ecological perspective.

1.3 Research questions

After analysing various media and their impacts, McLuhan and McLuhan (1988) developed a tetrad model to illustrate these effects. This model, structured as a tetrad, enabled them to showcase the influence of media on society through four concurrently displayed categories (Adam 2016:3).

For this study, the tetrad will be used to formulate the following research questions:

1. What is enhanced or improved by the Metaverse?
2. What is replaced or pushed aside by the Metaverse?
3. What is regained by the Metaverse that was lost?
4. What becomes of the Metaverse in its extreme form?

1.4 Significance of the study

The study will show the relevance of McLuhan's perspectives in understanding the use of technology in communication, thereby laying the foundation for further research on the topic. We will develop a set of criteria for analysing any technology in terms of how they "extend" us as humans and their influence on the existing media – i.e. the media ecology.

Considering its disruptive potential, it is essential to look at the Metaverse or the virtual reality from a media ecological perspective. The tetrad analysis will provide important insight into and a deeper understanding of the Metaverse.

McLuhan's most famous saying, "the medium is the message," claims the inseparability of message and medium. McLuhan's view of media is ecological, which means that he views media as environments affecting and altering the scale, pace and pattern of human affairs. He believed that each medium – whether print, television, or radio – creates a new environment that changes the way in which people perceive the world and interact with one another (Stephens 2014). Understanding the possibilities of the Metaverse is becoming increasingly important since, for example, Mark Zuckerberg argues, that it is "… a virtual-reality wonderland that represents the future of human connection" (Manjoo 2022 [no pagination]).

1.5 Research aims and objectives

The research objectives of the proposed study are both exploratory and descriptive in nature. Exploratory research serves as an initial probe into unfamiliar research domains, thereby helping to lay groundwork for further investigations. Descriptive research, on the other hand, seeks to outline and describe phenomena as they exist in their natural context (Terre Blanche, Durrheim & Painter 2010:41).

The investigation is primarily theoretical, rather than empirical. McLuhan's ideas will be applied to analyse the effect of the technologically extended – in this case in the form of the Metaverse – man on the current media environment. In its turn, the Metaverse will serve as an application to explore and understand McLuhan's concepts. The aim will be to gain a deeper understanding of the nature, characteristics, potential benefits and adverse effects of the Metaverse and its impact on society. We will employ the tetrad of media effects as a framework for the analysis of the Metaverse.

1.6 Literature review

Theoretical research always involves a thorough examination and evaluation of existing scholarly works. Therefore, the literature review itself can significantly bolster the research process. As highlighted by Terre Blanche, Durrheim and Painter (2010:21), the literature review is essential in identifying gaps in the knowledge base and research issues; establishing a theoretical framework; determining variables pertinent to the subject; and offering both conceptual and operational definitions.

The objective of the literature review is to understand existing theoretical models and frameworks or notions, so as to explore their implications and utilisation, thereby discerning principal concepts and themes and amalgamating these into a well-structured and substantiated arguments. In this study, the literature review is integral to data collection, analysis and interpretation.

1.6.1 Technology as the extensions of man

The prominent media of our time reshape and restructure patterns of our social interdependence and every aspect of our personal life. It has probably never been as clear as it currently is to what extent this is true: we need to look no further than Instagram or TikTok to see this clearly.

According to McLuhan and Fiore (1967:8), "… societies have been shaped more by the nature of the media that is used to communicate than by the content of the message". In the view of McLuhan, media include "any technology that creates extensions of the human body and senses, from clothing to the computer" (McLuhan & Zingrone 1995:239).

If we consider, for example, one of the most important, relatively recent communication technologies, the mobile phone, we can see how it extends our ability to hear and also *see* anyone at any time and at any place.

This is a direct extension of our sense of sight and hearing, which, for hundreds of thousands of years, were restricted to that in our immediate vicinity, or very large/loud. Virtual reality and/or the Metaverse is a big step further: it is an envisaged immersion in the virtual world in which we can move, live and communicate. On the face of it, this is an extension of the entire beingness of humans.

1.6.2 Media ecology

A medium is a technology within which a culture grows; "[…] it gives form to a culture's politics, social organisation, and habitual ways of thinking. Beginning with that idea, we invoked still another biological metaphor, that of ecology […] We put the word "media" in the front of the word "ecology" to suggest that we were not simply interested in media, but in the ways in which the interaction between media and human beings gives a culture its character [...]" (Postman 2000:10).

"It is perfectly clear to me that all media are environments. As environments, all media have all the effects that geographers and biologists have associated with environments in the past […] (Logan 2016b:136).

According to Postman (2000) and Logan (2016b), all media are environments. In other words, media possess all the qualities that have accompanied any conventional geographical or biological environment. These media, according to McLuhan (2016b), influence one another which, in turn, influence our perceptions.

Media ecology investigates the effect of communication media on the way in which we, as ,humans perceive, understand and feel; what we value; and how these effects either promote or hinder our odds of survival. In this context, an environment can be regarded as a multifaceted system that affects the way in which we think, feel and act (Postman 2006:15).

Postman (2006:14) states: “if in biology a ‘medium’ is something in which a bacterial culture grows (as in a Petri dish), in media ecology, the medium is a technology within which a [human] culture grows”. The pun between “media” and “medium” is a significant one. In order to address this idea, we can take, for example, the (old) telephone as a medium. The world before and after the telephone has not been the same, in that the lived environment of humans has changed completely along with the invention of mobile telephones. The introduction and implementation of new technology has resulted in enormous interpersonal, social and political changes. In other words, from the time of this invention, culture has developed “inside” the telephone technology.

We can interpret media ecology slightly differently, if we do not take a single media or technology as the environment, but rather look at the ecosystem of various pre-existing media and their interactions with us and among one another. It is from this point of view that the tetrad is applied. When a new medium is introduced into a media ecosystem in this view, it does not do so without changing the ecosystem, resulting in the tetrad questions naturally arising. It is particularly significant that the existing media have to adapt and find a new place or use in the ecosystem, or go extinct.

From this perspective, media ecology refers to the media themselves; the environment in which these media are active; and the way in which they influence one another, us and our own environment. The *means* by which this communication occurs also forms part of the ecosystem. “Media, by altering the environment, evoke in us unique ratios of sense perception. When these ratios change, men change” (Logan 2016b:136). For example, the technology for reproducing sight and sound is currently far better developed than that for smell and taste. We can make the argument that our recent technologies have decreased our “ratios” for smelling and increased those for seeing/hearing. Logan (2026b: 139) states that according to McLuhan, this age of ecology involves the instantaneous interplay of all factors, because information currently has the capacity to move at “electric speeds”.

The media we use, determine how we live and how we are, in a “soft” way (Levinson 2000:17). These effects are described as “soft”, because they appear to be indirect, subliminal and subtle. According to Postman (2013), the effects of media on society are disguised and subtle, because they are partly concealed by the societal assumption of media not being environments, but “merely machines” – e.g. just “a phone”. Media ecology aims at bringing the effects of these media into the foreground of our awareness. We do this by attempting to see the roles and rules to which the media make us abide; how media influence what and how we see; and how they influence what we feel and how we behave.

In this regard, the questions relating to the Metaverse are:

- What role will the Metaverse play in this ecosystem?
- How will the introduction of the Metaverse into this ecosystem “shake up” the equilibrium, and how will it be reached again?

Because the language with which media communicate with one another is also relevant in this context, it would be important to consider how the Metaverse “communicates” with other media in the ecosystem. Does it do so by invasive means, or will the Metaverse simply “slip” into the current ecology with minimal oppression of existing media?

Based on the foregoing information, we can recognise the Metaverse as a central medium or technology, and we can begin to understand how it will affect the social and psychological structure of our society. However, as cautioned by Postman 2006), if we overlook it and deem it “merely a machine”, we risk its profound effects remaining subliminal.

1.6.3 Marshall McLuhan's tetrads

The invention (or discovery) of the tetrad is vividly described in the preface to the work, *Laws of media: the new science* (McLuhan & McLuhan 1988).
As a reaction to critics describing the content of *Understanding media: the extensions of man* (McLuhan 1964) as unscientific, McLuhan set out to determine what characterises a statement as scientific, and settled on that of "being refutable", as expressed by the philosopher, Karl Popper.

This resulted in an intense search, as described by his son and co-author, Eric, of *Laws of media: the new science,* resulting in questions such as: What statements can be said about media that anyone can test – i.e. prove or disprove – for himself? What do all media have in common? What do they do? (McLuhan & McLuhan 1988).

According to Eric McLuhan, they were expecting around a dozen such statements, but to their surprise, this is not what occurred (McLuhan & McLuhan 1988). Firstly, the fact that "every technology extends or amplifies some organ or faculty of the user", followed by the consequent fact that this must be accompanied by a diminishing or numbing of another area of experience. For example, when we are concentrating on a telephone call, we do not see traffic very well. It should be pointed out that this diminishing or anaesthetising is also sometimes claimed to happen to the affected sense *itself,* e.g. we stop hearing persistent sounds clearly (McLuhan 1969).

A few hours later, the idea of reversal became clear, in that every medium, when pushed to the limits of its potential, reverses its characteristics. This property is also interpreted in two very different ways. Firstly, it is sometimes interpreted in terms of "What technology does the medium lead to?" For example, when pushed to its limit, the ordinary mobile phone, which is actually an *aural* medium, becomes the smartphone, which is primarily a *visual* medium.

Sometimes the question is interpreted as follows: “What does the medium *itself* become when pushed to its limits”? For example, the smartphone as a communication device, becomes a device that isolates the user from others, by their obsessive scrolling and gambling or gaming.

A few weeks later, the final element of the tetrad was found: every medium *retrieves* things from the background that have been neglected or ignored. Despite a great effort, no further universal characteristics were found and the well-known tetrads came to be known as: enhancement, obsolescence, retrieval and reversal.

There have been suggestions for further questions, for example, in *Expanding and enriching the McLuhan tetrad* (Echelson, Fialka & Logan 2022). In *The lost tetrads of Marshall McLuhan* (McLuhan & McLuhan 2017), numerous examples of applications of the tetrads are given, from “war” to “spectacles”. For each of these the following same questions are asked:

- What does it enhance?
- What does it make obsolete?
- What does it retrieve?
- What does it reverse into when pushed to its extreme?

In the next section, a form of media is discussed, namely the Metaverse, for which the potential implications are profound, uprooting several of our basic assumptions about how we live, communicate, and have relationships. It is critically important to conduct this analysis in terms of the tetrads.

1.6.4 The Metaverse

In current understanding, “the Metaverse” refers to a virtual reality that can be visited and explored (Ravenscraft 2023b). The usual implication is that, for an authentic experience, the user will use an interface, such as VR goggles, for immersion in the virtual world.

Although it can be argued that forms of the Metaverse have existed for decades – e.g. the game *Second Life* at*:* https://secondlife.com/ – the current term has associations of complete sensory immersion – not merely playing a game or interacting on a computer screen.

In this way, the Metaverse is a term used to describe a virtual world or a shared digital space in which users can interact with one another and/or virtual environments in real time. It is envisioned as a fully immersive and interactive environment that can combine elements of virtual reality, augmented reality and other technologies to create a seamless and engaging experience.

In the Metaverse, users can create their own avatars; explore new places; participate in social events; play games; and conduct business. Kraus (2022:53) observes that “It is an interconnected web of social, networked immersive environments in persistent multi-user platforms. It enables seamless embodied user communication in real-time and dynamic interactions with digital artefacts”.

Many see the Metaverse as the future of the Internet, e.g. in June 2022, the largest social networking company, Facebook, officially changed its name to Meta (Isaac 2021). According to many, the CEO of Meta, Mark Zuckerberg, has staked the future of the company on the Metaverse. In an interview with Fridman (2023), Mark Zuckerberg explains that he sees the Metaverse as the next frontier for what he and his team are working on. He believes that the Metaverse will allow people to experience social and psychological benefits that have previously only been possible through physical presence, such as intimacy, trust and nonverbal communication. As a virtual space in which people can interact with one another in a deeply meaningful way on the Internet, the Metaverse is a key part of Mark Zuckerberg's vision for the future.

Numerous other start-up companies are spending billions of dollars on their vision of the Metaverse. “Extended-reality gaming and social spaces have existed for decades, but in the early 2020s technological advances and the societal transformation caused by the COVID-19 pandemic, pushed the development of the Metaverse to the forefront. This inspired billions of dollars in new investments, and predictions that “the Metaverse is the future of the internet” (Manjoo 2022 [no pagination]).

Although doubts are being expressed as to whether current technology is quite ready for the demands of this vision, it is highly likely that the Metaverse will become a completely revolutionary environment in which to exist, interact and have relationships in the near future. The potential for the communications-landscape are profound (Manjoo 2022).

1.7 Research methodology

1.7.1 Research paradigm

The study will adopt an interpretivist paradigmatic position (considering facts as fluid and embedded within a meaning system). However, considering McLuhan’s approach, “it can also be linked to a critical realist position trying to explain what we see and experience in terms of underlying structures of reality that shape observable events” (Saunders & Lewis 2019:147).

Because the two paradigmatic approaches are not exclusive of each other, the study will reflect elements of both paradigms and, by using the shared elements of epistemological and ontological assumptions, will also draw on methodologies related to both.

1.7.2 Research approach

The purpose of the study is to gain an understanding and apply deductive reasoning – from a critical realist perspective – by using the theoretical framework to explore the Metaverse as a phenomenon in terms of its characteristics and structure (descriptive) to determine the way it fits the theory.

1.7.3 Data collection

As discussed in Section 1.3, a theoretical study employs a literature review to provide the theoretical framework – media ecology, technology as extensions of man and McLuhan's (1988) laws of media – executed as the tetrad of media effects. These theoretical underpinnings provide the criteria for analysing the Metaverse.

The data for the Metaverse will be collected by examining the formal characteristics, format and uses of the Metaverse as presented in formal documents published by the producers, publications with descriptive analysis and user reviews. We will also use existing technology to immerse and explore its functionality.

The data involved in this study comprises three parts: firstly, the literature on the Metaverse, technology as extensions of man, and media ecology; secondly, published accounts of users; and; finally, the author's personal experience in the Metaverse.

Upon completion of this study, the first interview with Mark Zuckerberg *in* the Metaverse was released. This interview, which is included as Addendum A, forms part of the data in the form of verification of the outcomes of the study. This process will also function as the analysis of data. A target population is not relevant to this study, because it is not a positivist study.

The analysed data, which can be regarded as rich data, is included in Chapter 4. The variety of data collected and analysed emphasises the exploratory and deductive approach of this study.

1.7.4 Development and application of criteria

A major contribution of the study will be a set of thirty criteria for implementing McLuhan's notions of technology as extensions of man and media ecology. We structured these in terms of the specific criterion, a description of the criterion, and methods for evaluation of each criterion. The theoretical discussions on "technology of man" and the discussion on the potential impact of the specific technology on the current media ecological environment will inform the development of these criteria.

The aim or challenge is to put forward a set of criteria that can be used to test or evaluate the nature and impact of any technology. As an example, the criteria will be applied to the Metaverse, and the application of the criteria to the Metaverse is based on the theoretical discussion of the Metaverse, as well as the data presented in Chapter 4.

1.7.5 The tetrad analysis

As discussed in the foregoing sections, McLuhan's (1988) tetrad is a conceptual framework that provides a way to analyse the effects of any technology on society, culture, other technologies and itself (Adam 2016). As mentioned earlier, the tetrad consists of four elements – i.e. enhancement, obsolescence, retrieval and reversal – that help to illuminate the dynamic relationship between technology and social change.

"Enhancement" refers to the way in which technology extends human capabilities and amplifies existing practices, while "obsolescence" refers to the way it renders older forms of technology and practices obsolete.

Retrieval describes the way in which technology revives and brings back older forms and practices, whereas “reversal” refers to the way in which technology has unintended consequences that fundamentally alter human experience and culture. The tetrad is a useful tool for analysing technology as a complex and multidimensional phenomenon.

1.7.6 Interpretation and presentation of findings

The tetrad can also be applied in *interpretin*g findings (Du Plessis & Du Plessis 2018:797). It can identify how the Metaverse enhances and amplifies existing practices; what it makes obsolete; what it retrieves and revives from the past; and what unintended consequences arise from its use.

The findings will be represented graphically as a square with four quadrants, each representing one of the four elements of the tetrad. The top left quadrant represents enhancement; the top right quadrant represents obsolescence; the bottom left quadrant represents retrieval; and the bottom right quadrant represents reversal. See also Figure 6.1.

As stated by Boldea and Sigmirean (2019:120), *“*The four components known as representative for the actions they take upon or due to a certain technological product are set in four corners of a diagram which has the medium as center-core”. This graphical representation of the tetrad provides a visual tool to analyse the impact of technology, while allowing for the illustration of the interplay between the four elements and their contribution to the overall nature of the Metaverse .

1.8 Summary

This section has outlined the effect of technology as extensions of man (body, all senses, and the human psyche) on media ecology. A media ecological approach will be followed for the purposes of this investigation. Several aspects and insights surrounding media ecology and McLuhan’s perspectives on the topic are explored.

It is only appropriate to conclude this section and to introduce the study with a quotation from McLuhan (1987:300).

> “My main theme is the extension of the nervous system in the electric age, and thus, the complete break with five thousand years of mechanical technology. This I state over and over again. I do not say whether it is a good or bad thing. To do so would be meaningless and arrogant”.

CHAPTER 2: LITERATURE REVIEW

> "[…] And you're not here, but you feel like you're here […] I keep forgetting for long stretches of time that we're not in the same room […] to have this experience like we're sitting next to each other is like [...] I don't think we can even imagine how that changes things" Fridman (2023:18) – Interview with Mark Zuckerberg

2.1 Introduction

Our literature review opens with an overview of the evolution of technology seen as an extension of human capabilities, starting from basic tools like shoes to modern advancements like artificial intelligence (AI) and the Metaverse. It discusses the way in which these technologies have reshaped society and our sensory experience, emphasising the profound influence of inventions like the printing press, the Industrial Revolution (1760–1840), the computer and the digital age. How these technological extensions impact human interaction, communication and perception in the context of media ecology will be explored.

Secondly, the discussion on media ecology outlines the field as an exploration of how media and communication technologies shape human perception, cognition, behaviour and their broader cultural and societal implications. It emphasises the interconnectedness of various components in the media system, likening it to an ecological framework. The review investigates the dynamic relationships among media technologies, the messages they convey, and the contexts in which they operate, drawing on the ideas of prominent theorists like Marshall McLuhan and Neil Postman. This section aims at describing the profound impact of media on our experiences, communication methods and culture.

The third section, which explores the Metaverse, provides a comprehensive overview of this emerging digital phenomenon. It delves into the technological foundations underpinning the Metaverse, including virtual reality (VR), augmented reality (AR), mixed reality (MR), and extended reality (XR). We also examine the possible profound effects of the Metaverse on human consciousness; identity modes of communication; and highlight the transformative potential of this technology. Additionally, the section addresses the ethical considerations and future implications of the Metaverse, particularly in terms of its impact on society and individual perception of reality. It explores how the Metaverse represents a significant evolution in the interaction between humans and digital environments.

Throughout these discussions, we will refer to McLuhan and McLuhan's (1988) *Laws of media* in terms of the tetrad of media effects, relating our discussions to the main research problem and research questions.

2.2 Technology as extensions of man

If one starts with the premise that technology can be seen as any creation of the human mind (Wach 2012), it can be said that the shoe was the first technology enabling travel. Advancing from simple tools like shoes, humanity entered the age of metals. The discovery and use of bronze and iron marked major technological revolutions, in that these materials allowed for stronger, more durable tools and weapons, thereby profoundly impacting agriculture, warfare and construction.

A pivotal technological extension in our history is the invention of the printing press by Johannes Gutenberg in the 15th century. This revolutionised the way in which information was recorded, disseminated and consumed (McLuhan 1962a).

The Industrial Revolution (1760–1840) also represented a crucial moment in the evolution of technology. This era introduced machinery, which drastically altered manufacturing, transportation and communication. The steam engine, emblematic of this period, revolutionised both transportation and industry (Spear 2008).

The invention of the computer and the advent of the digital age marked another, highly significant technological leap. Computers transformed how we store, process and transmit information, leading to unprecedented advances in various fields. The Internet further revolutionised communication, enabling global connectivity in an instant, thereby creating a form of “global village” – another of McLuhan’s favourite concepts (Mesch & Talmud 2010).

Digital technology has affected and, indeed permeated, every aspect of life – from education and healthcare to entertainment and social interaction, reshaping society in profound ways. Today, with artificial intelligence (AI) and machine learning, we are at the cusp of a new technological edge. These technologies not only represent new tools, but a fundamental shift in how technology is integrated into daily life. AI systems, which can learn, adapt and make decisions, already surpass human capabilities in performing certain tasks. This evolution raises critical questions about the future of work and ethics, and the relationship between humans and machines (Mijwil & Abttan 2021).

This study will examine aspects of virtual reality (VR) as developments that are at the very frontier of technology. The potential impact of VR on our lives is enormous, dwarfing previous communication technologies.

McLuhan (1969) opines that all media exert a compelling influence on man and society, regardless of the messages they communicate. – “Technological innovations are extensions of human abilities and senses that alter our sensory balance, which in turn reshapes the society that created the technology” (McLuhan 1969: [no pagination]). Each technological development or extension impacts the current media environment.

For example, by enhancing mobility, the shoe increased human interaction and the exchange of stories and oral traditions, an early form of media. The development of bronze and iron tools facilitated the construction of more advanced structures and artefacts, including more durable writing materials and devices. The printing press. in its turn. revolutionised media ecology by making written content widely accessible.

The Industrial Revolution (1760–1840) introduced mass production and advanced printing technologies, such as the steam-powered printing press. This, in turn, increased the volume and speed of print media production, leading to the rise of newspapers and magazines, which became primary sources of information and entertainment.

The advent of modern technology – particularly the Internet – has effectively transformed our world into a "global village," characterised by profound connectivity that transcends geographical boundaries and time differences. This heightened level of interconnectedness has effectively shrunk the world, forging unprecedented links between people across the globe. Individuals can now engage in instantaneous communication and exchange information with ease, regardless of their location. Consequently, a new era of global citizenship was introduced, marked by an evolved cultural consciousness (Federman 2003). This is evident in the widespread appeal of music, the emergence of international political movements and the establishment of English as a universal language, all of which are testament to our increasingly interconnected global community.

The global village sets the foundation for the metaverse by establishing a world that is already interconnected, digitally integrated and culturally diverse, supported by the necessary technological infrastructure. It is a natural extension of our current digital landscape, taking the concepts of global connectivity and interaction to new, immersive levels in which virtual reality and the Metaverse form the current frontier.

Digital technology has enabled the creation, distribution and consumption of media in diverse digital formats, leading to the rise of digital newspapers, blogs, social media and online streaming platforms. It has also facilitated instant global communication. enabling more personalised and interactive media experiences, AI is changing media ecology (Buchanan 2023). Indeed, many fear that the entire information environment will soon be AI generated – i.e. that AI – in the form of large language models – will be generating almost all content.

2.2.1 Media or technology according to McLuhan

For McLuhan, media or technology is anything that has the capacity to extend the human body and the senses. He broadened the concept of media in a way, so as not to refer to communication technologies only, but also to other technologies, like the clock, the train or electricity, stating that these technologies have similar implications for society to conventional communication technologies. For McLuhan, a chair was just as much a communication medium as the telephone. “He believed that just as clothing is an extension of the skin, the hammer is an extension of the hand, and the car is an extension of the foot” (Logan 2016b:135). Although all technology is media in McLuhan’s view, actual communication media are special, in that they are an extension of the mind.

2.2.2 Background on the concept of technology as extensions of man

“Environments work us over and remake us. It is man who is the content of the message of the media, which are extensions of himself. Electronic man must know the effects of the world he has made above all things” (Logan 2016b:136).

McLuhan believed that a medium, as he defined it, could extend humanity like an additional limb to both the body and the mind, as in prosthesis on which we begin to rely. A medium could transform us, leading us to live and experience the world entirely differently to the way we have prior to interacting with the medium.

For example: you have a pair of glasses, which helps you to see better. In this way, the glasses are like an extension of your eyes, and they change your experience of the world, even if they themselves are not directly communicating anything. Because of these glasses, you see the world differently than before you had them. You also rely on them to read, drive or work. This is what McLuhan believed about media: that they act as extensions of our abilities and our senses and when we use them, they change the way in which we experience the world around us.

The smartphone – an actual communication device – also makes for a relatable example. Humans have become increasingly dependent on these devices, relying on them for quick access to information, communication with loved ones, sharing their lives and for navigation. Emotionally and cognitively, people have formed attachments to mobile devices as extensions of themselves. In other words, by constantly providing access to information, communication and entertainment, smartphones have reshaped human behaviour and social interactions.

McLuhan believed that media create perceptual environments that influence what facts are seen as important and what type of stimuli are ignored or overlooked: that the nature and behaviour of an individual engaging with any medium are thoroughly shaped by the artificial environment created by the medium. This environment dictates the way in which an individual prioritises and responds with their senses, aligning their perceptual framework to suit the operational context of the medium (McLuhan 1964). In other words, it is not only the content that adjusts to the media – which is not surprising, e.g. in order to be on YouTube, you must be a video – but the user also adjusts to the media, e.g. by prioritising visual stimuli over others.

This is analogous to standing at a window. This window shows you certain things occurring outside, such as people walking by, cars passing and trees blowing in the wind. The things you see occurring outside this window keep your attention, and you may not notice the things happening in areas that the window does not show. This is what McLuhan believed happens when we engage with different types of media. Similar to the window, these media show us content and information, while affecting what we may or may not notice, creating an “environment” for our mind and not only affecting how we think, but also what we care about (Campbell 2000).

Consider also, for example, how the use of smartphones has changed the way we pay attention to things around us. Before smartphones became so common, people would presumably focus more on the surrounding environment. Now, when captivated by our phones, scrolling through social media, checking messages, or playing games, our attention is strongly directed at the screen, leading us not to notice as much of what is occurring in the physical world around us. This is very clear at a bus stop, where one wonders what everyone has done before having smart phones to fiddle with.

In McLuhan's view, the degree to which our experience is changed and the ways in which it changes, depends on the type of media with which we engage. He expressed it as follows: "… for example, that print media encourages linear, logical thinking, while electronic media like television encourages a more holistic and intuitive way of thinking" (McLuhan 1969 [no pagination]). When we, for example, read a printed book, our thinking tends to follow a linear path as we progress through the text. When we watch television, we engage with multiple sensory inputs simultaneously, leading to a more holistic experience of the content.

McLuhan argues that the *Gutenberg galaxy* – which refers to the era of print media that began with the invention of the printing press – is being eclipsed by a new era of electronic media. He suggests that the strong influence of the Western world on written communication, which has endured until today, is being weakened by electronic media.

McLuhan believes that this shift from print to electronic media will have profound effects on society and on human consciousness – particularly with regard to individualism. McLuhan (1962b) is of the opinion that the idea of individualism may become less important with the rise of electronic media, and that people may become more reliant on interdependent relationships because of the new ways of connection being created by it. This should be particularly true for social media and the Internet, which have created a new culture of interconnectivity among their users.

On the surface, this would be a positive development, but what has become a major area of study is that mutually antagonistic groups seem to form spontaneously, and that the individual is not becoming absorbed in humanity, but in the biased groupthink of the group in which that they are, increasing the mutual antagonism.

Katz and Katz (1998) delve into McLuhan's notion of the "electronic age”, a period that he believes has extended various human senses at the same time. McLuhan said that, through this multi-dimensional interaction with technology, people can more effectively take in the happenings within their community, wider society and the world.

McLuhan believed that the ability of electronic media to provide us with vast amounts of information would simultaneously enhance our awareness of and engagement with the world. Consider, for example, how people remained connected thirty years ago. To stay informed about what was happening in the world, the best sources would be the local newspaper, the evening news on television (TV), or perhaps a magazine. Currently, news from around the world can be accessed immediately, in real-time, at the fingertips of users of electronic media. To continue with the foregoing caveat, one problem is that we can now choose which “news” to receive and believe.

In a related work, Sandstrom (2014) expresses the view that “extension” makes more sense than “evolution” when talking about the modern electronic age. Instead of thinking of technology as something that changes us over time, Sandstrom (2014) suggests we think of it as something that stretches what we can do. In this way, electronic media are like extra parts of ourselves that help us do more. He emphasises the necessity for interdisciplinary discussions on human extension, which will create new ways of thinking about how we and our technology are connected, leading to new fields of study and new ways of looking at the world (Sandstrom 2014).

McLuhan's use of “the extensions of man” can also be an applied methodological tool for interdisciplinary conversations in the human-social sciences, Philosophy and Theology. Sandstrom (2014) argues that, by using this metaphor as a tool, scholars can explore the relationship between humans and technology in a more nuanced way.

This tool can help us move beyond the evolutionary metaphor that has dominated much of our thinking about technology and society.

2.2.3 Technology as extensions of the body

McLuhan (1969) opines that our sensory processes are affected as materials infringe upon them, arguing that different media technologies extend our sensory capabilities, altering how we perceive, experience and think about the world. For example, writing extends our ability to remember and communicate ideas beyond what we can do with our own memory or speech. The printing press extends our ability to reproduce and distribute written texts on a large scale. Electronic media, like television or the Internet, extend our ability to see and hear beyond what we can do with our own eyes and ears.

Understanding how different media extend our senses and alter our perceptions can increase our awareness of how media shape our lives (McDowell 2021). For example, social media platforms, such as Facebook and Twitter, have become extensions of human interaction and have transformed the way in which we communicate and share information. With its unique offering, the medium itself shapes the nature and dynamics of communication, thereby influencing social relationships and behaviours.

In an interview with the *Playboy Magazine*, McLuhan 1969 ([no pagination]) explains that “prehistoric or tribal man existed in a harmonious balance of the senses, perceiving the world equally through hearing, smell, touch, sight, and taste. However, modern technological innovations have altered this sensory balance”. The rise of television and the internet, for example, has led to an emphasis on the capacities of hearing and sight. The modern sensory experience can also be said to be fragmented, consisting of sensory input from both digital and physical realms.

In McLuhan's view, when we separate what we see and hear from their deeper meaning, an imbalance is caused between what we see and its interplay with the other senses, thereby weakening our unconscious mind. "This has disrupted the balance of the sensorium – or Gestalt interplay of all senses – and led to atrophy of the unconscious" (McLuhan 1995:249).

Consider, for example, reading a physical, printed book, and reading on a smartphone or tablet. When you read a physical book, your senses work together smoothly: you hold the book, see the words on the pages and maybe even smell the paper. Your brain automatically processes the information and you may get lost in the story without even thinking too much about it. Your senses team up to give you a complete and natural understanding of what you are reading. When you are reading on a smartphone or a tablet, the screen emits light and you are interacting with the text it by using your fingers. This changes the way in which your senses work together. The screen may be smaller than a physical book and the light emitted can affect how your eyes perceive the text.

This new way of reading disrupts the balance to which your senses are used to. You may find it harder to concentrate or to immerse yourself in the story and you may feel more distracted. In a sense, this new medium – the screen – impacts how your senses collaborate and how your brain automatically absorbs information. This means that, because the new medium (the screen) is different, the automatic, subconscious understanding of the brain of what you are reading may not be as strong. It may affect your natural ability to dive deep into a story, because the new medium changes how your senses work together (Mangen, Olivier & Velay 2019). Needless to say, a generation that grows up reading mostly on screens, the opposite may be true. Different extensions of the senses influence other extensions.

In his fascinating book, *Counterblast,* McLuhan (1970:60) says the following: “One medium of expression modifies another, as one language is changed by contact with another. Each of our senses is daily modified by the experience of other senses. Each medium gives explicitness and stress to one sense over another. Noise weakens touch and taste; sight diminishes the range of the audible, and of taste and smell”. Similarly, the inherent qualities of objects compel ways of engaging with them, and technology inevitably engages some senses more than others, causing some senses to come into play, and others to recede into the background of experience. McLuhan refers to these as "sense ratios".

For example, one reads a book by looking at the words and turning the pages. One appreciates a work of art by looking at the shapes and colours that it displays. Similarly, interactions with different technologies have different sensory participants. When you use your phone, you look at the screen and tap with your fingers, but you do not use your sense of smell or taste. When watching a movie, your sense of sight and hearing become heightened, while your sense of touch and smell may be temporarily diminished, because they are not in use and other senses are being engaged.

Landes (2020:459) remarks that even the media of the natural environment establish certain sense ratios: “air (the sonic medium) is felt but not seen, light (the visual medium) is seen but not felt, gravity (the proprioceptive medium) is felt but neither seen nor heard”. McLuhan (1969) defines the sense of touch or tactility, for example, in such a way as not only referring to human touch, but also to media themselves. He believes that media technologies are endowed with a sense of touch, which allows them to interact with their environment and shape our sensory experiences.

This reciprocal idea of tactility suggests that media technologies are not just passive tools that we use to communicate with one another and are, instead, actively shaping our perceptions and experiences by engaging our senses in different ways.

It has become evident that the experience of touch plays an integral role in interactions with modern technology. Vassiliou (2018) provides examples of how technology can even enhance the experience of tactility through the use of haptic feedback. Haptic feedback is a tactile response occurring when a user interacts with a touchscreen or another technological device, such as a vibration or a slight movement. This feedback creates a more multisensory experience for the user, enhancing their sense of touch and making the interaction feel more physical and tangible. Vassiliou (2018) explores the role of tactility in shaping a new kind of "common sense" in the digital age, stating that McLuhan's concepts of "acoustic space" and "contraction" can help us understand the interconnectedness of electronic media communication and how it affects our senses. “We need alternative frameworks to investigate the growing interconnectedness of tactile realms, especially in the increasingly complex world of electronic media” (Schmidgen 2022:132). By understanding how different media extend the capacities of the physical body, McLuhan hoped to assist us in becoming more aware of how media shape our lives (McDowell 2021).

2.2.4 Technology as an extension of the mind or consciousness

“In this electric age, we see ourselves being translated more and more into the form of information, moving toward the technological extension of consciousness. [...] By putting our physical bodies inside our extended nervous systems, by means of electric media, we set up a dynamic by which all previous technologies that are mere extensions of hands and feet and bodily heat-controls – all such extensions of our bodies, including cities – will be translated into information systems" (McLuhan 1964:64).

According to Barile and Sugiyama (2018), we are rapidly approaching the final phase of the extensions of man, which is the technological simulation of consciousness. This will allow the extension of the creative process of knowing to the whole of human society, much as we have already extended our senses and our nerves by various media.

2.2.5 Technology as an extension of the self and identity

A Canadian McLuhan scholar, Andrey Mir (2021 [no pagination]), writes: “McLuhan foresaw that electronic media gave humans the quality of a disembodied, angel-like spirit, which happens to us right now when we literally resettle to social media or video games and operate our digital selves”.

Electronic media have eliminated the constraints of time and space, allowing people to participate in events without being physically present. Digital media have taken this even further by making time flexible – a possibility not achievable in the physical world. In video games, players can manipulate time by slowing down, stopping, reversing, or replaying events. “Resurrection becomes an everyday routine for video game players, who save and restart their digital selves, and for social media users, who can delete and restore their profiles” says (Mir 2021 [no pagination]).

According to Jensen (2012), the very nature of our presence, or spirit or self, is rapidly transforming and expanding, stating that it is not theoretical nor metaphysical to say that, when we are sending an email, attending a conference call, or sending a text message, that we are “dividing our presence”. As observed by Jensen (2012 [no pagination]), “While I might be seated here, part of my attention – part of my soul – is back at the office, where the concerns of the e-mail I am reading are properly housed. Another part of my soul is in the company of the person I am texting – miles away”.

How much more will this phenomena hold for virtual reality, where it literally feels as if we exist in a highly tangible, explorable elsewhere. The relationship between technology and identity is not unidirectional, as both technology and human actors influence one another in a mutual shaping process (Viseu 1999). According to Khan (2020), users of social media platforms have become “prosumers”, who both produce and consume content, influencing and being influenced, respectively. Similarly, virtual worlds that are shapable by the participant will be formed and then, in turn, influence.

2.2.6 Artificial intelligence as an extension of man

Artificial intelligence plays a crucial role in the Metaverse and will be discussed in Section 3 of this study. Sokolowski and Ershova (2022) explain that artificial intelligence (AI) can be seen as an extension of human capabilities, enhancing our cognitive capacities beyond what we can accomplish on our own. This becomes clearer as we explore the role of AI in the Metaverse.

Say, for example, that a user is participating in a virtual conference in the Metaverse. Through the use of AI, the discussions, chat messages and presentations are all being processed quickly and accurately. The AI algorithm identifies trends, topics of interest and can even translate language in real-time. Users who engage in virtual shopping in the Metaverse, for example, may shop for clothing for their avatars. AI will be able to recognise their style preferences and to make suggestions based on this, so as to tailor their shopping experience.

When users are participating in a virtual game in the Metaverse, for example, AI-driven non-player characters (NPCs) adapt their gameplay, based on user inputs. AI players learn from the gameplay of users, in order to improve users’ overall gaming experience continuously.

At the moment, game developers are working on incorporating the astounding abilities of large language models like ChatGPT into NPCs (non-playable character), so as to turn them into something much closer to real characters with whom a player can interact, instead of a placeholder for a particular question or instruction.

In the Metaverse, AI essentially serves as an extension of human ability, because it acts as a powerful tool, capable of processing vast amounts of data, recognising patterns and learning from experiences. This extension of our capacities makes it easier to tackle complex problems; make better decisions; and enjoy more personalised, realistic and immersive virtual interactions. As the Metaverse continues to develop, the role of AI in enhancing our digital experiences will become increasingly significant.

2.2.7 The medium as the message

Marshall McLuhan's (1962b) famous saying, "the medium is the message," captures a profound insight into how communication tools shape and influence the society and culture that they permeate. The essence of this idea is that the medium through which we communicate often holds more significance than the actual content of the communication itself. – It is not just what we say that matters, but how we say it, and the means we use to convey it.

Take the smartphone, for instance. A smartphone is far more than just a tool for making phone calls or sending text messages: it is a multifaceted platform that has reshaped human interaction, behaviour and even thought processes. In this way, the smartphone has become an extension of the human body and mind (Adam 2016).

Consider how smartphones extend our cognitive abilities: they serve as external memory devices, storing vast amounts of information that we can access at any moment. We no longer need to remember phone numbers, directions, or even basic facts – our smartphones do all of that for us. This extension of our memory and knowledge base fundamentally alters how we process information and interact with the world.

Smartphones extend our social reach, whereas social media apps and messaging services allow us to maintain relationships and communicate with people across the globe, erasing geographical barriers. This constant connectivity influences our social behaviours, norms and even our sense of identity. The way we present ourselves on these platforms often becomes as important – if not more so – than our real-world interactions.

Additionally, smartphones extend our sensory and perceptual capabilities. Cameras and video recorders allow us to capture and share our experiences in ways that were unimaginable a few decades ago. Augmented reality apps can overlay digital information into the physical world, thereby altering our perception of reality.

In each of these extensions, the smartphone as a medium becomes the message itself. The way it enables instant communication, constant access to information and a digital presence becomes a defining characteristic of modern life. It shapes our interactions, our perceptions and even our thought processes. The smartphone does not just deliver content; it moulds and frames our daily experiences, thereby embodying McLuhan’s principle of the medium, indeed, being the message.

In the view of McLuhan (1964), people invent new technologies or forms of communication, like television or the Internet, with a specific purpose in mind. However, it takes quite a while, sometimes even decades, for these technologies to show their full cultural impact or what McLuhan refers to as their "message" (Euchner 2021).

Roncallo-Dow and Scolari (2013) discuss the way in which McLuhan broke down the separation between medium and message, drawn by classic theories of communication. McLuhan placed them in an “equivalence ratio” and emphasised that the content of a message and the media transmitting it are of equal importance, and that one cannot really be understood without understanding the other.

Khan (2020) further discusses the importance of McLuhan’s "the medium is the message" in communications. McLuhan claimed that, while the content of a message is important, its influence on society is relatively small. He suggested that, although the content carried by a medium may distract us from the medium, the medium actually has a much bigger impact on us than the message it delivers. To illustrate this idea, McLuhan and Quentin Fiore created a book entitled, *Medium is the message,* in 1967.

2.2.7.1 Effect of technology on human perception

McLuhan’s ideas emphasise that, if we want to understand how individuals may connect with different media, we should first understand the effects of different media on the senses. For example, insight into aspects like sensory ratio, attention span and information overload may help when designing content for different social media platforms.

To illustrate: a social media post may need to be brief and visually engaging, in order to capture people’s attention in a fast-paced environment. An extensive article or book may require a more linear structure to help readers follow the argument (Zhu 2022).

McLuhan's ideas suggest that understanding the impact of media on human perception is essential for tailoring content to the specific characteristics of different media platforms. Through the exploration of these concepts, creators can maximise their impact and reach, thereby creating content that resonates with audiences (McLuhan 1969).

2.2.7.2 Effect of technology on societies

Any technological extension changes the patterns of interdependence between people, just as the ratio between our senses changes (Zhu 2022). Media technologies are not neutral tools, but rather active agents in shaping society and, by altering the modes and channels of communication, they can lead to significant societal transformations and create societies that are more or less equitable, independent, or harmonious. Social media, for example, have enabled new forms of activism and political mobilisation. However, they have also contributed significantly to the distribution of misinformation and polarisation.

McLuhan (1969) contrasts the individualistic focus of the typographic culture with the communal nature of the acoustic culture. In a typographic culture, communication is centred around visual stimuli – particularly written language – favouring linear and sequential thinking, which leads to a more impersonal engagement with information. McLuhan (1969) asserts that this culture favours individualism and individual success, often at the expense of collective wellbeing.

In contrast, acoustic cultures are rooted in sound and spoken language. It is McLuhan,s belief (1969) that this favours communal unity and multi-layered understanding – particularly because of the participatory nature of oral communication resulting in a fostering of collective unity.

McLuhan (1969) suggests that acoustic cultures are better equipped to care for their communities, due to their emphasis on collective experience over individual accomplishments. In such cultures, people are more in tune with one another's needs and feelings, leading to increased empathy and societal harmony.

Electronic culture is marked by a holistic and intuitive thought process emphasising interconnectedness and communal living. This culture thrives on electronic media, such as television and radio, promoting a more engaging and immersive interaction with information. Therefore, electronic culture employs elements from both typographic and acoustic culture, making it a more complex and multifaceted form of communication and interaction.

Similar to typographic culture, electronic culture involves written language and visual elements, akin to the printed word. Electronic culture also incorporates acoustic cultural elements; particularly through the use of sound, voice and audiovisual media. It enables the transmission of emotions, storytelling and multi-sensory experiences, allowing for the ability to engage with multiple media types simultaneously, which can create an immersive and interconnected experience (Katz & Katz 1998).

Based on the foregoing information, it can be concluded that differing media technologies significantly influence our cultural values and societal structures. By discerning the disparities between typographic and electronic cultures, we can gain a more profound understanding of the effects of technology on our societal structure (Katz & Katz 1998).

2.2.8 The Metaverse as an extension of man

The Metaverse vastly expands our capabilities by allowing us to attend virtual concerts; explore digital art galleries; participate in virtual classrooms; hold business meetings; and socialise with people across the world – all without leaving our homes.

In this sense, the Metaverse can bring the world closer, breaking down geographical and physical limitations. As an extension of our social and sensory capabilities, the Metaverse enables us to experience new realities, embody different avatars, and engage with people or objects across the globe, as if they were in the same physical space.

If the Metaverse, which promises to be the “next phase of human connection”, becomes nearly as central a player to communication as the mobile phone, for example, one can expect similar results. – We go back to using a wired telephone to make calls to one another and yet, despite this, numerous individuals will, indeed, assert that they absolutely and undoubtedly need their mobile phones. One can expect the Metaverse to become a technology that aids in our connections, while we become dependent on it, in order to connect to one another.

2.2.8.1 The Metaverse as an extension of the body

Virtual reality immerses us in computer-generated environments, effectively extending our sensory experience beyond the immediate physical environment. This new technology creates new ways of seeing, feeling and hearing the world around us (Lambreti 2017). An immediate simulation of consciousness would by-pass speech in a kind of massive extrasensory perception, just as global thermostats could by-pass the extensions of the skin and body we call houses (McLuhan1964).

Within the sensory space, the Metaverse will have its users functioning in a dual-sensory environment. Users will experience sensory input from their bodies present in physical reality, such as hunger, fatigue, etc., as well as sensory input from whatever they are doing in the Metaverse.

2.2.8.2 Metaverse as an extension of the mind/consciousness

“Communication media of the future will accentuate the extensions of our nervous system, which can be made disembodied and totally collective … As man succeeds in translating his central nervous system into electronic circuitry, he stands on the threshold of outering his consciousness into the computer” (McLuhan & Powers 1989:83).

In the Metaverse, our consciousness is projected into a digital space in which we can see, hear and even interact with objects as if they were physically present. If a sense of presence can extend to a virtual world, what may well be happening is a decoupling of physical and conscious experiences. The immersive nature of virtual reality challenges our conventional notions of space and identity. We can feel "present" in a digital environment that does not correspond to our physical location. This blurring of physical and virtual boundaries raises questions about what it means to be "here" and how our experiences shape our perception of ourselves and our surroundings.

In considering the psychic and social consequences of the Metaverse in relation to how it would “reconfigure” our senses, it is important to note that the Metaverse promises to extend the human senses via virtual reality. Virtual reality headsets, controllers and gloves are planned to play a role in duplicating the human senses within this alternate or augmented virtual reality. This opens up the idea that humans will be operating in two separate sensory realms.

A seemingly frivolous question, but what would the implications be on the sensory experience of the Metaverse, if the senses in reality are interfering, e.g. if one is hungry, or in physical pain? How will these two sensory realms be interconnected, and how will they be in conflict?

If the senses experience one thing because of the Metaverse, and another because of something occurring in physical reality, what are the implications

of this experience on how sensory inputs are registered (Fridman 2023)? Further, what are the implications of the possibility of the sensory experience in the Metaverse becoming indistinguishable from the sensory experience of physical reality? Is it probable at all that the two realms of reality and virtual or augmented reality could merge into a new, unified, human experience?

What is also interesting to consider in this regard are the possible consequences of the addition of the Metaverse to the current media ecology within which we operate. When the Metaverse is introduced, it will be accompanied by shock, which will, temporarily, provide us with an anti-environment with which to compare our current media ecology (McLuhan 1970). During this time, the differences between the Metaverse and our current media ecology environment will stand out, followed by a merging of the new addition (the Metaverse) into the current ecology, allowing these differences to “fade” into the background as we grow numb to their effects. The suggestion is that, if we want to forecast the effects of the Metaverse as a new medium, we should strike while the iron is hot and perceive what comes to the forefront during this period of shock. As McLuhan (1970) mentions, without an anti-environment, an environment remains invisible.

One can presumptively assume that introducing the Metaverse will have significant implications for both physiological and cognitive human functions. We can take the introduction of the Internet as an example. With the Internet (and the devices we use to access it), almost any information can be retrieved instantly. For humans, the consequences of this instant information retrieval occur in the form of cognitive, physiological and behavioural changes (among others). Cognitively, the human brain now has much less work to do to retrieve information. Physiologically, studies point to these changes as reflections of actual physical changes in the brain (Firth 2019:126).
Behaviourally, humans have become accustomed to retrieving information quickly and, therefore, they are less likely to go through the effort of visiting a library to access information in books. The impending introduction of the

Metaverse presents the possibility of similar cognitive, physiological and behavioural changes in humans, with the question being: what will the Metaverse change about us and our essential nature?

In a now famous paper entitled “The extended mind” by Andy Clark and David Chalmers (1998), the authors observe that objects in an individual’s environment form part of that individual’s mind. The scholars introduce a hypothetical scenario aimed at illustrating the significant influence of the environment and its connection to the human mind (Clark & Chalmers 1988).

“The extended mind” presents a scenario in which two characters, named Otto and Inga, embark on a simultaneous journey to a museum. However, there is a crucial disparity between them. For example, Otto, afflicted with Alzheimer's disease, relies on a meticulously documented notebook to compensate for his impaired memory. Inga, on the other hand, possesses the ability to recollect the directions needed for navigation internally. The crux of their argument revolves around the notion that the sole distinction between these two cases lies in the manner in which memory is processed: Inga's memory is internally processed by her brain, whereas Otto's memory is externalised through the medium of the notebook. Otto's mind essentially extends to incorporate the notebook as an integral component of his memory. In this way, the notebook is considered an extension of Otto himself – due to its constant and immediate accessibility to him, effectively garnering his endorsement. Furthermore, Clark and Chalmers propose viewing Otto's notebook as a vulnerable "biological limb or organ" that Otto cherishes and seeks to safeguard from harm (Clark & Chalmers 1998).

According to Logan (2013b), McLuhan had indirectly predicted the extended mind thesis prior to its popularisation by Clark and Chalmers. Logan cites the following quotation by McLuhan, in which McLuhan refers to the possibility of the human brain existing outside of the skull: “Electromagnetic technology requires utter docility and quiescence of meditation such as befits an organism that now wears its brains outside its skull and its nerves outside its hide. Man must serve his electric technology with the same servo-mechanistic fidelity with which he would serve his coracle, his canoe, his typography, and all other extensions of his physical organs. But there is this difference, that previous technologies were partial and fragmentary, and the electric is total and inclusive” (McLuhan 1964:64).

2.2.8.3 Metaverse as extension of self or identity

In the virtual environment of the Metaverse, users will have the power to create and control their digital avatars, changing their appearance, voice and even species at will. This freedom may lead to exploring different aspects of our identities, perhaps even aspects that users feel unable to express in the physical world. The visual identity of the digital avatar will not necessarily need to mirror real-world identities or the specific physical characteristics of the actual body of its creator. This may lead to increased creativity, self-expression and freedom, but on the flip side, it may also lead to identity crises, as the boundaries between our physical selves and our virtual avatars begin to blur. Users may feel pressure to conform to certain norms within the Metaverse, just as they might have done in physical societies, which could influence their behaviour, self-perception and overall identity.

As an illustration: as soon as one chooses a WhatsApp profile picture, one has created a disembodied representative of oneself. When playing a video game, we play as the character we select. The actions of the character and the character itself act as a disembodied representation of their player. On social media, we interact through an online persona, which we project outward to the world.

In the Metaverse, we operate as a disembodied spirit or representation of some core essence of ourselves, and we call it an “avatar”. In a world where identity is deeply rooted in physical appearance and assessments of one's identity are formed by external appearances, the use of avatars has the potential to reshape our understanding of identity profoundly. Avatars will introduce a paradigm shift by disentangling identity from its traditional association with physical form (Saker & Frith 2022).

Once a metaphysical idea, it is now not even slightly mystical to suggest that the self can exist in the absence of the physical body. To quote Mir (2021 [no pagination]): “Now we are about to totally live inside our latest medium. Almost all our activities are already there. Humankind is resettling from biological bodies into the digital body”.

In the Metaverse, some people may create avatars that look or act similarly to the way they look or act in real life, while others may make avatars that look or act differently. However, neither of these avatars are more or less representative of their uers than the other. This very notion raises intriguing questions about our humanity and the boundaries of what we consider to be the human self. These discussions on the Metaverse and the nature of identity lend toward the theory that our sense of self may not be limited to our physical bodies, but may rather be a core essence of which the representation is constantly changing.

2.2.9 The tetrad of media effects

The McLuhan tetrad is a set of four laws that can be applied to all creations of man, whether they are tangible or intangible, abstract, or concrete (Adam 2016). Marshall and Eric McLuhan (1988) presented the tetrad in the book *Laws of media: the new science*. The four laws are: enhancement, obsolescence, retrieval and reversal.

Enhancement refers to how a medium amplifies or intensifies a particular human sense or ability. Obsolescence refers to how a medium eventually renders an older medium obsolete. Retrieval involves the way in which a new medium brings back something from an older medium that has previously been obsolesced. Reversal refers to how a medium can flip into its opposite effect when pushed to its extreme (Islas 2016).

As introduced in Chapter 1, the tetrad will be a reoccurring theme throughout this study. In the research phase of this study, McLuhan and McLuhan's (1988) *Laws of media* will be discussed in terms of the tetrad. In the concluding chapter, the laws will be applied to the Metaverse. The tetrad of media effects will illustrate how the two concepts – technology as extensions of man and media ecology – interplay in a tetrad formation.

Section 2.2 explored the concepts of technology as extensions of man and its effects on media ecology. As introduction, a brief discussion on the evolution of technology illustrated the importance of each phase of development and its effects.

Today, we are at the frontier of artificial intelligence (AI), the impact of which is already of great significance. This has a profound impact on media ecology, in that it shapes the way in which we interact with media and how media shapes our lives. We also discussed the Metaverse, a new technology that promises to extend the human senses via virtual reality, and how it will create a dual-sensory environment for its users. Understanding the relationship between technology as extensions of man and media ecology is crucial in shaping a future that is both innovative and equitable.

The next section focuses on unpacking the concept and development of media ecology and the relevant theories related to the concept.

2.3 Media ecology

Now that we have seen how technology functions and becomes an extension of humanity, we can delve deeper into the exploration of what unfolds when a new technology is introduced. The technologically extended individual navigates the media landscape, exerting specific demands upon it, ultimately leading to transformations. According to Levinson (1999:190), this process can be characterised as a cyclical, yet progressive, relationship between technologies and their impacts.

The concept of media ecology, as viewed through McLuhan's lens, can be aptly depicted by using a biological analogy (Strate 2004:2). Media ecology resembles the intricate, symbiotic relationships observed in a biological ecosystem. In this analogy, diverse forms of media mirror various organisms coexisting and interacting in a delicate equilibrium.

When a new media form emerges, it resembles the introduction of an invasive species in a biological ecosystem. This new "organism" can disrupt the balance of the existing ecosystem, either by competing for resources or by altering the existing relationships among the established media forms. As a result, the media landscape is constantly evolving, adapting and rebalancing.

Adopting a media-ecological perspective enables us to delve into the consequences of introducing the Metaverse into the media landscape. By subjecting the Metaverse to analysis through the lens of McLuhan's tetrad of media effects, we can start to see the extent to which the Metaverse may extend us.

2.3.1 What is media ecology?

At its essence, media ecology enquires into the ways media and communication technologies mould human perception, cognition and behaviour. It also examines the broader implications of these influences on culture and society.

The term "ecology" underscores the interconnectedness and interdependence of various components within a system, much like the natural environment (Scolari 2012). Within the realm of media ecology, this ecological perspective brings into focus the evolving relationships among media technologies, the messages they convey, and the sociocultural contexts in which they operate. Initially introduced by Neil Postman and popularised by Marshall McLuhan, media ecology theory encompasses the study of media, technology and communication and their profound impact on human environments (McLuhan 1964).

Postman and McLuhan were among the first to suggest that media or technology (McLuhan used these terms interchangeably) affect the way we are and how we live (Levinson 2000). Essentially, the field of media ecology aims at describing the relationships that human beings have with technology or media, focusing specifically on how media affect our experience of the world, the way we communicate with one another, and our culture.

Neil Postman (2006) asserts that, if in biology a “medium” is something in which a bacterial culture grows (as in a Petri dish), in media ecology, the medium is a technology within which a [human] culture grows. Media ecology investigates the effect of communication media on the way in which humans perceive, understand and feel; what they value; and how these effects either promote or hinder their odds of survival. In this context, an environment is, therefore, a multifaceted system that affects the way in which we think, feel and act (Postman 2006).

Robert K. Logan (2016b) defines a *media ecosystem* as a system made up of humans, media, technology and the language with which each of these communicates with the other. This definition of a media ecosystem is analogous to conventional ideas of biological ecosystems in which each part of the ecosystem communicates with each and every other part to create an equilibrium.

The means by which this communication takes place also forms part of the ecosystem and, in this way, one can say that media ecology is not limited to the study of the media and technology in the ecosystem, but includes the language with which these areas interact. Therefore, it is suggested that, together, the areas of media, technology and language form the media ecosystem (Logan 2016b).

What made McLuhan's opinions stand out from those of other scholars in the field of media ecology was that, instead of having communication as a foundation for his work, McLuhan made communication take "centre stage" to such a degree that, according to Levinson (2000:17) there was "nothing else on the stage". For most other theorists, a distinction was drawn between communication and technology. For McLuhan, all of it was communication.

In his studies on media ecology, McLuhan extended the concept of mediato the extent of not only referring to communication technologies alone, but also to other technologies, such as the clock, the train or electricity, stating that these technologies have similar implications for society as conventional communication technologies. For McLuhan, a chair was just as much a communication medium (the chair being the medium and the person sitting on the chair being the content) as the telephone. So was the car, the weapon and the money (Logan 2016b:135).

In the context of the Metaverse, this would imply that not only is the Metaverse a medium, but so are the platforms and devices associated with it (Yun, Rogers & Ko 2022:841–843). Virtual and augmented reality headsets, handheld devices, and anything at all which will be used to access the metaverse, are considered media in this context.

This raises the question as to whether each of these individual devices or media will cause its own disruptions to the current media ecology. Will users, for example, tire of the now considered small in comparison smartphone screens, being so accustomed to the immersive visual digital experience that the Metaverse virtual reality goggles provide? Will users prefer the tactile and body-language compatible experience of the handheld consoles of the Metaverse, over communicating via text or phone call?

2.3.2 The development of the concept of media ecology

The field of media ecology has undergone significant development over the past several decades, rising in prominence as a scientific discipline that examines the relationship between media, communication and human behaviour. As a multifaceted and interdisciplinary field of study, media ecology seeks to understand the complex relationship between media, communication and human behaviour. Over the years, it has received increasing scholarly attention, culminating in the exploration of diverse theoretical frameworks, methodologies and perspectives (Scolari 2012).

This discussion briefly examines the origins of media ecology, focusing on the founding thinkers and the most important ideas that shaped the development of the field. By examining these historical roots, we aim at gaining a deeper understanding of the core principles that have informed the study of media ecology and its continued relevance in the modern, rapidly evolving media landscape.

The roots of media ecology can be traced to the work of several inventive scholars and thinkers whose ideas laid the groundwork for the study of media and its effects on society. Although in this investigation we are mostly focusing on Marshall McLuhan’s perspectives on media ecology, the following section provides a brief outline of scolars who contibuted and are currently contributing to the field.

While it is impossible to cover all the important scholars in this field, the following list highlights some of the major scholars who have made significant contributions to the development and understanding of media ecology.

Marshall McLuhan (1911–1980) is often regarded as the father of media ecology. McLuhan's work – particularly his book *Understanding media: the extensions of man* (1964) – laid the foundation for the study of the impact of media on society. McLuhan’s work will form the foundation of this discussion and this study. His contributions will be covered in detail throughout this dicussion, as our study will be mainly focused on McLuhan’s work.

Harold Innis made significant contributions to the field of media ecology through his groundbreaking work on the social, political and economic implications of communication technologies. Innis's seminal works, *Empire and communications* (1950) and *The bias of communication* (1951), laid the foundation for subsequent media ecology studies by examining the ways in which different media technologies affect the structure and dynamics of societies. Innis emphasised the concept of "time-binding" and "space-binding" media, which respectively fostered long-lasting, stable societies or promoted rapid expansion and interaction over vast distances (Strate 2004).

By exploring the role of communication technologies in the rise and fall of civilisations, Innis's work shed light on the intricate relationship between media, culture and power (Scolari 2012). Harold Innis's contributions to media ecology have been instrumental in shaping the field, providing a rich theoretical framework for understanding the complex interactions between media, society and history.

Neil Postman contributed to the field of media ecology by producing his influential works that examined the ways in which media technologies shape human experience, culture and society.

In his seminal book *Amusing ourselves to death* (1985), Postman critiqued the growing dominance of television and its impact on public discourse, arguing that the emphasis of the medium on entertainment over substantive content was leading to a trivialisation of civic life. Postman's work built on the ideas of media ecology pioneers, like Marshall McLuhan and Harold Innis, while incorporating insights from social and cultural critics like Lewis Mumford and Jacques Ellul (Laskowsa & Marcynski 2019). His interdisciplinary approach to media studies, characterised by a synthesis of various fields, including education, communication and cultural studies, has been instrumental in shaping the field of media ecology. Postman's work has fostered a critical awareness of the ethical and social implications of media technologies, underscoring the need for media literacy and encouraging scholars and practitioners alike to engage in thoughtful and responsible analysis of the role of media in shaping human experience and society (Strate 2004).

Walter Ong's seminal work, *Orality and literacy: the technologising of the word* (1982), built on the ideas of media ecology pioneers like Marshall McLuhan and Harold Innis, while delving deeper into the transition from oral to literate cultures. Ong's concept of "primary orality" and "secondary orality" shows the differences between cultures rooted in face-to-face communication and those emerging from the written word, as well as the resurgence of oral-like communication in the electronic age (Scolari 2012). By examining the ways in which oral and literate modes of thought and expression shaped human experience, Ong provided valuable insights into the cognitive and cultural consequences of communication technologies (Laskowsa & Marcynski 2019). His work has had a lasting impact on the field of media ecology, offering a nuanced understanding of the intricate relationship between media, consciousness and culture, and fostering interdisciplinary dialogues that continue to inform contemporary scholarship.

These scholars represent only a few of the numerous thinkers who have contributed to the development of media ecology as a field of study. Their work provides a foundation for understanding the complex relationship between media, technology and society.

2.3.3 Concepts underpinning McLuhan's understanding of the role of media

2.3.3.1 Media as extensions of man

The topic of media as extension of man was extensively discussed in Section 2.1. Marshall McLuhan's concept of technology as "extensions of man" is a cornerstone of his theoretical contributions and holds relevance to the discourse on technological determinism. According to McLuhan, media technologies act as extensions of human senses, faculties and abilities, thereby altering the way in which we perceive, process and interact with the world around us (McLuhan 1964). This notion challenges the idea of media technologies being mere tools or passive instruments, positing them instead as active agents that shape human perception, cognition and communication.

By extending our capabilities and modifying our sensory balance, these technologies not only change the way we interact with our environment, but also profoundly impact our cultural values, social structures and power dynamics (Gordon, Hamaji & Albert 2007).

2.3.3.2 The medium is the message

> "By stressing that the medium is the message rather than the content, I'm not suggesting that content plays no role – merely that it plays a distinctly subordinate role. Even if Hitler had delivered botany lectures, some other demagog would have used the radio …" (McLuhan 1969 [no pagination]).

> "[…] to say that any technology or extension of man creates a new environment is a much better way of saying that the medium is the message. This environment is always 'invisible' and its content is always the old technology. The old technology is altered considerably by the enveloping action of the new technology" (McLuhan 1970:31).

The foregoing quotations demystify much of the confusion around this famous quotation. The information of a family member being very ill is obviosly important, but this importance cannot compare to the cultural importance of that which makes this sharing possible – namely the environment created by the mobile phone. The concept of "the medium is the message" implies that the medium through which we interact holds a message in itself. This message, rather than just the message held by the content that the medium may carry at any particular time, influences and shapes our interpretation of the world.

It is the structure of the medium itself that shapes our experience (McLuhan 1964). McLuhan gave the example of the printing press, stating that its introduction allowed for a new environment of "individualism" and "fragmented information", allowing individuals to retrieve informaton independently of the traditional means of communication, such as word-of-mouth.

The concept of media is typically explained as that of a "vessel" or a "conduit" (Ruotsalainen & Heinonen 2015:8). According to Logan (2004:9), in analysis of McLuhan's work, a medium of communication is "not merely a passive conduit for the transmission of information, but rather an active force', a 'living vortex of power' which forms and changes social trends and creates 'new perceptual realities" (Logan 2004:10).

Logan asserts that, once the central media and technologies of society have been recognised, one can begin to understand the factors affecting the entire social and psychological structure of that society (Logan 2004:9). For example, when we use the Internet (and the devices we use to access it), it allows us to access an array of information at an extremely fast rate. This function, or the medium through which the Internet is accessed, affects us just as much as the content we are accessing on the Internet. These effects extend to cognitive, physiological and behavioural dimensions. Cognitively, the human brain has much less work to do now to retrieve information.

Physiologically, studies point to these changes as reflections of actual physical changes in the brain (Firth 2019:126). Humans have become accustomed to retrieving information very quickly and, therefore, are less likely to go through the effort of, for example, visiting a library for access to information in books. The effects of a medium or technology are not limited in the least to those that have originally been intended via its usage or content, but extend far beyond these.

By pointing out the transformative power of media technologies on human experience and social structures, McLuhan's concept of the medium as the message has definite suggestions of technological determinism, which posits that technological innovations are the primary drivers of social change.

With the develpment of the virtual reality and the Metaverse comes the possibility of similar cognitive, physiological and behavioural changes in humans, with the question being: what about us and the way we are, will be changed by the Metaverse? We aim to address this question in the coming pages.

2.3.3.3 Hot and cool media

McLuhan's distinction between hot and cool media is another essential contribution to the understanding of technological determinism. Hot media are high-definition, low-participation forms of communication that require minimal user involvement, such as movies or radio. In contrast, cool media are low-definition, high-participation forms of communication that demand active user engagement, such as talking on a mobile phone or reading (Levinson 2000).

This classification helps to explain how different media technologies shape human interaction and social dynamics. According to McLuhan, hot media, such as modern, high definition televisions, do not require interpretation or collaboration from their audience, in order to absorb the message that they are conveying. These forms of media present the message in a way that is dense in terms of sensory information and can be said to be "high definition". They are considered "hot", because they only require the audience to participate passively, while offering a full message that can stand alone without any contribution from the audience (McLuhan 1964).

Cool media, such as books and the Internet, on the other hand, present the opportunity for participation and audience involvement for the message to be conveyed. These media are considered "low definition", because they present an incomplete message that requires participation from its audience to be completed (McLuhan 1964:26).

It is important to mention that, although this view of McLuhan's has been criticised for its simplicity – with numerous theorists arguing that media can change form, depending on how they are used – it remains an influential theory in the field of media studies and media ecology (Kellner 1995).

An example should illustrate this fact. – According to the conventional idea of a film as a medium, it is a hot medium, because it requires little participation from its user and really only requires attention on part of the audience. Therefore, the audience can simply sit back and relax as a film plays before them. However, watching a film in a cinema requires our full participation: we need to get into our cars, drive to the cinema, buy the tickets and snacks, walk into, sit down into the designated cinema seat and watch the film, thereby making the cinema, as an experience, a cool medium.

Many believe that the digital age is one in which users of media prefer doing as little as possible for the maximum experience (Kinash 2014:56). However, if this were really the case, we would never have attended the cinema and we would have just streamed the film from the comfort of our homes instead. Although 4D movies have failed to become popular among audiences, perhaps the experience of cinema is already immersive, even though the core medium (the movie) is not. This is probably the reason for the cinema having maintained its status as a popular form of entertainment, even in the digital age of streaming services, such as Netflix, Disney Plus and Amazon Prime, and even across the consequences of the global COVID-19 pandemic, which forced cinemas across the world to close their doors temporarily.

What is being suggested here is that media are dual-functioning and, whether a medium is hot or cool is a matter of perspective. Do we draw the line at defining a medium as that which carries the message, or can we fully apply McLuhan’s notion of the medium being the message and extend the definition of media to include that which goes along with the message, as in the way a cinema and its experience and atmosphere, accompany a movie?

The Metaverse presents a medium of which the function requires full and active participation from its user, in order to have a full experience of itself. However, it also presents a medium of which the function can be executed with very little effort on the part of its user, compared to existing modes of experience. Consider for a moment, real life or physical reality: in order for us to have a full experience of life, our physicality and our natural world, our immersed participation is required. However, participation in life itself requires no effort at all: we are born and we simply exist and, in this way, we are participating. What is being suggested here is that the Metaverse will mimic the ultimate medium of which the "hotness" or "coolness" varies, depending on perspective – i.e. the medium of life.

2.3.3.4 Global village

One of McLuhan's significant contributions to the field of media ecology is his concept of the "global village" (McLuhan 1962b). McLuhan believed that the development of electronic media collapsed the boundaries that once acted as barriers to communication between people across the world. McLuhan (1964:3) writes: "Today, after more than a century of electric technology, we have extended our central nervous system in a global embrace, abolishing both space and time as far as our planet is concerned … "Time has ceased, 'space' has vanished. We now live in a global village … a simultaneous happening".

Faster than a villager can talk to another occupant in the same village, we can communicate with one another, as if there is no distance between us. As quickly as an idea is spread through a village, so can we and our beliefs, behaviours and thought processes be informed by a message – as if there is no time to delay the spread of information. As the radio extends our ear, the television extends our sight. We no longer have to be near someone to hear what they are saying, or near a particular place to see it for ourselves. Something said years ago can be heard today, and something that occurred months ago can be seen today, as if no time has passed (Symes 1995).

This is a condensed experience of space and an accelerated experience of time. Before the introduction of electronic media, people were accustomed to long delays in communication, e.g. waiting for a response to a mailed letter, influenced by geographical journeys from one area to another via some form of physical transport (Symes 1995). Currently, communication can take place with no time breaks between message, as there is one seamless influx of information, crossing any geographic boundary in an instant. All of this gives rise to the following question: what does this mean in relation to what we think of the barriers of communication today?

In Section 2.1, it was established that all artefacts can act as extensions of man and, in this case, the Metaverse. One of McLuhan's most famous concepts – that of the global village – is relevant to this discussion. Du Plessis and Du Plessis (2018) suggest that McLuhan's prescient idea of the global village has only become real long after its introduction, and it is still evolving, serving as the basis for research on networks and "network societies".

McLuhan and Powers (1989) opine that an investigation into the principles of their book, *The global village*, would prove one of McLuhan's profound thoughts – i.e. that the extensions of human consciousness were projecting themselves into the total world environments via new technologies, driving humankind into a robotic future. Man's nature was being translated into information systems that would produce enormous global sensitivity.

The Metaverse may very well be one of the possible final extensions of the notion of a global village. The Metaverse system is designed to provide users with an open, untethered, immersive environment that tricks their visual senses into believing that the traditional barriers of time and space have been removed. The Metaverse is a virtual world that differs from its predecessors, in that it allows for the fusion between the virtual world and the physical world (Riva & Wiederhold 2022).

In many ways, the Metaverse exemplifies the global village by breaking down the remaining physical barriers and creating an immersive, interactive environment where everyone can engage and connect in real-time, across geographic and cultural divides ... the whole person. The Metaverse can be viewed as a realisation of McLuhan's global village in an immersive digital dimension through virtual worlds enabled by virtual and augmented reality technologies (Dionisio, Burns & Gilbert 2013). It is extraordinary that McLuhan “saw” this future in a time when our environment was fractionally as digitalised as it is now.

One of the more noticeable remaining barriers to this instantaneous at-a-distance communication is our very physicality. Although we can connect online via video, audio or text-based chat, we cannot physically interact by, say, giving one another a firm handshake or sharing in an embrace. Currently, new technologies can simulate certain types of touch across long distances by way of devices, such as a wearable sleeve, but even this technology is yet to be launched to the public (Sima 2022).

Although it is not easy to imagine these barriers (including smell and taste) being fully overcome, hundreds of years ago, only a few had predicted that time and distance would no longer be barriers to communication. If we carefully consider McLuhan’s words in his description of the global village, we may realise that similar concepts have been pointed out in more religious and philosophical disciplines (McLuhan 1964:4):

> “We live mythically and integrally ... In the electric age, when our central nervous system is technologically extended to involve in the whole of mankind and to incorporate the whole of mankind in us, we necessarily participate ... in the consequences of our every action … The aspiration of our time for wholeness, empathy and depth of awareness is a natural adjunct of electric technology ... There is a deep faith to be found in this attitude-a faith that concerns the ultimate harmony of all being”.

A key factor involved in the global village is the manner in which it allows individuals to move from their smaller, isolated communities and a sense of identity into the new, shared, global identity, by way of instant communication across the world. When McLuhan proposed his idea of the global village, numerous theorists argued that it had significant consequences on aspects relating to international culture, one of which, most notably, is known as cultural homogenisation (Dixon 2009).

Cultural homogenisation occurs where the sharing of a cultural pattern leads to the wide adoption of the dominant cultural trend and, consequently, a lack in cultural diversity. In other words, many people from many different cultures are now sharing their cultural backgrounds with the rest of the world, and the rest of the world responds by either willingly or even unwillingly “adopting” the most popular or appealing cultural norm or value at the time (Dixon 2009). One of the most popular examples of this is the dominant play of Western culture across the world, with theorists often viewing it as a “dominant, destructive culture” in terms of its ability to swallow and “destroy” smaller cultures as it spreads across the world (Jenkins 2006:12).

There should obviously not be a single culture to which people converge. In fact, many blame the rise of electronic media, like Facebook and Instagram, which only feed users the information or disinformation to which they are biased, thereby allowing for the rising to antagonistic cultures or tribes, as McLuhan notes in his interview with the *Playboy Magazine*. However, the instant nature of the electric information movement is decentralising – rather than enlarging – the family of man into a new state of multitudinous tribal existences (McLuhan 1995).

One cannot help but speculate that what McLuhan called" the global village" was an intuition: an intuition of the future existence of what we are now calling the Metaverse. As a philosopher notably ahead of his time, it would not be unusual for this being the case.

2.3.4 The tetrad of media effects

Marshall McLuhan's tetrad of media effects, developed in collaboration with his son Eric McLuhan, offers a comprehensive framework for analysing the consequences of media technologies, and has implications for technological determinism and media ecology. The study of the potential effects of the Metaverse on the media environment will essentialy interlink media ecology with the tetrad.

The tetrad comprises four interrelated aspects – enhancement, obsolescence, retrieval and reversal – each of which represents a distinct dimension of media impact on society and culture (McLuhan & McLuhan 1988). By examining these dimensions, the tetrad allows for a deeper understanding of the deterministic influence of media technologies, transcending simplistic cause-and-effect relationships. It is obviously that the tetrad and media ecology should be studied in conjuction.

The enhancement aspect, for example, highlights how media technologies amplify or extend human capabilities, while obsolescence sheds light on the decline of certain skills or practices as a result of new technologies. Retrieval, on the other hand, emphasises the re-emergence of previously dormant cultural patterns, while reversal illustrates how media technologies can generate unexpected consequences or even reverse their original effects, when pushed to their limits (McLuhan & McLuhan 2017).

In this way, McLuhan's tetrad of media effects offers a more holistic approach to understanding the impact of media on human experience and society than mere cause and effect (Grodsky, Hildebard & Hakanen 2018).

2.3.5 Media as environments

As discussed in the section on media-ecology, all media are environments. Even if we make our best attempt at forecasting the effects of a new medium, some effects remain unknown to us, regardless of how well we attempt to anticipate or predict them.

During the late 1970s, the United States (US) military developed a piece of global positioning technology called GPS (Global Positioning System). The original intention of the technology was to track US submarines with nuclear missiles attached to them, while navigating in and around the United States of America (USA) and enemy territory (Walker 2012).

GPS features, which are currently built in all modern smartphones, are used for a variety of purposes including navigation, fitness and social media location tags. Similarly, we cannot hope to predict all the consequences of virtual reality and the Metaverse, we can only make a serious attempt, so as not to risk them flying “under the radar”.

2.3.6 Media environments and the Metaverse

One of the most significant, potential effects of the Metaverse on existing media is that it may have a big impact on the interaction of humans with technology. This could easily lead to a movement away from traditional communication media – such as the touch-screen, keyboard and mouse – towards the more interactive body-language and voice-based Metaverse.

If we consider the use of a mouse for a moment: in a way, the mouse acts as an intermediary between the two participants in an interaction, such as you (the one using the mouse) and the Internet (what is being interacted with). Although, compared to current technology, this seems rather modern and intuitive, it does still present a sort of barrier or intermediary to the experience of interaction with the Internet. What we would ideally like, is to be able to access information without having to use an intermediary device such as a mouse.

With the use of VR and AR devices in the Metaverse, a more “immediate” and tactile experience of the Internet can be achieved. Although typing, texting and phone or video calls feel highly natural to most of us, the tactile experience of the Metaverse will probably present a far more natural way of interacting with the Internet and with one another. Another significant effect that the Metaverse may have, is the possible creation of brand new forms of media.

Similarly, media can affect our communication patterns (McLuhan 1962b). For example, the way we communicate with one another in person is deeply influenced by the advent of the mobile phone and the culture of texting and social media. We may not recognise it at first, but instant messaging has not only led to changes in how often we communicate face-to-face, but also in the types of words we use in communication (Hemmer 2009).

Because of these media, we tend to adopt a more casual communication style, compared to what would have happened, had we continued to use the mail system to post written letters to one another (Carey 1989).

In other owrds, if the Metaverse happens to have its own kind of communication “style”, which it most likely will, we can expect that communication style to affect the way we interact with one another in physical reality. We may, for example, become more expressive with the use of our hands, as body language and hand gestures will become a central part of communication in the Metaverse. Although this is only an example, it does illustrate the possible changes in our communication style as a result of the introduction of a new form of media. Emphasising how our media become our new world, McLuhan (1969) remarks that new media are not bridges between man and nature; instead they are nature.

2.3.7 The anti-environment

According to McLuhan (1964), the artist and the scientist have the job of creating an anti-environment as a “means of perception and adjustment”. Without an anti-environment, all environments remain ”invisible”. McLuhan (1964) asserts that it is suitable to view all the arts and sciences as acting in the role of anti-environments that enable us to perceive the environment (McLuhan 1964).

When a new medium first enters a media ecosystem, the intitial shock we experience acts as an “anti-environment” that elicits a high level of awareness in the user, creating, just for a moment, a strong contrast between the old medium and the new one. Over time, however, this shock dwindles as users become “numb” to the effects of the medium, which are soon perceived as commonplace as the distant sound of traffic on a freeway. This is what McLuhan termed *autoamputation*, during which both the body and the mind of the users of the medium are restructured (Logan 2016b:138).

A good example of this would be to consider the development of the mobile phone once again. Some of the numerous initial reservations and objections included that the phones were too fragile; that touch screen buttons would not be tactile enough; that we would make typing mistakes far too easily; that the absence of an ever-present QWERTY-based keyboard would be inaccessible; that the screens will become dirty to the touch; and that their five-hour battery life is far too little to be practical. These objections clearly reflect that the smartphone had temporarily created an anti-environment across the media landscape (LaFrance 2015). It is important to consider points raised during this time, because humans quickly adjust to new technology, after which the effects of said new technology become largely invisible.

In response to each of the issues outlined in the previous paragraph, humans now: purchase phone cases to protect their devices; take extra care not to drop them; make use of autocorrect functionalities that prevent typing errors on touch keyboards; have grown accustomed to a keyboard only opening up in certain apps under certain conditions; take care not to get their phones dirty and clean them; and charge their phone religiously in cars, on trains and at home. In this way, humans seem to have seamlessly adapted (for the most part) their lifestyles and preferences to suit the new technology and, before we know it, the effects of the new technology cannot be distinguished from the norms of daily life.

In McLuhan's view (1964), the wide introduction of wide use of the Metaverse will be accompanied by shock, which, in turn, will temporarily provide us with an anti-environment with which to compare our current media ecology. During this time, the differences between the Metaverse and our current media ecology environment will be highly prominent, followed by a merging of the new addition (the Metaverse) into the current ecology, allowing these differences to "fade" into the background as we grow numb to their effects.

As McLuhan mentioned, without an anti-environment, an environment remains invisible (McLuhan 1964).

At the time of writing, some responses to the initial launches of the Metaverse by Meta (originally known as Facebook) and similar, associated technologies have already been shared. For example, a researcher for the British Broadcasting Corporation (BBC), who went undercover as a 13-year-old girl in the Metaverse, describes her experience of the Metaverse as “horrible”, as she explains her encounters with various kinds of misconduct directed towards her and towards other avatars (BBC News 2022).

Rushkoff (2012) states that, instead of making technology more compatible with humans, the Metaverse is making humans more compatible with technology. He asserts that the Metaverse is nothing more than an escape from reality, which postpones the processing of actual human problems in actual human life, and that the Metaverse is simply another example of where large companies “value fame more than connection, likes more than love, and sensation over meaning”.

It is interesting to compare this view to that of the BBC researcher (2022) presented above, as the Metaverse in no way seems to guarantee an escape, and it can be more traumatic than the real world. Indeed, according to MacDonald (2022), the Metaverse does not make the problems of real life disappear and does not serve as an escape from them. Instead, MacDonald proposes that the real world problems are inherent to the Metaverse, because they have been created by it, stating that, “unless companies put immense efforts into dismantling prejudices and unconscious biases, they are thoughtlessly replicated in whatever they create” (MacDonald 2022 [no pagination]).

As observed by Huddleston (2022 [no pagination]), instead of bringing people together, the Metaverse only creates “more loneliness”. According to Huddleston (2022), the level of immersion offered by the Metaverse poses a whole new level of psychological vulnerability: “There’s a potency about being immersed in a world that is different than observing and interacting … through a flat screen monitor ... Once you’re actually embodied in a space, even though you can’t be physically touched, we can be exposed to things that take on a level of realism that could be psychologically assaulting”. Furthermore, Huddleston (2022) adds that the ability of users to present themselves as an avatar carries a particular risk for adolescents whose self-concepts and identities are still in the discovery process. Huddleston (2022) stresses the importance of safety measures in the Metaverse, as it is known that similar technologies have exposed minors to inappropriate material, and the Metaverse seems to be treading similar ground.

The reason that we raise these arguments against the Metaverse at this point is not to condemn the Metaverse, but to highlight the fact that it is clear by these remarks that the entry of the Metaverse has created an anti-environment with which individuals are subconsciously comparing it. For example, when users say that the Metaverse is unsafe, they are, in essence, comparing it to the safety of the current digital environment, by way of the “invisible” anti-environment. When users state that it is “too immersive”, they are comparing it to the levels of immersion currently experienced in digital media, which are acting as an anti-environment for the Metaverse.

For this reason, it is best to note the effects that arise now, rather than noting effects that arise later, after the Metaverse has become more popular. As soon as the Metaverse becomes commonplace, it will be more difficult to discern its effects as clearly as we do now, in the presence of the anti-environment, because human behaviour and tolerances would have adjusted to accommodate it.

2.3.8 The media-environment as a process

According to Du Plessis and Du Plessis (2018), the media environment represents a process. Media ecology can aptly be described as a process – due to its focus on the dynamic and evolving nature of the interactions between media technologies, human experience and social organisation. Rooted in the understanding that media technologies and their effects are not static entities, media ecology examines the continuous transformations and adaptations occurring in response to shifting cultural contexts, technological innovations and societal needs (Horst, Herr-Stephenson & Robinson 2010:31).

This processual perspective emphasises the interplay between media, culture and society, considering the ongoing changes in communication, perception, and social dynamics as a result of media technologies. By viewing media ecology as a process, scholars can obtain a better grasp on the multifaceted relationships between media and human experience, and analyse the intricate connections and feedback loops between media technologies, individual cognition and broader societal structures more effectively. This approach offers a more nuanced and comprehensive understanding of the transformative power of media in shaping our world, illuminating the constant interplay of forces that continually redefine human experience and social organisation.

Marshall McLuhan's assertion that "old technology becomes the content of new technology" emphasises the notion that, as new media technologies emerge, they tend to incorporate, build upon, or repurpose the content and functionalities of preceding technologies. This concept highlights the evolutionary nature of media and the interconnectedness of various technologies throughout history (Strate 2024).

For instance, the invention of the printing press built upon the handwritten manuscripts and made mass production of written content possible. Similarly, the advent of television incorporated elements of radio broadcasting, while introducing visual components. In the digital age, the Internet has integrated and transformed various forms of content – such as text, images and videos – from print, radio and television – into new formats and platforms. This demonstrates how new media technologies assimilate older forms of media, carrying forward their content and functions, while simultaneously altering and redefining them.

This dynamic relationship between old and new technologies reflects the continuous evolution of media, shaping human communication and social interactions across different historical contexts. The Metaverse encompasses elements of the Internet, social media, online gaming, virtual reality, augmented reality and more. The content and functionalities of these older technologies are repurposed and merged within the Metaverse, thereby creating new immersive experiences and interactive opportunities.

For example, text, images and videos from websites and social media platforms are incorporated into the Metaverse, enabling users to access and share information in novel ways. Online gaming mechanics and VR/AR technologies are combined to create immersive environments and interactive experiences that would not have been possible in their individual forms. The Metaverse also leverages advancements in artificial intelligence and blockchain technology, allowing for the creation of virtual economies, decentralised ownership and unique digital assets.

In this context, the Metaverse exemplifies McLuhan's idea that old technology becomes the content of new technology (Strate 2024), as it assimilates and transforms various forms of media and communication technologies into a unified, interactive and immersive virtual world.

This dynamic relationship between old and new technologies in the Metaverse will shape the future of human communication, social interaction and the media ecological environment.

2.3.9 Peripherical issues linked to a media ecological view

2.3.9.1 Zhu's generational media differentiation

Zhu (2022) employs Marshall McLuhan's media ecology theory to assess the mediating role of mobile phone use and the moderating role of the need for cognition in the relationship between media generations and media multitasking. This theory suggests that we interact with media differently, based on aspects such as the generation in which we were born and our need to engage in cognitive activity.

McLuhan (1969) discusses media generations as referring to different groups of people who have grown up with different types of media technologies. Baby Boomers, for example, grew up with television as their primary form of electronic media, while Millennials grew up with smartphones and social media. "Media multitasking" refers to the practice of using multiple forms of media simultaneously, such as watching television, while browsing social media on a smartphone. This behaviour has become increasingly common in recent years; particularly among younger generations.

The need for cognition involves an individual's motivation to engage in effortful cognitive activities, such as critical thinking or information analysis (McLuhan 1969). Some people have a higher need for cognition than others, which may influence their use and response to different media types. Applying McLuhan's media ecology theory results to a deeper understanding among researchers of how these factors interact to shape our use and experience of mobile media.

They may find, for example, that younger generations are more likely to engage in media multitasking, because they have grown up with more immersive and interactive forms of electronic media. They may also find that individuals with a higher need for cognition are less likely to engage in this behaviour, because they prefer to focus their attention on one task at a time.

2.3.9.2 Association with technological determinism

Seeing the biases of media technologies as the primary force for social and cultural change resembles the hard technological determinism of the embodied theory of technological bias (Zimmer 2025). As remarked by McLuhan & Fiore (1970:25), "there is absolutely no inevitability as long as there is a willingness to contemplate what is happening".

Media ecology is underpinned by several key theories that contribute to its explanatory power as a field of study. For the purposes of this study, we will briefly focus on technological determinism – specifically McLuhan's perspectives – and the tetrad of media effects, as developed by McLuhan and McLuhan (1988). Although critics often acuse McLuhan's work of being too determinaistic, he merely cautioned aganst the possible (known or unknown) effects of thechnology on the current media ecological state.

Technological determinism is a theoretical perspective that sets technology as the primary driver of societal change and development, emphasising the transformative power of technology in shaping human experience, social structures and cultural values. Technological determinism has been developed and debated by media ecology scholars, such as Marshall McLuhan, Harold Innis and Walter Ong.

In an article on his father's work, his son, Eric McLuhan (2008), explains how McLuhan did not have theories of communication. He described his method as starting with a problem, followed by finding some tool to open up the matter for clarification. To quote McLuhan (2008:25) "Begin with theory, you begin with the answer; begin with observation, you begin with questions".

Logan (2016b:24) directly poses the question, "Was McLuhan a technological determinist"? From one perspective, it may be said that he was a determinist,, but it is possible to distinguish between a single cause or multiple causes in explaining societal transformation. McLuhan was not a "single cause explainer" of anything: he navigated against the notion of the "point of view", describing his work as "observation minus ideas" (Logan 2016b:25).

At the core of technological determinism lies the belief that technological innovations and advancements have a deterministic impact on social, economic and political systems, often overriding the influence of other factors, such as individual agency or cultural context. However, critics of technological determinism contend that it oversimplifies the complex relationship between technology and society, neglecting the role of human agency, cultural factors and social institutions in shaping technological development and adoption (Tessema 2021). They argue for a more nuanced understanding of the interaction between technology and society, highlighting the importance of considering the broader social, political and economic context within which technological innovations emerge and evolve (Cherp, Vinichenko & Jewel 2018).

Technological determinisim remains subject to ongoing debates and critiques regarding its deterministic assumptions and its ability to account for the complex interplay between technology, human agency and cultural context (De-Lima-Santos & Mesquita 2021).

Marshall McLuhan's work provides a unique take on technological determinism, offering several key insights that have shaped the field of media studies. – McLuhan never actually used the term “determinism”; nor did he argue against human agency (Strate 2008:133). His view on technological determinism is that, at the core of the relationship between media technologies and human experience is the idea that these technologies are active agents that influence the way we perceive, process and communicate information (Du Toit & Swer 2021).

2.3.10 Observing changes in the media environment in retrospect

“We look at the present through a rear-view mirror. We march backwards into the future” (McLuhan & Fiore 1970:75). What is meant by this statement, is that we see the present in terms of the familiar past. For example, we see and evaluate the mobile phone as a portable phone – the new mobile phone environment becomes our new environment. When it is replaced, we see the new technology as a new type of mobile phone.

What would normally be seen as the present is, in fact, the past and, in this way, the key to understanding the future would be to focus on the present (Benedetti & De Hart 1997:33). Individuals are often unaware of the changes occurring in their media environment and only realise their effects in retrospect (Du Plessis & Du Plessis 2018). This lack of awareness can be attributed to several factors, including the gradual and subtle nature of media-induced transformations, as well as the difficulty in recognising the full implications of new media technologies during their initial stages of adoption (McLuhan 1964). As media technologies become increasingly integrated into everyday life, their impact on human perception, cognition and communication is often taken for granted or overlooked.

This phenomenon, known as the "fish in water" effect, suggests that individuals tend to be oblivious to the media environment that surrounds them, much like a fish being unaware of the water in which it swims (McLuhan 1964). Consequently, the true influence of media technologies on human experience and social organisation remains largely hidden from conscious awareness.

Changes in the media-ecological environment, which encompasses the intricate relationships between media technologies, human experience and social organisation, are inherently dynamic and multifaceted. The full extent and implications of these transformations often only become apparent in retrospect. Retrospective analysis allows scholars to overcome the limitations of contemporary perspectives, which can be constrained by the immediacy of the present and the lack of a broader historical context (Strate 2004).

By looking back in time, researchers can more accurately assess the impact of media technologies and their influence on human experience and social structures. Furthermore, this type of analysis enables the identification of unforeseen consequences and side effects of media technologies that may not have been apparent during their early stages of development and adoption (McLuhan 1964).

This approach also permits researchers to examine the evolution of media technologies and their effects on society over time, including the identification of paradigm shifts resulting from the introduction of new media.

2.4 The Metaverse as phenomenon

In the realm of human imagination, few ideas have been so persistent or fertile as that of virtual reality. Several writers, like Stanislaw Lem and William Gibson, have explored these ideas in the context of philosophical science fiction, while films like *The Matrix* and episodes of popular television series like *Black Mirror* have explored them visually. In fact, it can be argued that television and films themselves are forms of “virtual worlds” that we explore. Virtual reality poses fundamental questions about identity, location and personality, which thoughtful writers have found to be fertile ground.

As the world becomes exposed to the nature of virtual and augmented reality, as well as the virtual landscape of the Metaverse, the distinction between the visible (or physical reality) and the unseen (or virtual reality) will become increasingly blurred. In this way, these technologies will challenge our ideas of human connection, reality, human consciousness and the human self.

As discussed in Section 2.3, according to McLuhan and McLuhan (1988), any innovation in media has four effects or laws: enhancement, obsolescence, retrieval, and reversal. This probe-based approach will be applied to develop an understanding of the Metaverse and its possible effects throughout the following discussions.

2.4.1 What is the metaverse? Technologies and accessibility

O'brien & Chan (2021) explain that the Metaverse can be seen as a hypothetical place, a virtual one, in which users can communicate and share in experiences, while moving effortlessly from one location to another across this digital space. In this context, “the Metaverse” refers to a combination of various forms of technology, including virtual reality, augmented reality and the Internet, in the creation of a large, interactive and immersive digital landscape that users can explore by using avatars or digital personas, or indeed, accurate representations of themselves (Fridman 2023).

The Metaverse can be described as an immersive, shared virtual space in which various activities can be performed, with the help of augmented reality and virtual reality services. It is described as a fusion of biological, physical and digital worlds that individuals can experience in a way that is no different from reality, engaging all five human senses. Additionally, it is referred to as a conceptual next iteration of the Internet that supports real-time applications and experiences across devices (Zalan & Barbesino 2023).

Before embarking on discussions on defining and exploring the Metaverse, it is important to introduce relevant technologies and concepts related to the technical aspects supporting the Metaverse.

2.4.1.1 Virtual reality (VR)

Virtual reality is an immersive technology used to create experiences and environments within a virtual setting. Although these environments and experiences are computer-generated, they are designed to feel real.

By wearing special virtual reality (VR) gear, such as a virtual reality headset, users of virtual reality are transported into a digital world that can be visually or even physically interactive, in which they can explore and communicate – not only with the environment itself, but with others within that virtual environment. Usually, users navigate this environment through what is known as an “avatar”, or play as a designated main character, as in the case of VR video games (Mandal 2013).

The idea behind virtual reality is to replicate or mimic the real world, or to create new worlds, in a way that surpasses the boundaries of daily life, while making its users feel physically present within that space, regardless of where they find themselves in the real world. This sense of presence is normally achieved by utilising a variety of high-graphic visuals, realistic sounds and what is known as “haptic feedback”, which aims at replicating the sensory input of the physical body (Mandal 2013).

The boundaries of the real world are surpassed as virtual reality “brings to life” what would have been impossible to create in a real-life setting.

2.4.1.2 Augmented reality (AR)

Where virtual reality aims at creating a fully immersive digital experience, augmented reality combines virtual objects with real life, in real-time. Users of augmented reality experience a view of the real world recorded by a camera, which is overlaid by computer-generated content. This content may be visual, video or text-based, and will appear as though it is a part of the real-life environment. Augmented reality essentially aims at merging the physical and virtual reality seamlessly, thereby creating a hybrid reality that is viewed through a piece of technology, such as a smartphone, tablet or AR glasses.

Similar to virtual reality, augmented reality aims at surpassing the boundaries of what would normally have been able to be integrated in a real life setting. Users of augmented reality can, for example, try virtual models of furniture in their homes before purchasing them in real life; try on virtual clothes to see how they would look on them before buying them; and even to see navigation directions overlaid on the street while commuting.

Augmented reality can, therefore, add great value to our current perceptions, not only by enhancing them, but by providing daily life with additional context and more information. When developed ideally, augmented reality acts as a powerful bridge between the virtual and physical worlds (Carmigniani & Furht 2011).

2.4.1.3 Mixed reality (MR)

Mixed reality is a technology that combines elements of both the virtual reality and the augmented reality, so as to create a new type of immersive experience.

In mixed reality, virtual and physical environments overlap with one another and exist and interact with one another in real-time, thereby offering users a sense of presence within both their physical realities and virtual realities.

Unlike the augmented reality, in which digital objects are merged with the real world, and the virtual reality, in which users are fully immersed in a replica of a real-life environment, mixed reality enables virtual objects to interact with the physical world, and vice versa. Users of mixed reality can interact with digital elements, as if they were actually there in a physical sense, and those objects can respond to real-world input. Users can, for example, interact with these virtual objects by using controllers and certain gestures (Speicher, Hall & Nebeling 2019).

2.4.1.4 Extended reality (XR)

“Extended reality” is an umbrella term that refers to the application of a variety of technologies that merge physical and virtual environments. It refers to the combination of virtual reality, augmented reality and mixed reality, along with any other technologies that aim at merging virtual life and real life. Essentially, extended reality aims to surpass the boundaries of virtual and augmented reality by making use of both (Rauschnabel, Felix, Hinsch, Shahab & Alt 2022).

2.4.1.5 Wearables

In order to have full experiences of virtual or augmented realities, users require certain hardware and wearables are necessary. The complexity of these will differ, depending on the mode of virtual or augmented reality being experienced.

I. Head-mounted displays (HMDs)

HMDs are currently the most fundamental wearables involved in accessing virtual and augmented realities. HMDs are headsets that are worn on the head and cover the eyes of their users, presenting virtual content literally before their eyes. The headsets normally consist of high definition visuals, lenses and sensors to track users as their heads move. They can be wired or wireless, and range from those made for novice use to those designed for expert usage, which accompany more complex and advanced technological properties (Melzer 2014).

The Tech company, Apple, recently launched its HMD, called the Vision Pro, under the slogan *Welcome to spatial computing … innovation you can see, hear, and feel*. The headset features an array of high-end capabilities, including eye, face and hand motion monitoring, panoramic visuals and advanced spatial audio. While never stating the words "augmented reality" explicitly, the HMD is marketed as "seamlessly blending digital content with your physical space" (Browning 2023).

II. Controllers and other input devices

In order to interact with augmented or virtual reality environments, users may make use of handheld controllers. These controllers feature numerous input options, such as buttons, triggers or joysticks, which allow users to interact and adjust objects, explore environments and engage in other activities within virtual or augmented reality spaces. If these controllers are designed with motion sensors, users' hand movements can be tracked to allow for more complex non-verbal interactions (Liang, Shi & Lu 2016).

The company Manus, markets its virtual reality gloves as the solution to "possibilities of direct interaction" by removing the barriers created by handheld controllers. Manus gloves feature high-end finger tracking sensors, which provide accurate responses for even minute finger movement inputs when in a virtual reality setting (Manus 2023).

III. Mobile devices

Numerous augmented reality environments are accessed by way of users' smartphones or tablets. Since these devices already possess cameras and sensors, it is easy for virtual content to be overlayed with the real world through them. Various AR applications are available for download by users, which can make the experience of AR more accessible than those requiring the use of an AR headset. For example, the augmented reality translator app, Google Translate, allows users to scan words through their mobile phone cameras to translate in real time.

IV. Haptic feedback systems

Haptic feedback aims at giving users of virtual and augmented reality the experience of touch within a virtual setting. These devices, whether gloves, suits, or controllers designed with pressure sensors, aim to replicate experiences of sensations like vibration, texture or even weight (Burdea 1999).

The company bHaptics has released a virtual reality haptic feedback vest, called the bHaptics TactSuit, which features haptic feedback on various trigger points across the users abdomen, sending haptic vibrations across the vest for an immersive VR gaming experience (bHaptic 2023).

2.4.1.6 Accessibility

Hill (2022) remarks that "early adoption of technology is often determined by who can afford it". This remark would imply that how easily the Metaverse becomes widespread in terms of its usage will largely depend on affordable access. Although VR headsets are a popular way of accessing the immersive environment that is the Metaverse, they are not the only way. There are already tools available that act as intermediaries between traditional technologies and the Metaverse, allowing their users to experience the immersive metascape through desktops with average computational power, laptops, tablets and smartphones.

In other words, to access the Metaverse in 2D, all that is needed is a computer or a smartphone with Internet access. However, the requirements to access the 3D Metaverse fully are more complex.

For a user to experience the metaverse in 3D, various equipment is necessary, including a computer with the computational power to connect to the Metaverse, virtual reality headsets and augmented reality devices, and a fast Internet connection, making entry into the Metaverse a potentially expensive ordeal. Although these purchases may be seen as a once-off investment, individuals are often not able to afford this, even as an initial investment. Additionally, certain software and applications in the Metaverse may require a subscription to access, as well as offer in-app purchases. The fact that some individuals may not be able to afford to join the Metaverse has the potential of expanding the digital divide, where being a user of the Metaverse becomes an act of privilege. In this way, the Metaverse makes big promises of human connection, although it may also exacerbate existing economic inequalities.

Numerous users of the current Metaverse cite the graphics as unrealistic, obviously fake and cartoony. This is, according to Matthew Ball (2022), in part due to the cost that would be incurred for users, should higher graphic capabilities be employed. “A less cartoony Metaverse is possible” says Ball (2022), but considering current development, it would require users to wear a headset “the size of an Xbox” (a popular game console), or one that is far more costly. The VR headset titled the Varjo Aero boasts better graphics, but costs a massive $1,990. Currently, the headset of Meta remains relatively inexpensive, at a price of $400, but at the cost of dimmer graphics capabilities (Hill 2022).

Jensen (2022) is of the opinion that, as XR technologies develop, XR devices will become more affordable. According to Jensen (2022), the cost of VR headsets could well drop to under $100, perhaps via the integration with mobile phone technology. VR headsets will not only become far more integrated in use in daily life, but will also be accessible to various groups of people. Whether this is an accurate forecast of the baseline cost of entry into the Metaverse remains to be seen.

Just like any natural physical environment is upheld or maintained by the resources and materials it is made of, the Metaverse is shaped and maintained by the media that create it (Hall & Baier-Lentz 2022). The following question arises: what are the implications for the development of these media? At the moment, the Metaverse looks to be, at least for the most part, owned by large tech companies. However, if the Metaverse becomes more popular for use by the majority, it may become unfeasible for it to remain under the ownership and maintenance of only a few large enterprises. This opens up the question of what the implications will be in terms of decentralisation and ideas of monopoly ownership, which companies will own and maintain the Metaverse.

According to a study conducted by Zallio and Clarkson (2022), accessibility is key to democratising and providing access to new experiences and social interactions for people, who may have limited opportunities. The diversity of people and businesses that can create and access the Metaverse will give rise to new solutions, scenarios and experiences. However, there is a high risk that the availability of resources will be concentrated on a small number of individuals only, and this may reinforce socioeconomical and educational barriers. Businesses can ensure that the Metaverse is inclusive and accessible to all users by prioritising accessibility and diversity in the design process and by providing equal access to resources and opportunities for all users.

2.4.2 Nature of the Metaverse

The term “metaverse” was originally created by Neal Stephenson in his 1992 science fiction novel, *Snow crash*. In the novel, humans are able to access and live within the Metaverse – a virtual world existing parallel to the physical world, through virtual reality avatars (Lee, Braud, Zhou, Wang, Xu, Lin & Hui 2021:1).

According to Matthew Ball (2022), author of a book entitled *The Metaverse: and how it will revolutionize everything*, the most referenced description of the Metaverse is as an “expansive network of persistent, real-time rendered 3D worlds and simulations that […] can be experienced synchronously by an effectively unlimited number of users, each with an individual sense of presence” (Robertson & Peters 2022).

Lee, et al (2021:3) define the *Metaverse* as the “vision of an immersive internet as a gigantic, unified, persistent and shared realm”, stating that, although this may sound like a projection far into the future, current emerging media, such as extended reality, 5G and artificial intelligence, point to the idea that the wait for such “vision” is not as long as we may think.

Shaan Puri (2021) defines the *Metaverse* more abstractly, viewing it as more of a “moment”. As a moment, the Metaverse is described by the instance in which the digital lives of humans – including our online interactions, personas, experiences and resources – become more important to us than our physical experience. Like the idea of the singularity, a moment in which artificial intelligence surpasses humanity’s intelligence, Shaan Puri (2021) asserts that the Metaverse is a psychological transition, rather than a physical one, that has “been happening for over twenty years”.

In the Metaverse, individuals can connect, as if in the same room, play games with one another, visit locations, and share experiences. According to Mark Zuckerberg, Chief Executive Officer (CEO) of Meta (Facebook, prior to its

rebranding), says that, at Meta, they believe that the Metaverse will be the "successor to the mobile Internet" and that users will be able to experience a sense of presence within it, "like we're right there with people, no matter how far apart we actually are". Nick Clegg, the Vice-President of Global Affairs States at Facebook, opines that the Metaverse will be like a selection of "interlinked worlds" in which participants can move from, say, Facebook world, to Google world, to Apple world, etc. (Milmo 2021).

For this discussion, the term "metaverse" will be used in this context. It does, however, remain relevant to refer to the definition by Shaan Puri (2021) where appropriate, particularly due to the theoretical nature of the discussions that follow.

To a certain extent, the Metaverse remains to be fully realised and fully functional, with many citing that current developments merely constitute a "pre-metaverse" (Anderson & Rainie 2022). Nevertheless, it remains important to begin making informed guesses about what the Metaverse will look like and, more importantly, what influence it will have on humanity when it is fully developed or, at least, more so than at the time of writing. A recent interview with the founder and CEO of Meta is highly relevant to this development (Fridman 2023:15).

2.4.3 Characteristics and effects of the Metaverse

2.4.3.1 The blurring of the virtual and the physical

In McLuhan's posthumous book co-authored by Bruce Powers, the following statement is made:

> "Communication media of the future will accentuate the extensions of our nervous system, which can be made disembodied and totally collective … As man succeeds in translating his central nervous system into electronic circuitry, he stands on the threshold of outering his consciousness into the computer" (McLuhan & Powers 1989).

In the Metaverse, it is possible for individuals to participate and connect within a digital environment with their own avatar or persona. This environment, as well as the avatar through which players navigate it, act as extensions of the user's being and consciousness. Because both the subject (the avatar) and the object (the digital environment) are now contained within the digital space, the lines between ones self and ones digital self and environment begin to blur (Saker & Frith 2022).

As virtual environments rise in popularity, objects in our physical reality are becoming more compatible with virtual spaces. Our mobile phones, which are physical objects, function as portals to thousands of digital spaces. In this way, even physical objects are becoming more formless and, in a way, losing their "definition", which differentiates them from digital objects. This has already started happening with the advent of augmented reality (AR) technology, in which users can experience a combination of digital and physical reality as a seamlessly interconnected visual and interactive landscape (Klemens 2022).

In *Understanding media*, McLuhan (1964) mentions that an immediate simulation of consciousness would by-pass speech in a kind of massive extrasensory perception, just as global thermostats could by-pass those extensions of the skin and body we call houses. In *The Gutenberg galaxy*, McLuhan mentions something said by William Blake, in the words "when sense ratios change, men change … sense ratios change when any one sense of bodily or mental function is externalised in technological form" (McLuhan 1962a:265).

In the sensory space, the Metaverse will have its users functioning in a dual-sensory environment. Users will experience sensory input from physical reality such as hunger, tiredness, etc., as well as sensory input from whatever they are doing in the Metaverse. What is interesting to consider, is how these two sensory environments will coexist.

Although the Metaverse currently mainly relies on auditory and visual senses, over time, technology may develop to the point of stimulating other senses, such as taste and smell (Azcarate 2022).

Should this be the case, a user in the Metaverse would be able to, for example, have the experience of hunger in physical reality, while simultaneously having the experience of eating a virtual meal in the Metaverse. Although this exact situation is probably slightly further away in terms of technological advancement, it does illustrate the question of how users of these forms of media will be able to process sensory input from two places simultaneously. This could be compared to what happens in the dream-state. This dual-sensory experience may potentially lead to sensory overstimulation, or perhaps humans will become accustomed to filtering through two vessels of sensory input, without confusing them or becoming overwhelmed, thereby enhancing our cognitive capacities.

With the introduction of the Metaverse, the objects we use to access it will become just as digital as they are physical. Consider, for example, the use of a mobile phone without access to the Internet. Very few individuals would consider this a useful phone. A mobile phone has now, in a sense, become its function. In the same way, virtual reality devices and other hardware we use to access the Metaverse will presumably become “synonymous”, so to speak, with the Metaverse itself, thereby blurring the line between physical objects and digital environments.

What can be drawn from these blurring lines becomes far more philosophical than a matter of mere distinction between physical and virtual objects. In the same way that we, right now, believe that a full, holistic experience of communication requires the use of the physical body, individuals hundreds of years ago would have sworn that communication requires adherence to the boundaries of space and time.

Although current technologies only give us immersive experiences in terms of vision and sound, it looks as though technology will develop to provide us with experiences which that appeal to the other senses, such as touch and smell (Azcarate 2022). In other words, what may be on the horizon, is a fully immersive, interactive communication experience that allows its users to "… walk hand-in-hand across a meadow and smell the flowers as you go" (Marr 2022 [no pagination].

2.4.3.2 The digital body

The physical body will still be involved in the Metaverse to a large extent, as we possess no other means of sensory input. However, the Metaverse as it stands right now already removes the aspect of physical appearance from communication – an aspect that we once considered, and still do consider, to be a significant part of our identity.

Some view this as a hindrance to the novelty of the Metaverse, stating that no matter how "far-out" virtual reality experiences may become, they will still make use of the basic human sensory functions such as hearing, seeing, tasting, smelling, moving, balance and speech. However, what if the technological development of the Metaverse implies the technological development of another means of sensory input, one that can exist independently of the physical body?

Andrey Mir (2021 [no pagination]), a Canadian McLuhan scholar, writes: "McLuhan foresaw that electronic media gave humans the quality of a disembodied, angel-like spirit, which happens to us right now when we literally resettle to social media or video games and operate our digital selves". Hodgkinson (2021) is of the opinion that McLuhan had been nudging us in the right direction, with his notion of electronic media leading to the experience of a disincarnate state or one "without a body".

2.4.3.3 The avatar

As soon as one chooses a WhatsApp profile picture, one has created a disembodied representative of oneself. When playing a video game, the actions of the character and the character itself act as a disembodied representation of their player. This means that, when we use social media or play video games, we use or play as a spirit of ourselves. In a video game, we play as the character we select. On social media, we interact through an online persona that we project outward into the world. In the Metaverse, we operate as a disembodied spirit or representation of some core essence of ourselves, and we refer to that as our *avatar*.

Currently, there are already cultural and community identities being formed online. Because these exist in a digital environment, individuals are not confined by their physical limits or features and can, essentially, be anything they want to be, anywhere they want to be it. One can only assume that the Metaverse will take this a step further, since users are able to act under any persona of their choice, irrespective of what they are like in real life, and in any place in the Metaverse they prefer, regardless of the location anywhere in the world from which they are logging in (Saker & Frith 2022).

The Metaverse will make use of avatars, which users can design and customise to use as digital representations of themselves. Unlike one's physical form, the appearance of these avatars will not be limited by any physical attributes. This means that participants can choose their appearance, regardless of their actual age, gender, race or any other attribute, and base their persona solely on whatever factors they consider important. Contrary to the physical body and the indexical images of photographs, film and video, the digital avatar offers strong new capabilities for controlling and managing our visible appearance and public personas (Cleland 2008:124). The visual identity of the digital avatar need not reflect real world identities or the of the actual body physical specificities.

Users will, for example, be able to change their gender identity, racial identity or even their identity as a human being. In a world where identity is fundamentally tied to physical appearance and where judgements about one's identity are made based on your appearance, the use of avatars could lead to great changes in the way in which we think about identity, since identity will now be separated from physical form (Saker & Frith 2022). An episode of the Netflix series, *Black Mirror,* explores this exact situation, where a heterosexual male falls in love with his male friend's blonde avatar, with ensuing emotional chaos.

Although digital avatars provide a new way for people to control their online identities, the idea of representing oneself with a virtual image-body is not as groundbreaking as it may seem (Cleland 2008). This concept has existed in various forms throughout history, from paintings and photographs to age-old beliefs in ghosts and doubles. Cleland (2008) is of the view that digital avatars build upon previous forms of identity and subjectivity, while enabling new modes of self-reflection and self-presentation. The images we see in avatars play a crucial role in shaping our sense of self, with a complex interplay between the physical self and its various avatars. Images, such as mirror reflections and photographs, create a representation of the physical self that can be both self and other. These images, which represent self, blur the lines between "self and other, living and non-living, human and non-human, real and virtual" (Cleland 2008).

In the Metaverse, some users may create avatars that strongly resemble the image of their physical form in real life, while others may stray far from their physical appearance in the creation of their avatar. However, neither of these avatars should be considered more or less representative of its user than the other. Similar to the virtual reality, we can change our hair colour and even eye colour in real life. We can alter our body compositions.

We can alter our physical appearances to such an extent that we are unrecognisable from our former selves. Therefore, our outward appearances – whether real or virtual – are, to a certain extent, avatars. They are self-representative in nature.

According to Hodgkinson (2021), when complemented with an increase in computational power, the future of media and technologies and the virtual and augmented realities that accompany it could significantly “amplify this angelic tendency’ and create a new kind of ‘augmented humanity”. “Electronic media cancelled the physical time and space limitation for humans to be present at events. Digital media advanced this new quality of human beings even more, they make time elastic, which is impossible in physical reality. In video games, a player can slow down, stop, reverse, repeat time. Resurrection becomes everyday routine for video game players, who save and restart their digital selves, and for social media users, who can delete and restore their profiles”, says Mir (2021 [no pagination]).

As we wear the virtual reality headset, we experience a multi-sensory event. In the comfort of our living rooms, our bodies do not attend this event. Yet, we consider our *selves* participatory. Han, Bergs and Moorhouse (2022) explain how the virtual experience can be compared to a dreamlike state. Similar to a dream at night, while our bodies are asleep in bed, we perceive a multitude of dreamscapes, filled with people and objects similar to those in our physical reality, with which we can interact, in which we can progress, sense and experience.

Asleep in bed, our bodies do not attend this event, but we consider ourselves participatory. In the night-time dream, we sometimes have a different physical appearance to our appearance in our physical reality and yet, we know it to be our self who is experiencing the dream.
In the Metaverse, where we exist as avatar representations of ourselves while our physical bodies remain in our living rooms at home, we know it is our

selves who are experiencing the Metaverse. This very notion raises intriguing questions about our humanity and the boundaries of what we consider to be the human self. These discussions on the Metaverse and the nature of identity lend towards the theory that our sense of self is not limited to our physical bodies, but is rather a product of our thoughts, emotions and experiences. In this view, the self is a dynamic and ever-changing entity that can exist in different contexts and environments, and can be represented by different forms, such as an avatar in a virtual world.

Traditionally, the belief is that our sense of self is inherently tied to our physical bodies. Is what we call *self* solely tied to our physical bodies, or is it something more abstract and fluid, that can be represented in dreams, or by avatars in the metaverse? Perhaps the self to which we refer, is more malleable than once thought. In the Metaverse, it is possible to create and portray a self and an identity that can exist in a virtual environment, interact with that environment and others within it, and even possess a sense of presence within that environment.

Once a metaphysical idea, it is now not even slightly mystical to suggest that the self can exist in the absence of the physical body. To quote Mir (2021 [no pagination]): “Now we are about to totally live inside our latest medium. Almost all our activities are already there. Humankind is resettling from biological bodies into the digital body”.

If we can communicate without the use of the body, media will not only be extensions of ourselves, but will replace certain faculties that we once thought *were* ourselves. Should this be the case, we ought to wonder what the human “self” truly is. When we communicate wholly, in person, we assume we do so with all of our self. However, in the Metaverse, not only do we have the capacity to change how we appear to others, but we can also change the way in which we behave or act, depending on the role we want to play.

If a hearing aid can replace the ear and its function and a dialysis machine can replace the kidneys and their function, if our appearances can be changed at will and our personalities restructured depending on the roles we play in life (the list goes on), what, then, truly, is the self that these media extend? It cannot be the role one chooses to play in the Metaverse and nor can it be the one that one chooses to play in physical life, as these are transient. It cannot be the organs of the body or even the sensory capacities, as these are replaced as technology advances enough to do so.

This begs the following question: what is the absolute essence of humanness, that which media cannot extend, replace or enhance? What is the *self*? These are some of the predominant questions posed by the introduction of the Metaverse into the current media ecology.

2.4.3.4 Converging of the self and the environment

Derek Beres (2018 [no pagination]) writes: “Recently a close friend bought a new gaming system. At one point, when we were walking around outside, he started laughing. For a moment he thought he noticed a mushroom that would give him a few points. He even took a step in its direction to pick it. The simulated world became part of his direct experience even though his immediate environment did not offer what he believed to be part of it. The more immersive our technologies become, the harder it will be to pull ourselves out of them”.

The Metaverse avatar is set to replicate, extend and intensify the patterns already seen in conventional digital and image avatars. Users of virtual reality avatars will now experience the possibility of deepening their experience as a proxy of themselves, with added dimensions to areas of characterisation and customisation not previously experienced in the use of conventional image avatars, such as those on Instagram and WhatsApp, making identities more fluid and customisable. When we have a conversation with someone over text, the only image of them that we see is their profile picture (if they have one) and perhaps their name, and yet, we know who we are talking to.

Recent developments in artificial intelligence have made it clear that AI-generated images are becoming indistinguishable from photographs taken of physical reality. If the technology of the Metaverse, in combination with artificial intelligence and virtual and augmented reality, advance in a similar way, one can expect that the Metaverse itself will become indistinguishable from physical reality.

2.4.3.5 A new way of interacting with technology

One of the most significant, possible effects of the Metaverse on existing media is that it may have a great impact on the way humans interact with technology. As the Metaverse begins to gain traction as a form of communication in daily life, it may well become a highly popular way for people to connect – not only for social reasons, but also for the exchange of virtual products and services (Purdy 2022). This could easily lead to a movement away from traditional communication media, such as the touchscreen, keyboard and mouse, towards the more interactive body-language and voice-based Metaverse.

If we consider, for a moment, the use of a mouse: In a way, the mouse acts as an intermediary between the two participants in an interaction, such as you (the one using the mouse) and the Internet (what is being interacted with). The mouse presents a type of “barrier” or “intermediary” to the experience of interaction with the Internet. Ideally, what we would like, is to be able to access information without having to use an intermediary device such as a mouse.

With the use of VR and AR devices in the Metaverse, a more “immediate” and tactile experience of the Internet may be possible. Although typing, texting and phone or video calls feel natural to most of us, the tactile experience of the Metaverse may present a far more natural way of interacting with the Internet and with one another.

2.4.3.6 Creation of new media and modes of communication

Another significant effect that the Metaverse may have, is the possible creation of brand new forms of media. Because the Metaverse allows participants to experience a mix of different types of media, such as picture, audio, video, text and virtual or augmented reality, it paves the way for new types of media to form within the Metaverse – those that cannot exist in the physical world (Hall & Baier-Lentz 2022).

Similarly, media can affect our communication patterns. For example, the way we communicate with one another in person is heavily influenced by the advent of the mobile phone and the culture of texting and social media. We may not recognise it at first, but instant messaging has not only led to changes in how often we communicate face-to-face, but also to changes in the types of words we use in communication (Hemmer 2009). Because of these media, we tend to adopt a more casual communication style, compared to what would have occurred, had we continued posting written letters to one another (Carey 1989).

If the Metaverse does happens to have its own kind of communication “style” and it most likely will, we can expect that communication style to affect the way we interact with one another in physical reality. For example, we may become more expressive with the use of our hands, as body language and hand gestures will become a central part of communication in the Metaverse. Although this is only an example, it serves to illustrate the possible changes in our communication resulting from the Metaverse advancing.

2.4.3.7 Altered perception of space and time

As mentioned earlier, McLuhan asserted that media also affect our sense of space and time (McLuhan 1964). One of the best examples of this is the Internet.

Because of the Internet, global communication has become instant and effortless, leading to enormous changes in the way we think about time and distance – two factors that once made instant international communication appear impossible (Castells 1996).

Studies demonstrate that, when playing video games, our concept of time is altered. In a study asking players to estimate how long they had been playing a game, one group (who knew they will be asked for an estimate) overestimated the time they had been playing the game, while another group (who did not know they would be asked for an estimate) grossly underestimated the time they had been playing the game. Furthermore, the longer the players had been engaged in the game, the more inaccurate their time estimates were (Herrea 2019). Because the Metaverse aims to immerse gamers completely via the senses, it will, presumably have similar, if not more enhanced, effects.

The Metaverse is set to take place in a “gigantic” digital landscape, but what is special about this gigantic landscape is that it takes up no physical space at all. Because the Metaverse promises to be the next phase and an extension of the Internet, one can presume that it will allow users access to an uncountable number of locations. These locations, although appearing akin to the physical world in which we live, will be entirely digital, as in a modern open-world video game. The distance between users will be a mere matter of seamless teleportation from one location to another across the Metaverse (O'brien & Chan 2021:1–6).

As Avi Bar-Zeev, co-creator of Google Earth and HoloLens states: “VR fundamentally strips away the most common constraints of reality: location and travel, physics, even sometimes *time,* where hours can often seem like minutes, and we can travel to the historical past or imagined futures” (Bar-Zeev 2021).

If travel in the Metaverse can become immersive enough, this idea poses the question of what the implications will be for navigating around the real world, when most people become comfortable with the Metaverse. Will people tire of conventional travel, being so used to teleporting from one place to another as their Metaverse avatars?

2.4.3.8 Creation of communities

In the Metaverse, it will be possible for participants to be a part of online virtual communities, based on whatever they choose, in whatever location they choose. Although the idea of not being geographically limited from communicating is not so new to us, since the advent of the mobile phone, the Metaverse takes this to a new level, in that individuals can now actually *meet* in virtual locations, instead of simply connecting over voice, video or text (Clark 2021).

Peter Allen Clark (2021) writes for *TIME Magazine* about a woman whose son requested to have his 9th birthday party on Roblox. Roblox, which is a virtual platform that allows players to interact with one another through various games, has become a popular platform for children to use to connect with one another and to play games together.

Clark (2021) quotes the mother of the boy, saying “They hung out and played and they went to other different games together ... Just because it happens in a virtual space doesn’t make it less real. It’s very real to my son”. This scenario illustrates the ease with which platforms like this create online communities. At the moment, millions of people connect in social communities across a variety of platforms like Roblox (Clark 2021).

The Metaverse promises to, and has already begun, to allow users to form similar online communities. One can only presume that this paves the way for many more, allowing users to connect in new and more creative, immersive ways than before.

The Metaverse challenges traditional notions of physical space and time and offer unique opportunities for exploring identity, relationships and power dynamics. Additionally, questions arise regarding the reality of identities and relationships established in non-physical environments, and whether they are any less real for being virtual (Van der Merwe 2021).

2.4.3.9 Social media

We know that the Metaverse will be largely centred around social media, but what we have not yet investigated is how the Metaverse will change how we interact with and think about social media. The Metaverse may influence social media in such a way as to lead social media platforms to increase their focus on an immersive, interactive social media interaction that involves a multitude of our sensory capacities, instead of remaining focused on the interactions between people across 2D digital pages (Marr 2022).

Because the Metaverse allows individuals to connect in a more interactive, visceral way, it could even replace existing social media platforms that rely on text and image. Users may, for example, prefer the immersive social experience of the Metaverse and prefer communicating via their virtual avatars in a shared digital environment. These ideas can only make one wonder about the future of social media, as the Metaverse begins to influence not only individual social media platforms, but entire social media technologies.

2.4.3.10 Entertainment

The more obvious implications of the Metaverse for creative arts and entertainment are significant. Artists and audiences will be able to create and interact with artistic expressions, which engage each of the senses in an immersive and interactive way, thereby opening up new opportunities for creative sharing, while simultaneously lowering the barriers to entry into artistic creation. In this way, users will more than likely be able to compose music, design spaces and create art – all within the comfort of their homes.

With this, comes the assumption that the Metaverse may also influence traditional art forms, with the possibility of traditional creative media becoming virtual.

Because the Metaverse can foster the same feeling as if we were actually there *physically*, one ought to consider the implications of the Metaverse on real-life experiences. Will the experience of the Metaverse become immersive enough that conventional modes of entertainment (theme parks, movies, gaming and more) become redundant?

In the Metaverse, it is already possible (and very popular) to attend virtual comedy shows (Hill 2022). Whether this has led to a decrease in actual attendance of real-life comedy shows remains to be seen. However, one can only assume that it could, as individuals could adopt a preference for an interactive, virtual reality entertainment experience that the Metaverse provides. The entertainment industry currently presents a more passive form of entertainment. On introduction of the Metaverse, individuals may prefer the immersive nature of the Metaverse, forcing the entertainment industry to adjust its presentation modes to suit the new preferences.

Although more immersive entertainment experiences have been tested in the past, they did not seem to catch on with the majority. In 2015, the film, *Jurassic World* was screened in cinemas as a 4D film. A 4D film aims to combine the technology and novelty of amusement park rides and 3D glasses to create an immersive film experience. Cinemas may also include moving chairs and water or vapour jets alongside viewers, which are set off in relevant moments during the film, in an attempt to make the audience feel as if they were actually in the environment in which the film is taking place (Hsu 2015).

However, 4D films have not managed to gain much popularity and, although they still screen in a few Asian countries and the USA, they have by no means become the preferred way of watching a film by the majority of audiences. Some attribute this to the addition of 4D effects as “gimmicky”, rather than immersive (Hsu 2015).

This brings to mind the possible effect of the Metaverse on traditional entertainment: will it take the entertainment industry by storm and force films and other forms of entertainment to mould and reshape themselves to fit its form, or will it fail to gain the necessary traction it needs, leaving audiences in favour of the classic entertainment experience?

2.4.3.11 Changes to cognitive processes

When we access information, the medium through which this is done may affect the way we think (McLuhan 1964). For example, if a medium expects us to analyse its content via critical thinking, it may influence our thinking patterns and lead us to think more critically in daily life, e.g. if information consumption requires little reflective or critical thinking, our thinking patterns in daily life may become more idle, distracted, or scattered, because less is required from our minds to absorb the information. The latter is noticeable in the example of certain social media, in which some areas of content exist purely for entertainment, offering little to stimulate the mind.

According to Michel (2018), engaging in work in a digital or virtual environment leads to users becoming polychronic, which means that they can engage in multiple activities simultaneously. Michel (2018) opines that humans do not actually work on things at the exact same time but switch their points of focus rapidly across different tasks. Similarly, we can expect whatever mode the Metaverse requires us to engage in, to “flow over” into daily life and the way we think. If the Metaverse carries similar effects on our cognitive processes as social media, one can assume that we will adjust, as we adopt shorter attention spans, but higher ability to ingest large amounts of visual, auditory and text data simultaneously (Michel 2018).

Further to the topic of attention, the immersive and engaging qualities that the Metaverse promises to provide may lead to a change in the focus and attention of its users. As users spend increasingly more time in the virtual world, the real world may be given less attention, leading to effects on aspects of users' personal lives such as well-being, relationships and physical health.

2.4.3.12 Cultural diversity

Many fear the dangers of cultural homogenisation as a result of the Metaverse and similar technologies, stating that there is a possibility that it could lead to the total loss of cultural diversity and leave behind one large, standardised global cultural identity (Joshi 2022).

The introduction of the Metaverse presents an ideal scenario in which cultural homogenisation may occur. For example, each country or region in the world has what it considers on-trend or in fashion. This does not just pertain to clothing, but to several other aspects of societal culture. In the Metaverse, individuals will, presumably, be able to share one gigantic space, together. This space could combine users of many different cultures and nationalities, each with their own background. However, like any shared space, it demands a degree of conformity from its users.

It is for the same reason that all the teenagers in a certain country have (relatively) similar ideas of what is in fashion, on trend or hip at the time, even though this may differ from one nation to another. In this way, one can assume that the Metaverse will be yet another conduit for a certain dominant culture to rise to the podium of personal expression (Joshi 2022).

However, this is not exactly the cultural homogenisation that theorists are suggesting, as it is taking place in a digital landscape (Joshi 2022). This presents another possibility. – Individuals could adopt a dominant culture in the Metaverse and extend it towards the physical world, thereby leading to a process of cultural homogenisation in real life, *or* individuals can use the

Metaverse as a mode of expressing their individuality, thereby not leading to cultural homogenisation, as previously thought.

What may also occur, is for cultural homogenisation to occur in the Metaverse itself, while users preserve their cultural diversity in real life. Different spaces may obviously contain different subcultures, with a worse-case scenario of mutually antagonistic subcultures where people gather according to their respective prejudices – a sort of immersed chatroom for every prejudice and conspiracy. This would be a disastrous further step from the “only news you want to hear” phenomenon that is currently the case for social media.

2.4.3.13 Human connection

One of the major requirements for the experience of deep human connection in virtual reality environments is the aspect of presence (Butler 2022). Presence, says Butler (2022), is difficult to explain in words, yet unmistakably clear when experienced. Presence is that which allows us to, at both a conscious and subconscious level, know that we are in an environment and are interacting with that reality in some way.

According to Butler (2022), the most significant breakthrough by modern virtual reality is its capacity to foster this *presence.* “Achieving presence was a long and difficult process, but it’s the secret sauce that makes modern VR magical”, says Butler (2022). This “magic” of presence is what the Metaverse and other virtual reality creators are attempting to reach with the applications and platforms they create. – “For [virtual reality] to be compelling, your brain needs to accept the virtual world is real. At least to the extent that you’re actually there” (Butler 2022).

Although presence involves the feeling of actually being within a particular place and believing it to be real, that particular place does not actually need to *be* real. Even this physical reality, which we consider as real, is a reaction of the senses, as the eyes receive light and the brain receives information and from this, projects an image of “real world” onto experience.

Butler (2022) goes on to say that "… you do not have to 100% replicate the real world in order to trick the brain into feeling presence … With a few requirements met, you can feel a sense of presence with an affordable headset and relatively simple graphics".

In other words, the Metaverse, which is no more than a complex triggering of the human sensory functions, has the potential to foster such a presence within its users – provided that it can be believably real, just as our physical reality is. Often adopted as a description of virtual reality by its proponents are the words by McLuhan in his description of a computerised person*:* "[the computerised person] … is wearing his brain outside his skull and his nervous system on top of his skin". The uncanny similarity of what is referenced in this quotation to virtual reality devices is often noted (McLuhan & Powers 1989:94).

The journalist, Joanna Stern, who spent a day in the current Metaverse, notes the following about her experience. – Although the Metaverse environment appeared "obviously fake", the presence of herself and other people within the Metaverse felt "really real" (Stern 2021). This means that, although the technology of the Metaverse has not advanced enough to make it visually indistinguishable from physical reality, it does seem to be able to, to some extent, mimic real-life interactions in the sense of presence of participants.

Related to this sense of presence is the aspect of social serendipity. Compared to traditional online platforms, which connect individuals by way of an algorithm, what makes the Metaverse unique is that it also gives its users a chance to connect with others through spontaneous encounters and serendipitous connections. Akin to real-life, the Metaverse salvages the sense of social spontaneity and serendipity once lost to digital communication.

With the rise of the Metaverse, it may seem obvious that traditional modes of communication, such as face-to-face communication, may be diminished, just as the introduction of smart phones diminished the prevalence of previous forms of communication. Because the Metaverse promises to offer virtual reality experiences that mimic in-person interactions, as Metaverse technology advances, it can only be expected that the need for physical human presence or direct human contact be reduced.

However, it remains important to consider the possible implications of such a reduction in physical, face-to-face communication. Although the Metaverse promises to provide an immersive communication experience, there may be unique aspects of face-to-face interactions that even the best of the Metaverse cannot reproduce authentically. Things like body language, physical touch and simply the depth of shared physical presence that play such an integral part of human connection may not be able to be copied. In other words, should the Metaverse begin to replace in-person connection, it is possible for these dimensions of depth and nuance in communication to be lost.

Moreover, as virtual communication may become more common due to the Metaverse, it is important to consider the effects of this on social skills. One study conducted in China and Germany concluded that problematic Internet use is associated with low empathy (Melchers, Li, Chen, Zhang & Montag 2015). Similarly, Carrier, Spradlin, Bunce and Rosen (2015:1) found that, although time spent online does not significantly impact empathy, certain activities, such as video games, result in lower empathy levels in the real lives of their users. Although it is not clear whether the Metaverse will actually lead to a loss of subtle skills such as empathy, emotional intelligence and other social skills, it does remain important to consider this possibility.

Should the Metaverse truly diminish face-to-face interactions, its users' ability to actually communicate in the real world may be challenged. Although this may sound like an outdated viewpoint, it remains an important possibility for consideration. The opposite is obviously also possible: use of the Metaverse may allow individuals with otherwise antisocial social lives to begin socialising with others in the comfort of their homes, leading to the opposite effect, with users experiencing increased exposure to social interactions than ever before.

2.4.3.14 Virtual representation and accessibility

Users in the Metaverse will be able to make use of avatars to traverse the Metaverse and to interact with others. The implications of this for inclusion are significant, because users, who would normally be limited by aspects such as physical limitation or social barriers, will now be able to participate actively in virtual interactions, activities and explorations of the Metaverse, which would have been impossible for them in the real world.

Additionally, users with physical disabilities or any physical traits, which may limit them in the real world, may now create an avatar that transcends these limitations, which may foster a sense of belonging and empowerment not experienced before by such users. This does not mean that physical limitation is in any way wrong, or that it should not be embraced, but rather that the Metaverse may offer an experience of life that previously would not have been possible. In this way, the disembodied avatar of ourselves may actually promote inclusion of otherwise marginalised individuals.

Similarly, opportunities that once required physical presence may soon be on offer in the Metaverse. These possibilities include, but are not limited to, the ability to adventure and explore foreign and historical locations and attend historical events. Not only does this recover the opportunities that have been lost to humans in terms of spatial boundaries, but it may also act as a catalyst for adventure, education and cultural awareness.

By using the Metaverse for educational purposes by way of virtual classrooms, immersive simulations and interactive learning environments, the Metaverse may well make education and learning more accessible on a global scale, potentially transforming the field of education. Users will, for example, presumably be able to connect with various educational resources, as well as experts in a variety of fields.

Experiences, such as learning to fly a plane or learning to perform a surgery, will presumably be able to be replicated in the Metaverse, where students can learn in an environment in which the risk of these activities is far lower than those in real life. These are only a few of the possible benefits that the Metaverse may offer the field of education (Mystakidis 2022).

2.4.3.15 An escape from the limitations of physical reality

Kashmir Hill (2022), a journalist for the *New York Times*, writes about her experience of Horizon, the metaverse app of Meta: “When I power it up, the cries of ‘I want Mama to do bedtime’ fade away, replaced by the sounds of a gentle breeze and birds chirping. I am transported to a mountainside villa. I turn my head to gaze at a distant river and a golden sky dotted with hot-air balloons. This breath-taking spot (which I can change, like desktop wallpaper) is a glorified lobby, where I choose an app to load” (Hill 2022).

Where we once searched to watch a film in a theatre outside of ourselves, we now immerse ourselves in this experience within our own minds. We now access a quasi-physical experience of something that is not even physical in existence. The Metaverse will presumably allow its users to escape to a realm in which the limitations of daily life are dissolved. As E. McLuhan (1998 [no pagination]) states, “when we don the VR helmet, we deliberately tune out of the external world and tune into our inward world”.

In this movement, the landscape of our minds becomes the theatre stage. It is in this landscape where imagination and innovative technology begin to merge, awarding its viewer the opportunity to transcend the limitations of physical reality. As such, the Metaverse promises to be an invitation to relinquish the confines of the real world and to enter into one that liberates the imaginative mind by making it tangible, interactable and immersive. By turning our attention inward, the Metaverse and its technologies also invite us to explore the boundaries of our consciousness, our creativity, what we consider integral to the human experience, and the difference between what is real and what is not.

In this sense, what the Metaverse promises, is actually a virtual reality canvas awaiting the exploration of its users, in the absence of the creative limitations of real life. Users of the Metaverse will presumably be awarded the opportunity to create their own environments, customise their characters and design a life outside of their physical reality. In this way, the Metaverse will allow its users to bring their ideas into “reality”, creating a unique avenue for self-exploration and expression.

2.4.3.16 Ethical concerns in the M*etaverse*

Because the Metaverse creates a type of hybrid reality that does not occur entirely apart from our physical world, it may lead to a blurring of the boundaries between what we consider “real” and what we consider “digital”. Some are concerned that the digital nature of one’s actions will result in users abusing their capacities and committing inappropriate acts in the Metaverse, without consequences (MacDonald 2022).

Therefore, we have to ask ourselves the following questions: Does something we do in the Metaverse carry fewer consequences, just because it is occurring in a digital space, under a physical alias?

Will the Metaverse have to adopt similar rules to general society, or will players in the Metaverse be free to do whatever they seek to do, be it heinous or good, and not be bound to any consequences? Can players truly be bound by consequences of their behaviour in a digital space?

It seems highly unlikely that behaviour in the Metaverse will go unmonitored (O'Flaherty 2022), and it is likely that the Metaverse will adopt certain rules, demonstrated in popular video games, in which certain behaviours and phrases are censored with the possibility of player bans. Additionally, it is presumed that the Metaverse will provide a measure of safety for players, with the option of reporting unsafe behaviour across the Metaverse (O'Flaherty 2022). On the other hand, who is going to stop “dark web” Metaverse locations from being created. One does not even want to imagine what forms these could take and what could take place there.

Since the experience of the Metaverse promises to be exceptionally realistic, with visual, auditory and touch sensing capacities, can we be sure that its effects will not spill over into physical reality? Some conventional video games have attributed to violent behaviour in real life, after exposure to violence in gaming, but studies into whether violent video games actually do lead to violence in the real world have failed to prove anything conclusive (Boffey 2019).

If the effects of the Metaverse are similar to those of conventional video games, then it is possible that we can rely on the idea of most humans having an innate ability to distinguish between physical and digital reality. The Metaverse does, however, bring a new, untrialled level of realism to the digital space, which raises the question as to whether this innate ability to distinguish between digital and physical reality can be upheld, even when the digital space mimics the traits of our physical space so well.

We may want to recall Beres's friend and the mushroom! The more immersive our technologies become, the harder it will be to pull ourselves out of them (Beres 2018).

The use of virtual avatars may also raise concerns about the potential for deception and manipulation in virtual environments. For example, if we create an avatar that is significantly different from our physical appearance, we may intentionally or unintentionally be deceiving others about our physical identity. This raises important ethical questions about the use of virtual avatars and the responsibilities that come with using them in social contexts.

For example, someone could create an avatar that is more attractive or charismatic than they are in real life and use this avatar to engage in social interactions that they may not be able to do in real life. This could create a sense of deception or inauthenticity in the social interaction – particularly if the other person is unaware of the avatar not being an accurate representation of the person behind it. In the current digital environment, this is referred to as "cat fishing". In the Metaverse, the potential of cat fishing is enormously amplified, as we are highly visually orientated when we select partners. The potential for abuse and emotional chaos is enormous, as is the potential for intentional deception or manipulation in virtual environments. For example, someone could design an avatar with the purpose of tricking or deceiving others, such as an avatar that appears to be a child or a vulnerable person, in order to exploit others for their own gain.

According to Frenkel and Benner (2021), one of the more bizarre things occurring in the Metaverse is instances of sexual assault or harassment. Following a number of user accusations of sexual and other forms of misconduct, the Chief Technology Officer of Meta, Andrew Bosworth, states that Meta is aiming for "almost Disney levels of safety".

The technologies designed by Horizon to ensure this safety include mechanisms created to deter both virtual assaults and other threatening behaviours, and include things like a personal-space bubble that other avatars cannot enter; a “safe mode” that gives users an opportunity to escape a situation with a “solitary confinement cell”; a function that mutes other users; and a voting function that allows a group to vote for another user to be kicked out for being disruptive. Along with this, Horizon participants must also agree to their audio input being recorded by Meta. so that, if someone files a report, this audio can be retrieved for evidence of such a case (Hill 2022).

Although the Metaverse possesses promising potential, one if its biggest hinderances revolves around issues of security and privacy (Wang, Su, Zhang, Xing, Liu, Luan & Shen 2022). The Metaverse will be built as a combination of existing technology, which makes it vulnerable to the flaws involved in each of these technologies. According to Wang et al (2022), there have already been accounts of cases of virtual currency theft, hijacking of virtual reality devices, and the exploitation of artificial intelligence to spread fake news. Further concerns around the security of the Metaverse pertain to issues unique to the Metaverse, such as possible virtual stalking and spying, as well as ethical issues surrounding the recording of user data in the Metaverse, such as facial and eye movements, biometric details and speech recordings and the possible implications of these for misuse for tracking of others’ locations via their virtual reality devices (Wang et al 2022).

Wang et al (2022) further state that current security measures are not good enough to accommodate the safety requirements of the Metaverse, and that the promise of the Metaverse being a hyper realistic, immersive virtual experience necessitates the development of various measures, in order to secure the large amounts of sensitive personal data that will be collected from its users – something that Wang et al (2022) believe will require a high degree of innovation and adaptation.

2.4.3.17 Current and future state of the Metaverse

According to Hill (2022), attempting to explain the Metaverse by using current examples such as Meta's Horizon, is similar to explaining the Internet by engaging in "chat rooms in the 1990s, during the days of dial-up modems". It is clear that the Metaverse is still in the early stages of its development, but that it may well become a massive technological shift as it advances(Hill 2022).

At this time, the Metaverse is made up of virtual and augmented reality spaces, which are "somewhat immersive", within which users can connect with one another, or virtual entities by way of virtual or augmented technologies and an Internet connection. Some of these spaces are accessed daily on the computers and phones of their users, while some occur in environments grounded in a game or fantasy, with others within duplicate worlds attempting to replicate real life. The Metaverse we currently see, can be considered "pre-metaverse", with numerous experts expecting the technology to have reached a more mature state by 2040 (Anderson & Rainie 2022).

In recent years, several glimpses of the future of the Metaverse have surfaced, including virtual concerts held by popular musicians and attended by millions in avatar-form, virtual comedy shows attended in the same fashion, and the buying and selling of virtual real estate. According to Maher (2022), these events offer us the first insights into what the Metaverse may become, "… and how these virtual worlds, which for so long have been reserved purely for gaming, can eventually offer an alternate reality – one populated by gamers and non-gamers alike, who will attend events, socialise, or just explore these vast unknown spaces on a daily basis" (Maher 2022 [no pagination]).

While discussing his goals for the Metaverse headset, Mark Zuckerberg observes that it becomes very small, or even disappears, to have the Internet "surround us, accessible perhaps at the snap of a finger". Zuckerberg additionally states that "… one of the thought experiments that [he likes] to do is thinking about how few of the things that we physically have in the world actually need to be physical" (Hill 2022).

The Imagining the Internet Centre of the Pew Research Center and Elon University invited 624 random technological innovators, developers, business leaders, researchers and activists to answer the open-ended question of whether they believe that the Metaverse will or will not be a "much-more-refined and truly fully-immersive, well-functioning aspect of daily life for half a billion or more people globally". The results of the responses to this question were mixed, with 54% of respondents citing 'yes' and 46% of respondents citing 'no'. Those who answered 'yes', cited reasons including high levels of investment into the Metaverse over the coming years, increased access for daily use compared to current access, the technology for such an immersive world being possible by 2040, the popularisation of virtual and augmented reality as a result of the pandemic, and general positive and exciting uses of such technology. Respondents who answered the opposite, cited reasons including the Metaverse not being seen as something for use in daily life, but rather something like a niche, the accessibility and usability of the technology not being ready by 2040, people's natural preference to live in physical reality over virtual reality, public concerns regarding abuse by authority and the implications of surveillance capitalism, along with general potentially harmful effects of virtual and augmented reality on the human mind and behaviour (Anderson & Rainie 2022).

With the very recent (as of the time of writing in December 2023) upsurge in artificial intelligence, as exemplified by large language models like ChatGPT, one has to wonder if 2040 is not a severe overestimation of the time required for this maturation.

Indeed, numerous AI engineers in major companies are shocked at how quickly the large language models have become so proficient, expecting this to only happen in five to ten years. Some believe that the Metaverse has fallen victim to being another member of the “tech graveyard”, while others believe that it holds great promise, as XR technologies develop (Anderson & Rainie 2022).

Most agree, though, that the 2021–2022 Metaverse “hype” was greatly fuelled by events such as the rebranding of Facebook to Meta – not by the Metaverse being ready for it at its current state of development (Anderson & Rainie 2022). Mark Zuckerberg, CEO of Meta, has stated that, despite assumptions that Meta will focus on AI and not on Metaverse for the foreseeable future, the Metaverse remains just as important and will continue to be central to research and development at Meta (Paul & Bhuiyan 2023).

In its current condition, the Metaverse provides a glimpse into the future of digital interaction and immersion. While the Metaverse as we know it today is still in its early phases, with various limits and technological constraints, it is critical to recognise its promise and the direction in which it is moving.

The use of virtual and augmented reality technology is one of the most important components of the present Metaverse. These technologies give users an immersive experience, allowing them to interact with digital worlds and other users or virtual entities. The level of immersion and seamless connection with our daily lives, however, has not yet been fully realised. The current Metaverse includes a variety of experiences, ranging from common apps on computers and phones to fantastical game worlds and attempts to replicate real-life circumstances. Although these different experiences offer a look into the potential and diversity of the Metaverse, they also reveal the fragmentation and lack of a unifying experience that characterises the current condition of the Metaverse.

According to critics, the Metaverse is yet another victim of overhyped, technical breakthroughs that fail to deliver on their promises. They argue that the current state of the Metaverse falls short of the grand ideals shown in popular culture, in which virtual worlds blend perfectly with reality. However, it is critical to discern between false expectations and the intrinsic potential of the Metaverse notion itself (Anderson & Rainie 2022).

Proponents of the Metaverse, on the other hand, see it as a critical component of the future digital environment. They predict that, as extended reality technologies improve, the Metaverse will grow, functioning as a primary centre for social interaction, entertainment, business and education. The Metaverse has the potential to go beyond its current boundaries and become a transformational force in many parts of human life.

It is critical to recognise that the recent rise of interest in the Metaverse, spurred by big developments such as the rebranding of Meta, has produced a rush of excitement that may have masked the present limitations of the Metaverse. These instances, however, have drawn attention to the notion and hastened discussions on and investments in Metaverse-related technologies, which may contribute to its future advancement.

While the Metaverse in its current form is still a nascent and fragmented concept, one cannot deny that the concept holds significant potential. As XR technologies progress and the infrastructure supporting the Metaverse evolves, the Metaverse has the potential to become a fundamental part of the way humans communicate with one another, as well as the way in which humans experience the world, via the senses of what may well become a digital body. To quote McLuhan (1962b:32): “Instead of tending towards a vast Alexandrian library the world has become a computer, an electronic brain … And as our senses have gone outside us, Big Brother goes inside”.

2.5 Summary

The literature review highlights the profound impact of technology on media ecology, human experience and society, while emphasising the need for critical awareness of the ethical and social implications of media technologies and the importance of understanding the complex interplay between technology, media and human consciousness.

The literature review also discusses the emergence of the Metaverse, a new technology that promises to extend the human senses via virtual reality, and the way it will create a dual-sensory environment for its users. While the Metaverse holds great promise for immersive communication experiences, it is important to consider its potential impact on face-to-face interactions, social skills and inclusion. The literature review provides valuable insights into the future of digital interaction and immersion, highlighting the need for continued research and exploration in this rapidly evolving field.

Chapter 3 explores the criteria for the evaluation of technology as extensions of man, as well as aspects related to media ecology.

CHAPTER 3: CRITERIA FOR THE EVALUATION OF TECHNOLOGY AS EXTENSIONS OF MAN AND ASPECTS RELATED TO MEDIA ECOLOGY

3.1 Introduction

People frequently characterise McLuhan's writing style as cryptic and aphoristic, resulting in interpretations that may be perceived as overly broad or lacking in specificity. This vagueness may make it difficult for readers and scholars to pin down the precise meanings or applications of his theories. Furthermore, critics argue that McLuhan's theories lack empirical evidence, leading to assertions that they are more speculative than scientifically grounded, and that they demonstrate a preference for involve broad, sweeping statements over detailed, data-supported conclusions (Chandler 2011).

Table 3.1 outlines criteria for evaluating technology as extensions of man and aspects related to media ecology, operationalising McLuhan's theories. We developed this set of thirty criteria, based on data in the literature review. It includes criteria like extending physical, mental and sensory capabilities; altering sense ratios; impacting identity and thought patterns; and influencing perception and media ecosystems. We pair each criterion with an evaluation method, such as assessing enhancements, analysing cognitive functions and examining the impact of technology impact on perceptions and social interactions. These structured criteria aim at making McLuhan's concepts more applicable and measurable, thereby addressing the criticism of vagueness and lack of empirical support.

3.2 Criteria

Table 3.1 frames a set of criteria that can be used to evaluate the effects of any technology.

Table 3.1: Criteria for the evaluation of the nature and impact of technology

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
1	**Extension of physical capabilities** *(See sections 1.6.1, 2.1 and 2.2.1)*	Technologies can offer enhancements or changes to our physical bodies and our physical interaction with the environment. It refers to the way in which technology extends human physical abilities, such as strength, speed or endurance.	Identify the physical function or ability that the technology enhances. Consider both the intensity and the range of this enhancement.
2	**Extension of mental capabilities** *(See section 2.2.4)*	Technologies can expand our cognitive or mental capabilities, such as information processing, memory, problem-solving, calculation or creativity.	Analyse the cognitive function or capacity that the technology expands. Consider the complexity of the tasks enabled by the technology.
3	**Extension of sensory capabilities** *(See section 2.2.4)*	This assesses how a technology can alter or enhance our sensory experience, thereby changing how we perceive the world. How does the technology extend human sensory capabilities, such as sight, hearing, touch, taste or smell?	Evaluate how the technology augments or changes the human sensory experience. This may involve amplifying a sense, providing new ways of experiencing sensory input or enabling sensory experiences at a distance. Analyse and describe how the technology changes the human sensory experience (sight, hearing, touch, taste & smell), the level of enhancement and its effects on perception.
4	**Alteration of sense ratios** *(See sections 2.2.3 and*	This refers to the way in which a technology may alter the balance or ratio among our senses, leading to different ways of perceiving and experiencing the world.	Evaluate how the technology changes the balance between the senses, and the implications this has for human perception and experience.

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
	2.4.3.1)		Evaluate the impact of technology on our reliance on, or use of, different senses and its implications for our experiences.
5	**Acoustic space** *(See section 2.4.3.2)*	The term *acoustic space*, drawn from McLuhan's work, refers to the sphere of aural perception created by technology.	Examine how the technology affects auditory experiences and how it reshapes our perceptual relationship with our surroundings.
6	**Visual space** *(See section 2.2.3)*	The term *visual space* refers to the sphere of visual perception created or enhanced by technology.	Examine how the technology affects visual experiences and how it changes our perceptual relationship with the visible world.
7	**Tactility** *(See section 2.2.3)*	Tactility involves the way in which technology may enhance or create new forms of tactile (touch-based) experiences.	Evaluate how the technology enhances or introduces new tactile experiences, and the implications this has for human interaction and perception.
8	**Typography** *(See section 2.2.3.2)*	This criterion pertains to how technology influences or changes the appearance and arrangement of printed or digital text, potentially affecting communication and comprehension.	Evaluate how the technology influences or changes the way text is displayed and arranged and the subsequent impact on communication and comprehension.
9	**Orality** *(See section 2.3.2)*	Orality pertains to the spoken word and auditory communication. Before the advent of written language, orality was the primary mode of communication and, in this way, it is deeply rooted in human traditions, stories and cultures. Hence, the influence of technology on orality is a significant criterion.	Assess how the technology augments, suppresses or changes the way in which the spoken word and auditory communication occur. How does the technology influence or alter oral traditions and auditory communication? Does it promote or diminish the significance of spoken word in our society?

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
10	**Alteration of space perception** *(See section 2.4.3.8)*	Technologies may redefine our perceptions of, and interactions with, both physical and virtual space. How does the technology alter human perception of space, such as creating virtual spaces or enabling remote interaction?	Assess how the technology changes the way we perceive, navigate or interact with space. This could include creating new spaces (like virtual reality) or changing our experience of physical spaces.
11	**Alteration of time perception** *(See section 2.4.3.8)*	Technologies may change our perceptions of time and alter the pace of life and communication. How does the technology alter human perception of time, such as enabling instantaneous communication or storing and replaying experiences?	Determine how the technology changes the way we perceive, measure or experience time. This might involve speeding up processes, enabling activities to occur simultaneously or breaking down temporal boundaries.
12	**Technology-identity relationship** **Impact on individual and collective identity** *(See section 2.2.5)*	This criterion investigates how technology shapes our identity, roles and self-perception, and how it influences our interactions with others. Explore how the technology influences human identity, reflecting on the idea of the shaping power of tools and technologies. How may the technology shape personal self-awareness and group identity?	Evaluate the impact of the technology on self-perception, roles, identity and social interactions. Consider both individual and group identity. Explore shifts in personal and collective self-perception and roles as influenced by the technology.
13	**Influence on thought patterns** *(See sections 2.2.6)*	Technologies may shape our cognitive processes and thought patterns. Assess how the technology influences human thought patterns, aligning with the notion of technology shaping cognitive processes.	Evaluate the impact of the technology on cognitive processes, decision-making and overall thought patterns. Consider both individual and societal impacts.

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
14	**Influence on perception** *(See section 2.2.3.1)*	Technologies may change how we perceive the world, including our self-perception, perception of others and perception of our environment. Consider how the technology modifies human perception, aligning with McLuhan's concept of technology affecting how we interpret our world.	Assess the influence of the technology on perceptions of self, others and the environment. Evaluate how the technology changes our perceptions and the way we interpret the world. Consider both the intended and unintended consequences.
15	**Mind-body extension** **Extension of mental capabilities** (See section 2.2.2)	Some technologies can extend cognitive functions or thought processes beyond the physical confines of the body. Determine how the technology extends the mind beyond the physical body, keeping in line with McLuhan's views on extended cognition.	Evaluate how the technology facilitates thought processes or cognitive functions outside the physical confines of the body.
16	**Type of technology or media** **Technological affordances** *(See sections 2.2.3.1)*	Identify the specific type of technology or media under evaluation (e.g. digital, mechanical & biological). Every media technology, from print to radio to social media platforms, has inherent characteristics that shape how content is produced, distributed and consumed. These technological properties can influence user behaviour, content virality and the overall media experience.	Consider the inherent characteristics of the technology type and how these may affect its interactions with users and its wider impacts. Study the features of the platform, the way in which users engage, and the possibilities it offers. Compare different media technologies or platforms ,based on their capabilities.
17	**Human-object interaction / engagement**	This criterion looks at the way in which technology changes the way we interact with objects and the surrounding environment.	Evaluate the changes in user interaction and behaviour induced by the technology.

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
	(See sections 2.2.4.2)	How does the technology mediate, change or influence the human interaction with objects (physical or virtual)?	Consider factors such as ease of use, intuitiveness and the changes in engagement with other objects. Evaluate the ways in which the technology changes users' interaction with objects. This may include the way physical objects are manipulated, the use of virtual interfaces or the impact on users' interaction with their environment.
18	**Cultural metaphors and terminology** *(See section 2.3.2)*	How does the technology embed, alter or introduce new metaphors or terminology specific to it?	Examine the linguistic and symbolic nuances the technology introduces. Evaluate how these metaphors or terminologies shape understanding, dialogue or discussions on the technology and their broader implications within cultural contexts.
19	**Impact on cultural patterns** *(See section 2.3.2)*	How does the technology potentially shift cultural behaviours, traditions or values? How does the technology potentially influence societal structures and cultural norms?	Analyse the influence of the technology on established cultural practices, symbols, rituals and values. Identify any emerging cultural trends as a direct or indirect result of the presence or use of the technology. Assess societal and cultural shifts, considering both enhancements and disruptions resulting from the adoption of technology.

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
20	**Changes in social interaction** *(See section 2.3.8)*	How may the technology affect the ways in which people communicate, relate to one another or build relationships?	Evaluate shifts in communication patterns, changes in interpersonal dynamics, and any transformation in the building and maintenance of relationships as influenced by the technology.
21	**The role of technologies in media ecosystem** *(See section 1.6.2)*	How does the technology fit into and influence the broader media ecosystem?	Analyse the interaction of the technology with other media, its contribution to the media landscape and the dynamics it introduces or modifies within the media ecosystem.
22	**Level of involvement** *(See section 1.6.4)*	How actively and frequently does a user need to engage with the technology? This criterion involves users' level of involvement and interaction with the media, such as commenting, sharing, or creating content.	Evaluate the degree of immersion, duration and frequency required for users when interacting with the technology and the potential implications of this involvement level on users and their environment.
23	**Content diversity, or content favoured by media** *(See section 2.3)*	This refers to the richness and variety within the media landscape. A diverse content spectrum ensures a multiplicity of voices, sources, opinions and narratives.	Examine a sample of media content for the diversity of sources, topics and perspectives.
24	**Access, inclusivity and reach** *(See section 2.3.1.6)*	This criterion relates to the ease and equality with which different societal groups can access and take part in the media environment. A truly inclusive media environment ensures that there are no barriers	Test platforms with various tools and techniques to check their inclusivity. Assess the variety and diversity of communities within the Metaverse.

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
		(economic, physical or social) preventing certain groups from consuming or producing content. The criterion also involves the number of people who have access to the media and the frequency with which they use it. New technologies may change the way people consume media, leading to shifts in audience preferences and behaviours.	
25	**Ownership, control, regulation and policy** *(See section 2.3)*	Concentration of media ownership may lead to a monopolisation of voices and perspectives. A diverse ownership landscape ensures a variety of editorial stances and decreases the likelihood of a single narrative dominating the media environment. New technologies may also disrupt the existing media regulatory frameworks, creating new challenges for policymakers and regulators. For example, the rise of social media has led to new challenges around issues such as privacy, data protection and content moderation, which require new regulatory approaches.	Chart out the owners and stakeholders of media entities. Use metrics to measure the concentration of media ownership.
26	**Ethical standards** *(See section 2.4.3.16)*	The ethical frameworks within which media operate, play a pivotal role in ensuring trustworthiness. Ethical standards cover everything from reporting accuracy and fairness to transparency in conflicts of interest.	Examine the code of ethics of a media entity. Track and analyse incidents of ethical breaches.

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
27	**Adaptability and resilience** *(See section 2.4.3.17)*	The media landscape is constantly evolving. This criterion evaluates the capacity of media entities to adapt to technological advancements, changing audience preferences and external challenges.	Trace development of media. Examine specific instances of media adaptation in challenging situations.
28	**Incorporation of old technology** *(See section 2.2.5)*	Does the technology build upon or repurpose the content and functionalities of preceding technologies? Does it build upon the strengths of older media, or does it aim at eliminating their perceived weaknesses?	Does the technology incorporate elements of older media forms into its design or functionality? Assess if the technology acts as a supplementary tool to existing media, or if it poses a threat to make them obsolete.
29	**Relationship to other media** *(See section 2.2.3)*	Does the technology converge multiple media forms into one, or does it introduce an entirely new experience?	Examine if the new technology converges multiple media forms, thereby leading to a singular media experience, e.g. the way in which smartphones converge cameras, music players and phones into one
30	**Changes in the human environment** *(See section 2.2.4)*	Technology may also change the physical and social environments in which we live, work and communicate. For example, the development of transportation technologies has made it possible to travel and communicate across vast distances, thereby creating new opportunities for cultural exchange and globalisation.	What impact has technology had on modes of communication? Has technology made public spaces more or less social? How has technology affected mental health or wellbeing? What is the impact of technology on time spent with family or social circles?

CRITERIA FOR THE EVALUATION OF THE NATURE AND IMPACT OF TECHNOLOGY			
	Criteria	**Description**	**Evaluation**
			How has technology changed the way in which we perceive and navigate space?

3.3 Summary

The criteria we developed outlined in Table 3.1 provide a structured framework for applying and operationalising Marshall McLuhan's theories. By establishing clear criteria and evaluation methods for understanding technology as extensions of man and its impact on media ecology, the study addresses common criticisms of McLuhan's work, such as vagueness and lack of empirical support.

This approach not only makes McLuhan's ideas more accessible and measurable, but also enhances their relevance in practical and academic contexts. By doing so, the criteria contributes significantly to the ongoing discourse in media theory and communication studies, demonstrating the enduring relevance of McLuhan's concepts in understanding the relationship between humans and technology. In chapter 6, the criteria in Table 3.1 will be repeated in an application on the Metaverse. This will also demonstrate its functionality.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

The research paradigm and approach of the study will be *interpretivism* and *critical realism*. Interpretivist studies emphasise understanding of subjective interpretations and meanings and the way in which they shape social reality. The study uses critical realism from an interpretivist position to explore the Metaverse as a phenomenon and to determine how it fits the theoretical framework.

The aim of this study has been to develop and test a set of criteria that will measure any technology in terms of two aspects: (i) Marshall McLuhan's notions of technology as extensions of man; and (ii) consequent effects on and disruptions to the existing media ecology. Although applicable to any technology, in this study the criteria will be applied to the Metaverse. These criteria will naturally inform McLuhan's tetrad analysis as applied to the Metaverse.

The study is, to a large extent, theoretical. The first part of the data consists of the presentation, interpretation and theoretical discussions of the literature review. The second part of the data consists of published accounts of Metaverse users, which include their immersive experiences. The final part of the data will be the author's personal experience in the Metaverse.

The literature review has been used to develop the set of thirty criteria. As stated above, these criteria will evaluate the manner and extent to which the Metaverse is an "extension of man", as well as the manner and extent of the consequent effects on and disruptions to, the existing media ecology. The applied set of criteria will inform McLuhan's four questions of the tetrad of media effects in particular. The outcomes of this tetrad analysis will address the research questions and the main research problem.

4.2 Research paradigm

Individuals' interpretations and experiences of the Metaverse are subjective and understanding these subjective meanings is essential to gaining a deeper understanding of the phenomenon. Consequently, this study adopts an interpretivist approach, positing that social reality is not objective and singular, but rather is formed by human experiences and social contexts. According to this viewpoint, comprehending the social world necessitates grasping the subjective meanings and interpretations individuals assign to their experiences and contexts (Goldkuhl 2012).

Interpretivism, therefore, can be regarded as a philosophical approach to research where truth and knowledge are subjective, embedded within specific cultural and historical contexts, and reliant on individuals' experiences and perceptions of knowledge and truth. This approach contrasts with positivism, which asserts that knowledge can be attained solely through objective, empirical observation and quantification. Interpretivism underscores the significance of comprehending the meanings and interpretations individuals attach to their experiences and acknowledges the influence of the researcher's personal values and beliefs in the research methodology (Ryan 2018).

In interpretivist studies, the ontological stance is typically relativistic, which means that reality is subjective and multiple, as opposed to a single, objective reality. Individuals construct and interpret their realities based on their experiences, values, beliefs and social context. Therefore, interpretivist research has a subjective ontological stance, in that it views social phenomena as socially constructed and subjective and reality as being created through the perceptions and consequent actions of social actors (Al-Abebneh 2020). The ontological perspective adopted here is constructivist, indicating that social phenomena and their meanings are constantly created and redefined by social actors. This implies the absence of a single "truth," but rather the existence of multiple realities shaped by individuals and groups.

The epistemological stance is firstly subjective. Interpretivists believe that knowledge is a product of the interactions between the researcher and the researched. Therefore, knowledge is not necessarily "out there", waiting to be discovered, but can be co-constructed. For interpretivists, both reality (ontology) and knowledge (epistemology) are constructed and interpreted by individuals, based on their unique experiences, backgrounds and interactions.

From this perspective, human beings are making meaning and constructing their reality and the understanding of this reality cannot always be interpreted through science and, therefore, subjectivity matters in interpretivism. Researchers act as insiders (emic), in that they experience the same thing as the participants (Ikram & Kenaythulla 2022).

Because interpretivist studies are context-bound, knowledge is not viewed as generalisable in the traditional sense. Instead, findings are specific to the particular social contexts, settings and individuals under investigation. Interpretivists are often more interested in deeply understanding specific contexts, rather than making broad generalisations.

For an interpretivist study, the researcher would approach their subject matter with the understanding of reality being socially constructed and multifaceted. The epistemological stance in interpretivist research is that inquiry is value-related and findings are subjective (Kroeze 2012). Interpretivists would seek to understand individuals' subjective experiences, meanings and interpretations. Instead of detaching themselves from their research, interpretivists would often immerse themselves, recognising that their own background, perspectives and interactions influence the research process and outcomes.

As demonstrated in the foregoing paragraphs, interpretivism is important in this study, as it allows for a more nuanced and comprehensive exploration of the Metaverse and its impact on society. The study employs the research approach of critical realism from an interpretivist position to explore the Metaverse as a phenomenon and to establish how it fits the theoretical framework.

4.3 Research approach

The research methodology adopted here is based on a critical realist approach. Critical realism, as an ontological stance, posits that while a reality independent of our perceptions exists, our understanding of this reality is inherently limited and prone to error (Scott 2014). This perspective holds significant sway in the realm of social science research philosophy, aiming to reconcile the gap typically seen between positivist (or empirical) and interpretivist (or constructivist) methodologies. It endeavors to uncover the foundational structures and mechanisms that shape the social world, yet it recognises the constraints of human perception and cognition (Gorski 2013).

Patomaki and Wight (2000:216) state: "Our use of the term ontology refers to philosophical ontology, a concept that logically precedes the formation of any scientific or social ontology." From this viewpoint, reality is considered multi-layered, with a deeper ontological layer serving as a prerequisite for both empirical and linguistic realism. The world is not merely a collection of events, states, experiences, impressions, and discourses, but also includes underlying structures, forces, and tendencies that exist regardless of whether they are perceived or acknowledged through experience and/or discourse.

Social and natural structures exist and endure outside of our perceptions or constructions of them. These structures influence events and possibilities, even if they themselves are not always directly observable. Instead of focusing on regularities of events – as positivists may – critical realists emphasise the mechanisms and structures that cause those events

Events may not always repeat in predictable patterns, but the mechanisms causing them are consistent.

In terms of epistemology, critical realists see knowledge as mediated. We cannot know the real world directly: our knowledge of it is always mediated by our senses, tools, methods and interpretations. Critical realism seeks to explain the "why" behind phenomena, not simply document patterns or describe interpretations.

Grasping the foundational structures and mechanisms allows researchers to provide more informed explanations for why certain events happen. Critical realism views the world as influenced by theories, but not exclusively defined by them, and recognizes that some forms of knowledge may be more closely aligned with reality than others (Fletcher 2017).

This research approach is appropriate for the study, since it aims to explore the Metaverse as a phenomenon in terms of its characteristics and structure. The study uses critical realism to apply deductive reasoning and to determine how the Metaverse fits the theoretical framework. There are underlying structures of reality that shape observable events and understanding these structures is essential to gaining a deeper understanding of the Metaverse. Critical realism is an important perspective for this study, as it allows for a more comprehensive exploration of the Metaverse and its impact on society by considering the underlying structures that shape it.

4.4 Research design

The study employs a qualitative research design, which involves methodologies focusing on exploring, interpreting and understanding the meanings and experiences of individuals related to a specific phenomenon, event or situation. Contrary to quantitative research, which is concerned with numerical data and statistical analysis, qualitative research emphasises depth, context and nuance.

Qualitative research often seeks to understand human experiences, perceptions, motivations, intentions and emotions, recognising that people create meaning in different ways, based on their unique experiences and perspectives. It emphasises understanding and interpreting the experiences and perspectives of individuals and groups (Muzari, Shava & Shonhiwa 2022).

Qualitative research designs can be flexible, allowing for changes in the research questions, sampling and data collection techniques as the researcher gains more insights during the study. Data collection often results in detailed descriptions and narratives, typically using words, rather than numbers. Examples of data sources include interviews, observations, diaries, journals and even visual materials like photographs.

This emphasises understanding the depth and complexity of human experiences and contexts. It offers researchers tools to explore the "why" and "how" of phenomena, delving into the layers of meaning and interpretation that numbers alone might not reveal. It also considers that the prior knowledge, experiences and attitudes of the researchers influence how and what they see (Bryman & Bell 2014).

4.5 Deductive reasoning

This study will utilise deductive reasoning, a logical method where conclusions are derived from certain premises or assumptions (Borgstede & Scholz 2021). This approach works from the top down, starting with a theory or hypothesis which is then tested against empirical evidence. Deductive reasoning involves beginning with a broad principle or theory and then applying it to a particular case or scenario to reach a specific conclusion. The process encompasses various stages, such as creating a hypothesis or theory, designing research methodology, gathering data, analysing this data, formulating conclusions, and assessing the validity of the initial theory.

The researcher begins by formulating a hypothesis or theory that they want to test. In this study, Marshall McLuhan's theories of technology as extensions of man and media ecology will be the starting point. A research design is developed that allows the researcher to test the hypothesis or theory. In this study, data is collected from the theoretical discussions of the Metaverse, users' immersion experience of the Metaverse, as well as personal accounts of immersion. This is followed by the researcher analysing the data to determine if it supports or contradicts the hypothesis or theory. Based on the analysis of the data, the researcher draws conclusions about whether or not the hypothesis or theory is supported.

For this study, a set of thirty criteria is developed to test aspects of the theory in the collected data. If the hypothesis or theory is supported, the researcher may evaluate the theory to see if it needs to be modified or expanded. This study goes further to employ a tetrad analysis to test the theory. If the theory is not supported, the researcher may need to develop a new theory or modify the existing one (Armat, Assarroudi, Rad, Sharifi & Heydari 2018).

4.6 Data sources

In this study. the data collection involves a threefold process of which a theoretical study forms the basis. Publications on the Metaverse and people's experience of it will be analysed, after which the researcher's personal experience of immersion of the Metaverse will be provided.

4.6.1 Theoretical study

This is, to a large extent, a theoretical study. In the context of research methodology, this refers to a study that primarily focuses on the development, articulation or elaboration of theories, rather than empirical tests or observations. While empirical studies rely on data collected from real-world observations or experiments to make conclusions, theoretical studies delve into existing or newly proposed ideas, concepts and frameworks to generate or refine theories.

A theoretical study refers to research that is grounded in a particular theoretical framework or perspective. Theoretical frameworks provide a set of assumptions, concepts and principles that guides the research process and helps to explain the phenomena under investigation (Packard 2017).

The theoretical study starts by understanding where the theoretical or conceptual gaps exist in the current literature. Deeply engaging with existing literature is important for understanding the current state of the theory, its historical development, applications and criticism. This involves delving into the details of concepts, terminologies or ideas, clarifying ambiguities and making distinctions (Packard 2017). The research will articulate or propose new theoretical constructs or models, explaining their components, relationships and significance.

While theoretical studies are not empirical, proposed theories often need some form of validation. This can be achieved by demonstrating the coherence and applicability of the theory, or by illustrating how it can be tested empirically in future studies. The investigation will clearly document the theoretical exploration, highlighting contributions, implications and potential applications or future research directions.

This study uses a qualitative research method – a literature review – to collect data and to develop a deeper understanding of theoretical frameworks, models or concepts related to media ecology, technology as extensions of man and McLuhan's laws of media.

4.6.2 Documented accounts of users

Analysing documented accounts of experiences as a research method involves the examination of written or recorded narratives, testimonials, personal diaries, letters, autobiographies and other forms of firsthand accounts of experiences in the Metaverse.

These documents provide rich, qualitative data that offers insights into individuals' perceptions, emotions and reflections about particular aspects of immersion in the Metaverse.

Published documented accounts of participants are a qualitative research method, because they provide rich and detailed descriptions of the participants' experiences, perspectives and behaviours. This method involves analysing written or recorded materials, such as diaries, letters, autobiographies and other documents produced by the participants themselves or by others who have observed them. By examining these documents, researchers can gain insights into the participants' thoughts, feelings and actions, and use this information to develop a deeper understanding of the research topic (Muzari, Shava & Shonhiwa 2022).

Documented accounts can lead to the development or refinement of theoretical concepts, based on real-world experiences. Accounts are compared and contrasted across different periods, cultures or contexts to identify patterns, changes or differences. Based on the research question, criteria will be defined to select specific accounts for analysis. Documented accounts were sourced through a purposive search for relevant data.

4.6.3 Personal description of immersion

Personal accounts, often referred to as “firsthand narratives” or “testimonials”, can be valuable data sources in research; particularly within qualitative paradigms. They offer insight into individuals' subjective experiences, beliefs, feelings and interpretations of events or situations.

When used as data, these accounts have the potential to help researchers to understand the depth and nuance of human experiences in ways that quantitative methods may not capture. Mohajan (2018) maintained and updated a diary for every instance of immersion.

4.7 Development of criteria

The discussion on the Metaverse in Section 2.3 serves as theory and a source of data. The conclusions drawn from the discussion of technology as extensions of man and media ecology form the basis for the formulation of a set of thirty criteria. The criteria will suggest how McLuhan's notion of "technology as extensions of man" and media ecology can be operationalised. This will be structured in terms of criteria, description and evaluation method.

4.8 Application of criteria

The set of criteria developed for the evaluation of elements related to technology and media ecology will be applied to the sources of data previously mentioned – i.e. the discussion of the Metaverse, users' published accounts of experiences and attitudes towards the Metaverse and the researcher's personal experience of immersion in the Metaverse.

The conclusions drawn from the analysis of the Metaverse in terms of it being an extension of man and the impact on media ecology will be used as an intermediary. This intermedia will, in turn, be used to inform McLuhan and McLuhan's (1988) tetrad of media effects.

4.9 Tetrad analysis of the Metaverse

McLuhan and McLuhan's (1988) laws of media in the form of the tetrad of media effects can function both as theory and as a methodology. – On the one hand, they assert that all media or technology have some or all of the effects; on the other hand, that any media or technology can be subjected to the tetrad framework to explore the exact effects (McLuhan & McLuhan 1988).

The tetrad, which is essentially a framework for understanding how different media affect human perception, behaviour and culture, is based on the idea that every medium has four effects: enhancement, obsolescence, retrieval and reversal. By analysing these effects, we can gain a deeper understanding of the way in which our media shape our world.

The tetrad provides a useful framework for analysing the effects of media on our lives and can also be used as a theory to guide research and analysis in this field (Bobbit 2012). By asking the four questions of the tetrad about the Metaverse, the following four research questions, as formulated in Chapter 1, will be answered:

1. What is enhanced or improved by the Metaverse?

   For example, does it enhance our ability to connect with others, to explore new environments, or to express ourselves creatively?

2. What is replaced or pushed aside by the Metaverse?

   For example, does it make physical travel or face-to-face communication less necessary?

3. What is regained by the Metaverse that was lost?

   For example, does it retrieve a sense of community or shared experience that has been lost in modern society?

4. What becomes of the Metaverse in its extreme form?

   For example, does it create new forms of isolation or addiction, or does it lead to a greater sense of interconnectedness and empathy?

By answering these questions, we can gain a deeper understanding of how a medium affects our perceptions, behaviours and relationships, as well as its impact on the current media ecological state. This methodology can be applied to any medium – from the printing press to the Internet – and can help us to understand the complex interactions between technology and society (Bobbit 2012).

In this study, the tetrad analysis will perform several functions. Firstly, it is used to generate findings, which, in this case, are the criteria developed informed the tetrad. The findings are also interpreted by employing the tetrad and addressing the four questions, which also serves as the research questions of this study. The tetrad also forms a tool for creating a graphical presentation of the findings. By answering these questions, it will be possible to address the main research problem.

4.10 Summary

The discussion in this chapter has summarised the interpretivist and critical realist paradigms employed in this research study. The research design is qualitative, by means of deductive reasoning. The research process followed in conducting this research is also outlined. The literature review plays a significant role in this study, as it is employed as theory, method and data. From the theoretical discussion, a set of thirty criteria will be developed for the evaluation of any technology in terms of “technology as extensions of man” and aspects related to media ecology.

The sources of data include the theoretical discussion on the Metaverse, user accounts of experience in the Metaverse, as well as the researcher’s own account. The criteria developed will be tested by applying it to the collected data. The outcomes of the application of the criteria will be used to inform the tetrad analysis by addressing the four questions of the tetrad. The four questions also serve as the research question of this study. By determining if the Metaverse satisfies McLuhan and McLuhan’s (1988) laws of media, the research questions and the main research problem will be addressed.

In the following chapter, the importance of the collected data will be emphasised. The collected data will also be presented, which will include users’ published accounts of their experiences on the Oculus Quest 2 and VRChat, as well as a description of the researcher’s own experiences of immersion.

CHAPTER 5: PRESENTATION OF CRITERIA DEVELOPED

5.1 Introduction

The data sources presented in this chapter comprise the following three parts:

- Scholarly literature on the Metaverse, including books and journal papers;
- Published personal accounts of users, which were collected from a range of publications; and
- The author's personal account of her experience.

The variety of data emphasises the exploratory and deductive nature of the study, which, in itself, plays a significant role in the overall process. The data forms a substantial part of our exploration of the nature and effects of the Metaverse, while also play a prominent role in the interpretations of the Metaverse in terms of the thirty criteria developed. The collected data can be seen as "rich data".

The term "rich data" emphasises the value of detailed, context-specific information that allows the researcher to develop a deep understanding of the Metaverse. Rich data is valuable in qualitative investigation, because it provides a deep understanding of the phenomenon under investigation and forms a valuable part in the narrative to develop an understanding of the Metaverse and its effects, allowing for "thick" descriptions and interpretations (Schultze & Avital 2011).

Contrary to, for example, numerical data, rich data is comprehensive, and it provides depth of insight into the subject being studied. This type of data is qualitative, capturing the complexities and nuances of human experiences, behaviours and social phenomena.

5.2 Data sources

This section firstly presents a description of and discussion on a sample of users' or participants' experiences in the Metaverse in terms of *the Metaverse as extensions of man*, and also in terms of media ecology. Secondly, the Oculus Quest 2 user guidelines serve as a source of data in terms of functionality and navigation.

VRChat (i.e. the predominant virtual world being investigated) will be briefly explored – particularly in terms of safety, security and the ethical aspects involved in the use of VRChat. Lastly the researchers' personal experience of, and in, the Metaverse will be discussed.

5.2.1 User experience

5.2.1.1 "This is life in the Metaverse"

TITLE
Kashmir Hill. 2022. This is life in the metaverse. *The New York Times,* 7 October 2022. Every hour of the day and night with the gamers, parents, insomniacs, preteens and aspiring comedians, who are the earliest adopters of the immersive, three-dimensional Internet that Mark Zuckerberg has bet the future of his company. *The New York Times,* 7 October 2022.
SUMMARY OF DESCRIPTION
This is a highly extensive opinion piece on the Metaverse. The author, is a journalist, discusses her experience in the Metaverse. She explores the concept of the metaverse as a three-dimensional Internet where users can interact with one another in a virtual reality. The author shares her experiences of using the Oculus Quest 2 headset to explore different virtual worlds and meet other users. She also interviews experts and executives from companies like Facebook (now Meta) to discuss the potential benefits and challenges of creating a seamless Metaverse experience. While some see the Metaverse as a promising new frontier for social interaction and entertainment, others are concerned about the impact it may have on privacy, mental health and inequality. The article also explores the technology behind virtual reality headsets, like the Oculus Quest 2, and the challenges involved in creating a seamless virtual reality experience.

The author interviews executives from Meta about their efforts to make the headset more comfortable and to develop new ways for users to interact with the metaverse without a headset. They also discuss the potential of other emerging technologies, such as haptic feedback and brain-computer interfaces to enhance the Metaverse experience.	
ELEMENTS DEPICTING THE MATAVERSE AS "EXTENSION"	
Overcoming space and time	The author explores how users can overcome the limitations of physical space and time by interacting with one another in a virtual environment. The article also discusses the potential benefits and challenges of creating a seamless Metaverse experience, including concerns about privacy, mental health and inequality.
Extending or enhancing senses and abilities	The article discusses how the Metaverse can extend or enhance our senses and ability ties using virtual reality headsets and other technologies. For example, the author describes how they were transported to a mountainside villa in the Metaverse when they put on the Oculus Quest 2 headset, and how they could change the virtual environment like desktop wallpaper. This allows users to experience new sights, sounds and sensations that are not possible in the physical world. The article also mentions how emerging technologies like haptic feedback and brain-computer interfaces could enhance the Metaverse experience by allowing users to feel and control virtual objects with their bodies and minds.
Alter perceptions	The article discusses how the Metaverse can alter our perceptions of social interaction by allowing us to meet and interact with people from all over the world in a virtual environment. This can create a sense of presence and connection that is not possible through traditional social media platforms. The article notes that there are concerns about ways in which the Metaverse could alter our perceptions of reality, which, in turn, may lead to addiction, mental health issues and other unintended consequences.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	The types of messages created in the Metaverse may vary widely, depending on the virtual world/space or experience in which the users are involved, and other factors. We can say that this article is mostly concerned with social messages. Users can interact with one another in the Metaverse and create social messages through their avatars.

	This may include messages of friendship, support, humour and even trolling and harassment.
Relationship to other media	The article does not directly or indirectly discuss how the Metaverse relates to other media. However, it does suggest that the Metaverse represents a significant technological shift with the potential of far-reaching implications for the way we interact with one another and the way in which we experience the world. As such, it is possible that the Metaverse could influence other types of media in a variety of ways.
Communication behaviour	It notes that the Metaverse offers a new platform for social interaction, where users can create and explore virtual worlds and interact with one another through their avatars. The article also acknowledges that communication behaviour may vary widely in the Metaverse, depending on the virtual world or experience, the users involved and other factors. The author addresses the problem of trolling and harassment within the Metaverse, highlighting it as an emerging battleground for such conduct. The text outlines measures introduced by Meta, the entity responsible for the Metaverse, to combat virtual harassment and aggression. These measures include a personal boundary feature to prevent avatars from approaching too closely, a "safe mode" enabling users to retreat into a private space, a mute option to silence other avatars, and a polling feature to assess if a group believes a disruptive user should be expelled. It suggests that communication behaviour in the Metaverse is still evolving and that there are both opportunities and challenges associated with this new form of social interaction.
Content favoured by media	The article gives examples of the types of experiences that are currently available in the Metaverse, including virtual concerts, art exhibitions and other forms of entertainment. It also notes that the Metaverse has the potential to transform several aspects of our lives, from education and healthcare to shopping and socialising. As such, it is likely that a wide range of content will be developed for the Metaverse in the coming years, as creators and businesses explore the possibilities of this new medium.

5.2.1.2 “Just a girl looking for love in the Metaverse”

TITLE	
Madeleine Aggeler. 2023 “Phantom Touch” and the (real) pleasures of virtual dating. Just a girl looking for love in the Metaverse. *The New York Times*, 21 June 2023.	
SUMMARY OF DESCRIPTION	
Madeleine Aggeler explores the world of virtual dating, discussing the benefits and challenges of finding love in the Metaverse. She shares personal experiences of virtual dating, including technical difficulties and unexpected connections. The article also discusses the rise of virtual dating during the pandemic, as well as the potential benefits for users with social anxiety or limited mobility. The author notes that virtual dating can be a safe space for users. She notes though, that virtual reality technology has been around for decades without ever really taking off, and discusses some of the limitations and disadvantages of virtual dating. For example, the author notes that it can be expensive and it requires a certain level of technical expertise. Additionally, virtual dating can be isolating and lacks the physical touch and intimacy of in-person dating.	
ELEMENTS DEPICTING THE MATAVERSE AS “EXTENSION”	
Overcoming space and time	The article explains that virtual dating in the Metaverse can overcome space and time by allowing users to create and interact with virtual environments and avatars. In doing so, users can feel like they are physically present in a shared space, even if they are in different parts of the real world. This creates a sense of connection and intimacy that transcends physical distance. Overall, the article explores the ways in which virtual dating may help people form deeper connections and overcome some of the limitations of traditional dating.
Extending or enhancing senses and abilities	The article focuses on how virtual reality technology can create a feeling of presence and immersion that can enhance the user's experience. The article further suggests that, in the Metaverse, the user's sense of connection, creativity and self-expression may be enhanced. However, it does not discuss any enhancement of physical abilities.
Alter perceptions	Additionally, virtual reality can allow users to experiment safely with their sexual identity and/or gender expression, which may be empowering and liberating. The article also discusses how virtual dating services, like Nevermet and Flirtual, allow users to connect with

	potential partners, based on shared interests and values, rather than just physical appearance. This suggests that the Metaverse may offer a unique and thrilling experience that can alter perceptions of self, others and the world around us.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	The article mentions that users can engage in various types of communication and interaction in the Metaverse. For instance, it describes a thriving social scene that is often full of drama, intrigue, binge-drinking and erotic role play (ERP), which refers to virtual reality sex.
Relationship to other media	The author mentions that virtual reality (VR) dating services like, Nevermet, Flirtual and Single Town, are becoming increasingly popular. Additionally, it is recorded that Match Group – the company behind apps like Match, OkCupid, Tinder and Hinge – has announced plans to launch a virtual space for singles to meet and organise pixelated engagements. The article also notes that there was already a thriving social scene in the Metaverse before savvy developers began putting out apps for it. While the article does not provide a detailed discussion of other media, it does suggest that virtual dating is a growing trend that is becoming increasingly mainstream.
Communication behaviour	The article suggests that communication behaviour in the Metaverse can vary widely, depending on the context and the users involved. As previously noted, the author states that users can engage in various types of communication and interaction, including socialising, dating, and engaging in role play. The article mentions that virtual dating services like Nevermet and Flirtual work by allowing users to create profiles and connect with potential partners based on shared interests and values. While the article does not provide a detailed discussion of the content of communication, it suggests that the metaverse offers a wide range of opportunities for communication and interaction.

5.2.1.3 "I've seen the Metaverse – and I don't want it"

TITLE	
Keza Macdonald. 2022. I've seen the Metaverse and I don't want it. *The Guardian*, 25 January. The tech world has been overtaken by the seductive idea of a virtual utopia, but what is on offer looks more like a late-capitalist technocratic nightmare. *The Guardian*, 25 January 2022.	
SUMMARY OF DESCRIPTION	
The author, who has spent a significant portion of her life in virtual worlds, expresses her concerns about the Metaverse, which, in her opinion, has become more aligned with a virtual utopia that is being promoted by the tech world. She argues that what is being offered, looks more like a late-capitalist technocratic nightmare in which our attention is continuously tracked and monetised. The author also questions the idea of artificial scarcity, which is being taken to an absurd extreme in the Metaverse, and the current NFT (non-fungible token) gold rush, which erodes her faith in humanity. She concludes that the Metaverse may be a distraction from what giant companies are doing to the real world.	
ELEMENTS DEPICTING THE METAVERSE AS "EXTENSION"	
Overcoming space and time	The author explains that the Metaverse allows people to interact with one another and digital objects in real-time, regardless of their physical location. This is made possible by the use of advanced technologies, such as virtual reality, augmented reality and blockchain. The Metaverse creates a shared digital space that transcends physical boundaries, allowing people to connect and collaborate in ways that have previously been impossible. However, as stated in the article, the Metaverse is still in its early stages of development, and there are numerous technical and social challenges that need to be addressed before it can become a truly immersive and inclusive experience for everyone.
Extending or enhancing senses and abilities	In this article, extending senses is not directly discussed. However, in mentioning the use of virtual reality and augmented reality, it is apparent that these may create immersive and interactive experiences that engage multiple senses. For example, virtual reality can create a fully immersive 3D environment that allows users to see and interact with digital objects as if they were real, while augmented reality can

	overlay digital information onto the real world, thereby enhancing the user's perception of their surroundings. These technologies have the potential to create new forms of sensory experiences that go beyond what is possible in the physical world.
Alter perceptions	Virtual worlds can be used as an escape from the inequalities and injustices of the real world, and they can provide a sense of community and belonging for people who may feel isolated or marginalised in their physical lives. On the other hand, the Metaverse is constructed by people to whom the problems of the real world are mostly invisible. Therefore, it is possible that the Metaverse may alter perceptions in both positive and negative ways.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	This informational opinion piece addresses various issues related to the development and use of the Metaverse, including the potential benefits and drawbacks of virtual worlds, the challenges of creating an inclusive and safe digital space, and the need for companies to address issues such as worker exploitation, misogyny, homophobia and racism in their virtual worlds.
Relationship to other media	The author mentions that the current buzzword for the virtual world is "the Metaverse" and that, if a Metaverse is where the real and virtual worlds collide, then Instagram is a Metaverse. This suggests that the Metaverse can be viewed as a new form of media that combines elements of the real with those of virtual worlds. The author also notes that companies like Epic Games and Facebook are investing billions of dollars in the Metaverse, which suggests that it is likely to become a major player in the media landscape in the future.
Communication behaviour	The article also notes that nobody has found a way yet to moderate anywhere online to keep it free from abuse and toxicity and manipulation by bad actors. This suggests that communication behaviour in the Metaverse may be subject to the same challenges and issues as communication behaviour in other online spaces.
Content favoured by media	The author mentions examples of virtual worlds and Metaverse platforms that currently exist, such as Second Life, Fortnite, Roblox and VRChat. These platforms offer a wide range of content, including games, social experiences, creative tools and immersive environments. The article also notes that the Metaverse is being

	developed by tech billionaires and companies such as Facebook/Meta and Microsoft, which may have their own ideas about the content that should be favoured in the Metaverse. Therefore, it is possible that for the content favoured by the Metaverse to be influenced by a variety of factors, including the interests and values of its creators, the preferences of its users, and the economic and political forces shaping the digital landscape.

5.2.1.4 ”My Sad, Lonely, Expensive … Adventures …”

TITLE	
Farhad Manjoo. 2022. My sad, lonely, expensive adventures in Zuckerberg’s V.R. *The New York Times*, 4 November 2022.	
SUMMARY OF DESCRIPTION	
The article discusses Meta's investment in the Metaverse, a virtual-reality wonderland that Mark Zuckerberg believes represents the future of human connection. The author, Farhad Manjoo, explores the financial side of Meta investment and raises questions about the accounting department of the company. Manjoo notes that, despite Meta's staggering investment in the Metaverse, the virtual theme park, Horizon Worlds, is largely abandoned and a waste of money. He argues that Meta is burning billions on a party that nobody wants to attend, and that the company lacks original and innovative thought.	
ELEMENTS DEPICTING THE MATAVERSE AS “EXTENSION”	
Overcoming space and time	The article does not explore or directly address the issue of overcoming space and time. However, it does describe Horizon Worlds as a virtual reality platform that is meant to be a social corner of Meta's Metaverse where people can hang out, chat with friends and strangers, play games and explore the digital future of human relationships across the globe.
Extending or enhancing senses and abilities	The article mentions that, by using VR headsets and other devices, people can enter virtual worlds and interact with others in ways that would not have been possible in the physical world. In this sense, virtual reality can help to overcome the limitations of physical space and time, allowing people to connect and communicate in new and exciting ways.

Alter perceptions	The article mentions that virtual reality may have negative effects on perception, such as causing motion sickness or disorientation Overall, while the article does not provide a comprehensive answer to the question of how perception can be altered, it does touch on some of the ways of virtual reality potentially affecting our perception of the world.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	The article discusses the author's experiences with virtual reality in Horizon Worlds of Meta. While the article touches on various aspects of virtual reality, it does not provide a detailed explanation of the types of messages in the Metaverse.
Relationship to other media	The author mentions that virtual reality is a new and emerging technology that is still in its early stages of development, and that it has the potential to transform various aspects of human experience, including communication, entertainment and education. Although the article does not provide a detailed comparison of virtual reality to other media, it does suggest that virtual reality is a unique and powerful technology that has the potential to transform various aspects of human experience.
Communication behaviour	The author also describes his experiences in Meta's Horizon Worlds, where he found that conversations frequently went little deeper than "hey" and "how you doin'?" This suggests that the communication behaviour in the virtual reality may be different from that in other media, and that there may be a need for new norms and conventions to emerge as virtual reality becomes more widespread.
Content favoured by media	The author describes his experiences in Horizon Worlds, where he found that the virtual theme park was often buggy, empty and lacked engaging content. He found that most of the "worlds" he visited were deserted, with conversations frequently going little deeper than "hey" and "how you doin'?" Overall, while the article does not provide a detailed analysis of the content communicated in the metaverse, it does suggest that there may be a need for more engaging and immersive experiences to be developed to make virtual reality a more compelling medium for communication and social interaction.

5.2.1.5 “Here is what it looks like”

TITLE	
Dan Patterson & M Bidar. 2022. You’ve heard of the Metaverse. Here is wat it looks like. *CBC NEWS*, 3 March 2022.	
SUMMARY OF DESCRIPTION	
The article discusses the rise of the Metaverse – a 3D social network that offers a unique and immersive experience where users can connect with others, attend events and even meditate. The Metaverse is viewed as the next big thing in tech, with companies like Facebook investing heavily in its development. The article also discusses the history of virtual worlds, including Second Life, and how the Metaverse is different. The Metaverse offers richer opportunities for socialising than the real world, and users can attend events and activities beyond gaming. The article concludes by noting that the Metaverse raises important questions about data privacy and regulation.	
ELEMENTS DEPICTING THE MATAVERSE AS “EXTENSION”	
Overcoming space and time	The article mentions that the Metaverse is a virtual space in which users can interact with one another and with virtual objects and environments. Instead of physical locations, the Metaverse consists of virtual spaces or "worlds" with which users can interact and explore. These virtual spaces can be designed to resemble real-world locations or to be entirely fantastical, and can range in size from small rooms to entire virtual worlds. Users can navigate these spaces using their avatars, which are virtual representations of themselves that they can customise to their liking. The Metaverse thus offers a new kind of space for social interaction and exploration that is not limited by physical distance or real-world constraints. Virtual reality technologies can create immersive experiences that may alter the user's perception of time by simulating environments and activities that may not be possible in the physical world. Virtual reality can create the illusion of being in a different time or of engaging in activities that take longer or shorter amounts of time than they would have in the real world.
Extending or enhancing	It mentions that some virtual reality technologies can simulate physical experiences, such as touch and movement, which, in turn, may enhance the user's immersion in the virtual environment.

senses and abilities	Additionally, the Metaverse can provide users with opportunities to engage in activities that may not have been possible in the physical world, such as flying or exploring fantastical environments.
Alter perceptions	Some technologies in the Metaverse may create immersive experiences that may alter the user's perception of reality by simulating sensory experiences and environments that may not exist in the physical world. For example, virtual reality can create the illusion of being in a different location or environment, or of interacting with objects and creatures that do not exist in the real world. These experiences may provide a sense of presence and immersion, which, in turn, may alter the user's perception of reality while they are in the virtual environment.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	As a social network, the Metaverse is likely to support various forms of communication between users, such as text chat, voice chat and video chat. Users can also interact with one another and with virtual objects and environments, which can convey information and messages in various ways. A virtual object may represent a message or idea, or a virtual environment may convey a particular mood or atmosphere.
Relationship to other media	As a virtual environment, the Metaverse supports various forms of media, such as images, videos and interactive experiences. Users can create and share their own media in the Metaverse, such as virtual art installations or interactive games. In this way, the Metaverse offers a new kind of space for creative expression and exploration that is not limited by physical materials.
Communication behaviour	Similar to any social network, people in the Metaverse behave in a variety of ways. Some users may be there to socialise and make new friends, while others may be there to attend events or explore virtual environments. Users can interact with one another and with virtual objects and environments, which can create a sense of presence and immersion. It offers opportunities for creative expression and exploration, such as building virtual objects or designing virtual environments.

Content favoured by media	The Metaverse is a 3D social network in which users can create avatars and interact with one another in virtual environments. Instead of a traditional news feed, users can explore social hubs, where they can share news, gossip and play games. The Metaverse offers a new type of space for social interaction.

5.2.1.6 "I threw a holiday party in horizon worlds"

TITLE	
Eric Revenscraft. 2023a. I threw a holiday party in horizon world. It didn't go well. *WIRED*, 3 January 2023. Zuck promised his "Metaverse'' could bring people together. All I got were glitches and disappointment. *WIRED*, 3 January 2023.	
SUMMARY OF DESCRIPTION	
The article is Eric Ravenscraft's personal account of his experience hosting a holiday party in Horizon Worlds, a virtual reality platform of Meta. Despite his initial excitement, he found the glitches and lack of depth in the platform disappointing. He questions the efficiency of the Metaverse in bringing people together and suggests that existing technologies like Zoom may be more effective. The article expresses scepticism towards the concept of the Metaverse.	
ELEMENTS DEPICTING THE METAVERSE AS "EXTENSION"	
Overcoming space and time	This article does not contain a direct reference to overcoming space and time. However, the author does note that the physical challenges of wearing a VR headset may be taxing, which may affect the length of time that users can spend comfortably in the Metaverse.
Extending or enhancing senses and abilities	The author does not provide a discussion on the way in which the Metaverse enhances physical abilities. In fact, the author notes that wearing a VR headset is physically taxing and may be challenging for users. While the Metaverse may offer opportunities for physical activity and interaction with physics-based games, the author suggests that the current technology has limitations and may not be as physically engaging as traditional forms of exercise or gaming.
Alter perceptions	Although the article does not provide a specific discussion on alteration of perceptions, it does discuss the limitations of the physics-based games and interactive toys available in Horizon Worlds, which

	may affect the perception of space and immersion in the virtual environment.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	The article does not provide information on messages. It primarily discusses the author's experience of using the Horizon Worlds Metaverse, while reflecting on the current state of virtual reality technology.
Relationship to other media	The author does make a number of comparisons to other technologies. For example, the author notes that the physics-based games and toys in Horizon Worlds are similar to those found on the Nintendo Wii, which was released in 2006. He also compares the process of organising an event in Horizon Worlds to using Zoom.
Communication behaviour	In terms of behaviour, the article primarily discusses the behaviour of the author and his friends while using VR technology. For example, the author describes how he and his friends played various physics-based games and toys in Horizon Worlds, such as virtual air hockey, laser tag and basketball. The document also mentions how the author's friend, Adrienne, tricked them into thinking she was good at basketball by using an auto-aim ball.
Content favoured by media	In terms of specific technologies or content, the document discusses various physics-based games and toys that the author and his friends played in Horizon Worlds, such as virtual air hockey, laser tag and basketball. The author notes that, while these games are fun, they lack depth and can only hold players' attention for a brief time. The document also mentions the limitations of current virtual reality technology, such as lagging and unresponsive controls.

5.2.1.7 "On your marks, headset, go …"

TITLE
Oliver Roeder. 2023. On your marks, headset, go: my surprising, scary trip to the Metaverse.. Do virtual reality games show us the promise of the Metaverse? And are they a model for life itself? *The Financial Times*, 24 February 2023.

SUMMARY OF DESCRIPTION	
The article explores the potential of virtual reality (VR) games and their relationship to the Metaverse – a digital world that is distinct from VR games. Roeder describes his experiences playing various VR games and discusses the benefits and drawbacks of the Metaverse. He also considers the potential impact of the Metaverse on our understanding of reality and our daily lives. Roeder concludes that the Metaverse does have the potential to be a transformative technology, but that it also poses significant risks and challenges.	
ELEMENTS DEPICTING THE MATAVERSE AS "EXTENSION"	
Overcoming space and time	The article does not refer to space and time perception. The author notes that the Metaverse is a digital world that is distinct from the real world, but which can be accessed through virtual reality games and other immersive technologies. It is possible for the Metaverse to overcomes space by creating a new kind of digital space that can be accessed from anywhere. The Metaverse is defined as a collective, virtual shared space that emerges from the blending of virtually augmented physical reality with a continuous, physically consistent virtual space. This encompasses all virtual worlds, augmented reality, and the Internet. As a fully immersive and interactive virtual environment, it enables users to participate in diverse experiences and interact with others within this shared realm.
Extending or enhancing senses and abilities	The article does not explicitly refer to how the Metaverse can enhance senses. It primarily discusses the potential impact of the Metaverse on our interactions with others, as well as the potential of virtual reality games to shape the development of technology and popularise a broader Metaverse.
Alter perceptions	The article discusses the potential impact of the Metaverse on our understanding of reality and social interactions. The author notes that the Metaverse is a place in which certain joys of the real world are muted and certain pains amplified. For example, trying to press a virtual button, the author knocked over a real glass of water – an action he has performed many times in the real world without incident. The article also suggests that VR technology is a catalyst for terror, as it can leave players helpless within a threatening world. However, the author also notes that games in a virtual reality can capture essential

	elements of living and human agency, and that they may shape the development of technology and popularise a broader Metaverse. The article suggests that the Metaverse has the potential to enhance and distort our understanding of reality and our interactions with others.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	The article does not specifically discuss content in terms of the actual messages or information conveyed in VR games or the in Metaverse. However, it does explore the potential of these technologies to shape social behaviour and interaction, as well as the development of technology more broadly.
Relationship to other media	In terms of the relationship to other technologies, the article discusses how virtual reality games and the Metaverse are related to other emerging technologies, such as spatial computing and artificial intelligence (AI). It notes that virtual reality games may help to shape the development of these technologies by providing a platform for experimentation and innovation. The article also explores how virtual reality games and the Metaverse are related to broader social and cultural trends, such as the increasing importance of digital communication and the blurring of boundaries between physical and virtual reality.
Communication behaviour	The article discusses how the Metaverse and VR games may impact communication behaviour by allowing users to interact with others in a shared virtual space. It notes that virtual reality may foster a sense of bodily presence and vulnerability, which may lead to strong bodily reactions and emotional responses.
Content favoured by media	Virtual reality games are one example of a possible experience in the Metaverse, as these games allow users to enter and interact with a virtual world through a headset or other device. The article explores the potential of VR games to shape the development of technology and popularise a broader Metaverse.

5.2.1.8 "My Metaverse diary …"

TITLE	
Io Dodds. 2022. My Metaverse diary: what it's like to live, work and shop inside the Internet. *The Telegraph*, 8 October. Mark Zuckerberg has bet his reputation on it – but is the emerging digital frontier really the future of tech? *The Telegraph*, 8 October 2022.	
SUMMARY OF DESCRIPTION	
The article offers a comprehensive guide to the Metaverse, an emerging digital frontier that is being developed as a new way of living, working and socialising on the Internet. The document includes descriptions of various Metaverse applications, such as virtual reality (VR) meeting apps and social apps, as well as insights into the potential benefits and challenges of this new technology. The author also discusses Mark Zuckerberg's ambitious plans for the Metaverse and the massive investments being made in related technology. The article is written in a diary-style format, with the author sharing the personal experiences of living in the Metaverse and exploring its various applications. Overall, the document provides a fascinating insight into this exciting new technology and its potential to transform the way we live and work in the future.	
ELEMENTS DEPICTING THE MATAVERSE AS "EXTENSION"	
Overcoming space and time	The author mentions the idea of the Metaverse overcoming physical constraints in a few ways. For example, it discusses how virtual reality and augmented reality headsets can allow people to work and collaborate with others from anywhere in the world, essentially eliminating the need for a physical office. It also talks about how people can explore virtual worlds and attend events without leaving their homes, which may be particularly useful for those with mobility issues or those who live in remote areas. It mentions how the Metaverse could allow people to experience things that would have been impossible in the physical world, such as flying or visiting other planets.
Extending or enhancing senses and abilities	The article contains a discussion on the way in which the Metaverse can engage our senses in new and exciting ways. For example, it discussed the way in which virtual reality headsets can create a sense of presence and immersion, allowing users to feel as if they were actually in a different place. It also mentions how virtual environments

	can be designed to stimulate our senses in ways that would have been impossible in the physical world, such as by creating fantastical landscapes or allowing us to fly. Additionally, it discusses how virtual events can incorporate music, sound effects and other sensory elements to create a more engaging experience.
Alter perceptions	It discusses how the Metaverse can affect our perception of reality by creating a sense of presence and immersion in the Metaverse, allowing users to feel as if they were really in a different place. It also mentions how our brains can quickly begin to accept virtual environments as reality, even though we know, on some level, that they are not. It also mentions how virtual environments can be designed to manipulate our perceptions in interesting ways, such as by creating optical illusions or playing with scale.
ELEMENTS RELATED TO MEDIA ECOLOGY	
Type of messages	In the Metaverse, users can share a wide range of information, including text, images, videos and audio. They can also engage in activities such as gaming, shopping, attending events and socialising with others. The Metaverse is designed as a fully immersive experience, where users can feel as if they were really present in a different place and, as such, it offers a unique platform for communication and collaboration.
Relationship to other media	Although the article does not explicitly refer to other media, it does mention technologies related to the Metaverse, which include virtual reality (VR) and augmented reality (AR) headsets, which are central to Zuckerberg's vision of the Metaverse. It also mentions the potential for Metaverse-related technology to become the smartphones of tomorrow, with AR headsets accompanying us everywhere we go. Additionally, it mentions the use of AR and VR technology to visit the theatre and attend events, as well as the potential for Metaverse-related technology to revolutionise the way we work and shop.
Communication behaviour	In terms of communication behaviour, the author mentions that the Metaverse offers a unique platform for communication and collaboration. Users can interact with one another and with digital objects in real-time, sharing a wide range of information, including text, images, videos and audio. He also notes that the Metaverse can be more intimate and exciting than a Zoom call, and that users can shed

	aspects of their offline selves with which they are uncomfortable or find like-minded people to spend time with. Additionally, he describes how users can engage in activities such as gaming, shopping, attending events and socialising with others in the Metaverse, all of which involve various forms of communication behaviour.
Content favoured by media	Concerning the content favoured by the Metaverse, the article mentions that the Metaverse is based on 3D virtual worlds, which are different from the flat pages and social media feeds of the current web.

5.2.2 Meta Quest 2 user instructions

The instructions outlined in this section are included in the user manual that is included with the Meta Quest 2 Oculus and hand controllers. This information is useful for this investigation, in that it provides insight into how users should interact with and navigate their use. This directly relates to physical extensions of man in terms visuals space, acoustic space and tactility.

The first step in getting started with the Meta Quest 2 VR headset involves the unboxing process. When you first remove the slipcover and open the box, the Quest 2 headset is cradled in the middle, with touch controllers on either side. A spacer for users wearing glasses is also included. Installing the spacer involves popping off the foam and the plastic face pad, inserting the spacer, and then replacing the face pad.

Safety is clearly a paramount concern when using the headset. The manual presents several guidelines for a secure virtual reality experience. One crucial feature is the Guardian boundary system, which demarcates your play area to prevent you from bumping into real-world obstacles. It is advised to inform others in your household about your play area to avoid accidents. Frequent breaks are recommended – ideally every 30 minutes – to prevent discomfort or injury.

The headset lenses are sensitive to sunlight and should be stored away from direct exposure. Users are also cautioned against performing a factory reset or mistreating the controllers, as these actions may result in loss of games and diminished device performance.

Wearing the headset properly ensures a more immersive and comfortable experience. The manual advises loosening the side and top straps before positioning the headset on your head. The straps should be tightened, so that the device fits snugly without applying too much pressure. For those wearing glasses, a special spacer is provided for additional comfort. The headset also features an image slider for manual adjustment of visual clarity.

Setting up the Guardian is another crucial step for a safe experience. During the initial setup, you will be prompted to define your play area according to specific size requirements outlined in the manual. The Guardian system can be reset through the settings menu, but it is essential to remember that it is not foolproof. Awareness of your physical surroundings is still needed to prevent accidents.

The Quest 2 features Oculus Touch controllers that offer a highly interactive experience. These controllers have traditional action buttons, thumb-sticks and analogue triggers. Each button has a specific function: the trigger, A and X buttons are used to make selections, while the B and Y buttons serve as the "back" option. The Oculus button can be used to return to Oculus Home or to reset controller orientation. Individual games may offer their own tutorials for controller use.

Connecting to a Wi-Fi network involves navigating to the Settings from the bottom toolbar, while wearing your headset. Once there, choose Wi-Fi and select the network to which you want to connect. Input any required passwords and then connect.

Once the initial setup has been completed, you are ready to start playing games in virtual reality. Free games like Horizon Worlds or VRChat are good starting points, as they are games that are marked "Comfortable" in the Quest 2 store. Frequent breaks are still recommended to prevent discomfort.

Once you have set up your Guardian, findings games is a straightforward process. Your installed games are in the Library/Apps folder, accessible from the VR Menu. Some games may need to be sideloaded and will be found in the Library/Unknown Sources/Quest App Launcher folder. As a security measure, you should only download games from trusted sources.

5.2.3 VRChat regulation, codes of conduct and ethical standards

Personal experience of immersion in the Metaverse (to be discussed in Section 4.5), has made it clear that VRChat would be the predominant “chat room” where experiences would take place. Control, regulation, policy and ethical standards relate directly to the media ecological impact of the Metaverse. Upon entering each of the “worlds”, the rules outlined in the following paragraphs are presented to the user.

VRChat is a platform that gathers individuals from various walks of life around the world. The environment offers a range of unique experiences, which can vary from fun and uplifting to unconventional and potentially inspiring. This wide range of experiences exists primarily because of the dedicated community. The aim is to ensure that VRChat remains a secure and enjoyable digital space, with the Terms of Service serving as the foundational regulation. The Community Guidelines act as an auxiliary framework, providing additional clarity on expected behavior within the platform.

These guidelines highlight two fundamental principles. – Firstly, users should avoid actions that have the potential to harm or distress others. Behaviour that may cause emotional or physical inconvenience is strongly discouraged. Secondly, privacy remains a key concern.

Users in possession of sensitive or provocative material are advised to share such content only within private spaces where explicit consent from all participants has been obtained.

The Community Guidelines intend to provide context and elaboration for the broader rules laid out in the Terms of Service. Given that both the Internet and societal norms are subject to change, the platform reserves the right to adapt these guidelines and enforce sanctions on a case-by-case basis, all with the objective of maintaining a safe community environment.

For those focusing on content creation, specific Creator Guidelines offer a comprehensive set of directives. Further general behavioural guidelines encourage treating all individuals with respect and understanding. The age requirement for using VRChat or its related services is set at a minimum of 13 years, with individuals aged between 13 and 17 requiring parental or guardian consent.

Discriminatory language or behaviour, based on attributes like race, gender, or sexual orientation, is explicitly prohibited. Harassment is not tolerated and the platform discourages disputes that devolve into repeated negative comments or behaviours. Illegal activities, the use for medical therapy, or impersonation of authority figures are also not permitted in VRChat. Technical guidelines explicitly state that activities like reverse engineering or unauthorised system access are disallowed.

The platform offers a variety of instance types, each with its corresponding set of rules and guidelines, depending on whether the instance is public or private. Group instances come with specific norms that should ideally align with the core principles of VRChat of preventing hate, harm, or harassment. Although community moderation within these instances is encouraged, any rules set by groups should not override the overarching regulations set by VRChat.

Conduct outside VRChat, such as harassment across other social platforms, should ideally be reported by using the specific reporting mechanisms those platforms. The commitment to community safety extends beyond the immediate environment of VRChat, establishing it as a shared responsibility among all users.

5.2.4 Personal immersion experience

The following discussion portrays personal experiences in the Metaverse. These accounts clearly depict the exploratory nature of this study. The descriptions of the experiences are real and authentic. The focus of this discussion is on depicting the Metaverse in terms of extensions of man and the effects on media ecology. The accounts are that of a novice Meta Quest 2 user and a novice visitor in the Metaverse.

5.2.4.1 Setting up and getting started

Upon opening the box, I experience a sense of anxiety. – Seeing the Oculus and controllers for the first time and considering the knowledge that I required to engage with them was rather intimidating. I carefully unboxed them and laid them down on the coffee table, trying to determine what it is that I would have to do next. I briefly scanned the Meta Quest 2 user guide, but decided to resort to watching a YouTube video for guidance, which was unsuccessful too.

I decided to ask my teenage daughter to assist me. The generational divide soon became apparent between me (a Generation Xer) and her, with my generation being slower to adopt newer technologies. My Generation Z daughter ignored the instruction manual, and she watched a YouTube video too. I am still not sure exactly what she did, but in no time, the oculus was set up and ready for use.

One of the first options with which you are provided, is to setup a PayPal account or enter your credit card details, which, at that time, I did not know the reason for.

When I managed to don the Oculus, I struggled to get a good grip on the controllers, being confused by the different buttons and leavers and their functionality. The next step was to set up a “room scale”. At this stage, you can see through the Oculus (the lenses become transparent, which is probably what is meant by “mixed reality”), in order to adjust your real environment. Before knowing exactly what I wanted, I cleared a two-by-two meter area (as suggested) in the dining room and drew a circle around the area by pointing the controllers in those directions. My “room scale” was now set up as a safe zone, where I could freely move around without hurting myself or breaking anything in the house.

5.2.4.2 My avatar

At this point, I found myself in a breathtaking mountain villa with a beautiful view of mountains and a river flowing through the mountains, with the sounds of birds, the river and wind blowing through the trees. I was looking at a beautiful sunset with a few air balloons in the sky. The room is furnished with large soft couches, hanging chairs and a large dining room table. It was a truly immersive experience and I was sure I could feel the cool air against my skin.

Still in the mountain villa, I was presented with a display, similar to that of a laptop, in which I could now create my avatar. Although I guess you can start anywhere, I went to “edit avatar” on the screen. Starting with “body type” seemed the most natural to me. Of course, I made my avatar somewhat skinnier than I actually am. You can go on to select and change any features from hair to makeup, to eye shape, etc.

When I began selecting an outfit, I realised why they asked for my credit card details. There were only a few outfits on display from which I could choose at free of charge. More extravagant or diverse outfits are available at a price. Because I like blue, I chose a blue puffer jacket with jeans and boots. I chose to wear my hair in a ponytail – and there I was, happy with my avatar.

5.2.4.3 The tutorial

Before anything else, you are advised to do the tutorial. When in the tutorial, you have to go through it from start to finish before you can leave. While standing in your “safe zone”, you find yourself in front of a counter presented with an array of objects. You have a round pink hanging ball that you can hit several times, as it swings about by making a fist. You are also presented with a ping-pong ball, a bat, and several square blocks you can stack and throw around. As you move along with the tutorial, you are rewarded with the phrase “it seems like you are getting a hang on this”.

At this point, it becomes slightly more complicated, in that you should use the to navigate an airship and launch several rockets into the air. When you are done with this, you receive a tape cassette-like object that you have to insert in a slot, which takes you to the next game, where you choose a gun and are supposed to shoot at several star-like objects flying your way. After successfully completing this game, you move on to the next, where you find yourself dancing with a rubber-like stick figure with a friendly face that mimics your dance moves. When done with this, you can exit the tutorial.

At that stage, I found myself exhausted and took the headset off. What felt like 20 minutes, turned out to be almost two hours. After that, we did research to determine which “chat room” options were available to me. With disappointment, I realised that Horizon Worlds was not available in South Africa. I continued looking for places to go where I could meet people. There were only a few options available for free and I ended up going to a site called “VRChat”.

5.2.4.4 VRChat

I found myself in a room with a casino look and feel to it. – It had purplish walls and red velvet couches and what looked like different games mounted against the walls. I looked around and found what looked like a snack bar. What was on selection were different, more playful avatars from which I could choose. I noticed a cat-like image, a large orange dinosaur, a Lego man, a ghost and what looked like a pink doll.

I chose the pink doll and to my surprise I found myself being a cute pink avatar with a pink hoody and a pink dinosaur tail. I waked around a bit and realised that what looked like the games mounted on the walls were in fact portals to different worlds within VRChat I could visit. It later became clear that that this would be the room I would visit several times in my Metaverse journey as very few other free options were available. There is a wide selection of gaming worlds available, and I guessed that that is one of the popular purposes of the Metaverse. I was however more interested in exploring and meeting people.

Before I could enter any of the VRChat world, I needed to read through expansive safety and trust system regulations, including community guidelines. It seemed to be generally well regulated, though there were instances where I felt harassed by “trolls”, and many instances of foul language.

5.2.4.5 Urban Bird Sanctuary

I moved around and saw a portal to a world that I could visit. The world, which resembled a bird park, was called the “Urban Bird Sanctury”. When entering the bird park, all I could see was ducks. I could touch them, and they would respond by running around and making duck noises. This was enjoyable and it felt as if I really interacted with the ducks. It was rather noisy in the park, as several avatars were talking and laughing. I just walked around and observed what they were doing, too scared to interfere with their conversations.

A cat-like avatar approached me and called me in his/her direction with a hand gesture. I walked in the avatar's direction and saw a stand with a red button with the sign "Donate to park". I tried to press the button, but I just heard a buzzing noise. When nothing happened if I repeatedly pressed the button, I wondered if something would have happened if I could actually pay an amount to donate to the park. While struggling to press the button, I somehow managed to turn on my "self-mirror" through which I could see what my avatar's face looks like. I had a quite pointy nose and big, green eyes. My mouth moved as a talked and, if I blink my eyes, my avatar blinked.

With this, the avatar left. I looked around and saw picnic benches with pretty tablecloths. I walked closer and noticed watermelon slices, pears and slices of bread on the table. The ducks came closer to me, and I reached for a slice of watermelon, holding it out for the ducks. As they started pecking away, I could feel with my controllers how they were pecking on the watermelon. I did the same with the slices of bread.

5.2.4.6 Steel and gold

On my second visit to VR Chat, I managed to navigate to a portal to a world with the following instruction the wall: "try playing a social ice breaker game". The name on the portal read "Steel and Gold". I had to read through several instructions and codes of conduct before I could continue, which included that one should not harass users or share any inappropriate content. It also indicated that you could mute users if you feel offended in any way.

When I eventually managed to enter, I found myself in what looked like a barn-like restaurant, but there was no one there. I moved around and started hearing people talking outside the restaurant on the porch. I went outside and found about seven avatars talking and joking. They were rabbits, zombies, a Lego man, a baboon and a very large orange dinosaur.

Although I am an introvert and I would never approach a group of strangers in real life, I decided to try to start a conversation. I said “Hi”, but received no response: they just stared at me and continued with their conversations. When I said “Hi, I’m Therise”, someone responded by saying, “You look foreign”. I took that as an indication that I was new to the group. I realised that this was a group of users who knew one another, and that they were probably teenagers who “hang out” here regularly.

I realised for the first time that other people around you could hear the talking and laughing and other sounds in the virtual environment. My husband left the room indicating that “they sound too obnoxious”. He also said that it made him feel anxious as I am trying to converse with the other avatars. The Oculus Quest 2 obviously did not actual separation from your real physical environment.

I continued to try to make conversations with the other users/avatars on the porch of the barn. I went ahead and said, “I’m from South-Africa”. Someone mumbled, “South Africa. Hmmm”. At this stage, I started feeling rather insecure, but persevered and asked, “Does anyone want to chat with me?” The huge dinosaur said “No” and when I asked, “Why not?”, he said “You are from South Africa, and we ….” I hear what he was mumbling. At this point, I decided to leave the porch, feeling rather rejected and insecure. It became evident that, even cartoon-like characters in a virtual world can hurt your feelings.

While walking around, I realised that I was in a sort of abandoned mining town. There were ox wagons, a saloon, several carts lying around and a pig (I guessed) roasting on an open fire. As I entered the saloon, where all the furniture looked old and broken and was stacked in one corner of the room. I played on an old piano in the saloon for a while, at which point a robot-like avatar entered the room. He said, “Come, come play this game with me” and ran out the room.

I followed him, excited about the fact that someone wanted to interact with me. On the dusty ground, there was one square patch of grass. He hinted at me in the direction of the grass, where there were four other avatars. A sign appeared, saying “Six players ready to enter game”. I found myself in a room with several benches or counters and, as I walked closer, I saw guns and ropes with nooses.

When the avatar said, “Come, lets protect the gold’’, I grabbed a gun and a rope and ran out after him. I could hear guns and saw avatars running around. I did not know what to shoot at, but just shot away at anything. I shot a few avatars and black balls and just repeatedly received the message, “It looks like you’re not trying your best – try again.” I tried to throw the rope with the noose at something, with no success.

5.2.4.7 Epic rollercoaster

When I decided to don the Oculus again, I accidentally selected “Epic Rollercoaster”, which was really not what I intended to do, but I did not know how to go out. A friendly, round bouncy face gave a few instructions and asked, “Are you ok?” When I selected “Yes”, the face instructed me to pull down the handlebars.

I did so and my rollercoaster ride began. It was a truly immersive Ice Mountain world. As you sit in your cable-car, your controllers start to vibrate when your ride starts. It felt like an authentic experience, and I could feel an adrenaline rush as the cable car ascended and descended at a very fast pace. When the cable-car stopped at the top of a mountain, the friendly round face appeared again, asking “Are you ok”? After selecting “Yes”, I went for a second more adventurous ride up and down the mountains and felt dizzy and a bit nauseous when the ride stopped.

5.2.4.8 Winter Company

Becoming slightly more comfortable in the casino-like VRChat room, I decided to enter a portal named “Winter Company”. Upon entering, I found myself in a comforting, warmly lit dining room with a long wooden table with Christmas decorations. As I walked through the room, I could see a beautiful, snowy landscape outside, with rabbits and other small animals playing around in the snow.

Looking back at the table, I got a fright when a saw a tall, fit soldier with dark hair standing on the table. I just stood there for a while, still too scared to approach strangers. The soldier came down from the table and walked my way, we just stared at each other for a short while. I said “Hi” and he responded with waving at me. I asked, “Do you speak English?” He said, “I speak Greek and English. I am Jim”. We tried to continue our conversation, but other avatars started harassing us. It was at this point that I realised that is what is called “trolling”.

Jim said, “Come, follow me, let’s go outside”. I followed him outside into a wintery garden. We continued our conversation. He indicated that he was from Greece and that he and his father owned a property company. I told him about myself and what it was like living in South Africa. He mentioned that he did not want to stay in Greece any longer and that he wanted to go to America, unlike most Grecians who were leaving the country for employment in Russia.

My headset indicated that my power was low, and I was getting rather tired. I told Jim that I might need to leave soon, but would like to “meet-up” again, although I did not know how. He indicated that I needed to accept his friend request. I did not know how to do that, and he gave me instructions. On my console, I could see a notification. I selected it, and accepted his friend request. In this way, I made my first friend, Jim, from Greece in the Metaverse.

5.2.4.9 No Time Two Talk

I do think I should mention my visit to this world, I was not in the mood for talking or any stressful social situation and decided to enter a world I thought was called “No Time To Talk”. I entered a square, red room with a black and white tiled floor and an empty round table in the middle. On all four walls, there were lists and lists of options you could select to describe yourself. After moving around to view all four walls, I decided to select some of the aspects/descriptions listed. There was a section for “genre”, where I selected “Documentaries and mystery”. On the list for “Creative”, I selected “Writing”. Where it indicated what you do, I selected “Student”. There were many other lists of options I could select from but decided to leave it at that and try to determine what it is I should do next.

On one wall, I saw a large sign, saying “Click here to match”. This is when I realised that it was “No time two talk” and not “No time to talk”. I clicked anyway and a large, wooden door appeared and opened, after which a robot-like avatar entered and waved at me. When I said “Hi”, he greeted me, and I continued to explain that I am a new to this and that it is my first time in this word. The robot avatar disappeared.

After a short while, the large door opened again and a guy dressed in formal clothing entered the room. We had a brief conversation and then he also disappeared. With this, I realised that you were matched up with someone “they” think are compatible with you and that you only have two minutes to talk.

A large, yellow teddy bear entered through the door. We introduced ourselves and he mentioned that I had a British accent and asked if I am British. I explained that I was a student and a lecturer from South Africa, after which he also disappeared.

I never selected my gender, but only male avatars came into the room. I decided to leave the world, as two minutes are not enough time to interact with another avatar and I was not sure if this was a sort of speed-dating world.

5.2.4.10 Tunnel – Music Visualizer

I was glad that I decided to visit this world. Upon entering, I found myself in a pitch-back room with a few avatars chatting or just standing around. A doll-like avatar with a cute skirt and blouse started talking to me. This was the first time in my Metaverse experience that a female avatar was interested in chatting with me. She mentioned that she was from Florida and asked if I knew where it was. She added that she was a student and that she was 24 years old. When she asked, I lied about my age saying that I was 25. I told her a little about myself, indicating that I was also a student at the University of South Africa.

On one wall, there was a sign saying, “Udon powered real-time music visualization”. There were several options to select from, including the following options: “Enable colors”; “Enable rotation”; and “Enable scaling”. I was able to select a specific rotating and scaling style. I looked around and saw a sign saying, “Press play to start”. I pressed “Play” and what happened then, is difficult to describe accurately. It felt as if I was in a rotating tunnel, with music playing loudly and with different colours and shapes flying and swiftly passing by. I felt dizzy and lightheaded as I was rotating in the tunnel. It really felt as if I could hear the colours and see the music.

I visited a few other worlds, but in some of them, I was not sure what to do, or how to navigate. With rude and antagonistic avatars, I also felt unwelcome in some worlds. The opposite is also true: in some instances, I shied away from interacting with other avatars, depending on my mood or state of mind.

5.2.4.11 Overall experience

The first aspect that became apparent was accessibility. Firstly, the fact that Facebook's "Horizon Worlds" was not available in South Africa was rather disappointing. In the description of my experience, it was clear that I was limited to virtual spaces for which I did not have to pay. An expansive world of options is available, depending on how much one is willing to pay.

The matter of policy and regulation also seems to be taken seriously in the Metaverse. As mentioned previously, in every world I entered, I needed to read safety and security regulations and what codes of conduct need to be followed before I could enter any of the VR Chat worlds, including its community guidelines. Despite these instructions and codes of conduct, there were several times in which I felt harassed and insulted by what is referred to as "trolls".

The Metaverse is truly an immersive environment and extraordinarily close to reality. In numerous ways, it extends the entire physical body, even allowing for physical activities that are not easily accessible in a real word environment. The avatar acts and behaves like a real extension of the user, including its movements, body language and facial expressions. It extends senses in several way, in that it provides for (sometimes too vivid) visual experiences.

The auditory aspects are also very close to reality, e.g. I found myself in several situations where there were too many avatars talking and I could not hear the avatar to whom I was actually talking. In the sound tunnel, it was amazing to be able "see" music in colours. The Oculus and controllers also provide haptic feedback in a way of vibrations in certain situations. It definitely alters sense ratios, leading to different ways of experiencing the virtual world. I experienced several instances of immersion in different acoustic and visual spaces.

Every virtual word that I visited, had to provide the user with instructions of sorts, and every world had a different theme. In terms of typography, all related aspects were very cleverly designed, so as to make the user part of the theme of the specific world. Because the Metaverse is made up of a community of users and, orality is, by implication, a highly prevalent aspect. Although I was not able to attend any concerts or events, all my conversations like a story of sorts.

The Metaverse definitely alters perceptions of and interactions with space – both physical and virtual. The virtual spaces that I visited, created an exceptionally real experience of being in a different space. When visiting the Metaverse, time perception is also highly pertinent: in all my visits, I spent more than an hour longer than intended.

The potential impact of the Metaverse on identity may be highly notable. As reported, there were several instances in which I felt alienated and harassed. On the other hand, the pleasant interactions made me feel good and excited. Prolonged time in the Metaverse has the potential of having a major impact on individual or collective identity and influencing thought patterns. Compared to other technologies, the user's engagement with the different technologies in the Metaverse is more natural and closer to reality than several technologies coming before the Metaverse.

5.3 Summary

The published accounts of immersion in the Metaverse show diverse and varied experiences. These experiences were examined in terms of two main factors: elements of the experience depicting the Metaverse as an extension of man, and elements related to media ecology.

The explanation on the functionality of the Oculus Quest 2 wearables also provides insights into how the user interacts with the physical technology. It was also important to refer to VRChat, as most accounts of personal experiences occurred in this virtual world. The discussion of the researcher's own account of experiences in the Metaverse also provided valuable insights into the varied types of interactions and accompanied emotional effects that occur in the Metaverse.

In the following chapter, all the collected data and the theoretical discussions will be used to apply the set of criteria outlined in Chapter 3. A set of thirty criteria for the operationalisation of the concept "technology as extensions of man" and aspects related to media ecology will be applied to the Metaverse.

CHAPTER 6: CRITERIA APPLIED TO THE METAVERSE

6.1 Introduction

We have suggested a set of criteria to be used for testing or evaluating the nature and impact of any technology. This can be viewed as a major contribution in this study. The theoretical discussions on “technology of man” and the potential impact of the specific technology on the current media ecological environment inform the development of these criteria.

6.2 Criteria and application to the Metaverse

Table 6.1 suggests how McLuhan’s notion of “technology as extensions of man” and media ecology can be operationalised. The table is structured in terms of the specific criterion, a description of the criterion and methods for evaluation of each criterion. In this way, we will apply the criteria to the Metaverse, which will be based on the theoretical discussion of the Metaverse presented in previous chapters.

Table 6.1: Criteria for the evaluation of the nature and impact of technology

	Criteria	**Description**	**Evaluation**
1	Extension of physical capabilities	The criterion refers to how the technology extend human physical abilities, such as strength, speed and endurance. Technologies can offer enhancements or changes to our physical bodies and our physical interaction with the environment.	Identify the physical function or ability that is enhanced or amplified by the technology. Consider both the intensity and the range of this enhancement.
The Metaverse extends our physical capabilities beyond what is currently possible in the physical world. For example, the Metaverse allows us to interact with digital objects in ways that mimic physical interactions, and it allows us to experience virtual environments that are too dangerous or impractical to experience in the physical world.			

	Criteria	Description	Evaluation
The concept of the "extended mind" put forth by Clark and Chalmers (1998) states that external tools, such as Otto's notebook, can become an integral component of one's memory and an extension of oneself. Similarly, the avatar in the Metaverse can act as an extension of the user's being and consciousness, allowing individuals to participate and connect within a digital environment. This extension of oneself into the digital space enhances physical abilities, such as the ability to navigate and interact with virtual environments, beyond the limitations of the physical body. The Meta Quest Oculus and controller for example, lets users experience and interact with digital environments in ways that can extend and enhance their physical capabilities. Through accurate motion tracking, the controllers capture and translate real-world hand movements into the virtual domain, enabling users to perform tasks, play games and manipulate objects in a way that feels natural and intuitive. For example, from personal experience, one can launch a rocket and shoot a gun in what appears in a real-life setting. In the article on Kashmir Hill's (2022) experience, he notes for example, that virtual reality experiences like "Beat Saber" can provide a form of exercise that is both fun and challenging. The article also suggests that the Metaverse can offer new opportunities for people with disabilities, allowing them to interact with others and explore virtual worlds in ways that may not be possible in the physical world. Additionally, the article notes that the Metaverse could offer new opportunities for remote work and collaboration, allowing people to connect and collaborate with others from anywhere in the world. This could be particularly beneficial for people with mobility issues or other physical limitations that make it difficult to travel or work in traditional office environments. In Madeleine Aggeler's article on dating in the Metaverse in *The New York Times* (2023), she suggests that, as virtual reality technology continues to advance, it may become more immersive and allow users to experience "phantom touch" or other physical sensations, which could deepen feelings of intimacy and connection. Overall, the article suggests that virtual dating can offer a way for users to extend their physical abilities and connect with others in new and exciting ways.			
2	Extension of mental capabilities	Technologies can also expand our cognitive or mental capabilities, such as information processing, memory, problem-solving, calculation, or creativity.	Analyse the cognitive function or capacity that the technology augments. Consider the complexity of tasks it enables.
The Metaverse includes complex virtual spaces in which participants can develop complex thinking skills such as collaborating, managing and communicating with their peers. It has the potential to enhance mental capabilities, such as the ability to process and manipulate information in new and			

<table>
<tr><th></th><th>Criteria</th><th>Description</th><th>Evaluation</th></tr>
<tr><td colspan="4">innovative ways, by providing a platform for users to engage in complex thinking and develop skills that can be transferred to the physical world.

Additionally, the literature review suggests that games in virtual reality, which are a part of the Metaverse, can help hone search techniques and problem-solving strategies.

In Hill’s (2022) experience, she notes that the Metaverse could offer new opportunities for creativity and self-expression. By using tools and technologies that are not available in the physical world, users can create and share content in new and innovative ways,. This could provide new outlets for artistic expression, as well as new opportunities for people to develop their creative skills.

She also addresses the potential of the Metaverse to offer new opportunities for learning and education. For example, she notes that virtual reality experiences could be used to create immersive educational environments, allowing students to explore historical sites, scientific concepts and other subjects in a more engaging and interactive way.</td></tr>
<tr><td>3</td><td>Extension of sensory capabilities</td><td>This criterion assesses how a technology can alter or enhance our sensory experience, changing how we perceive the world.

How does the technology extend human sensory capabilities, such as sight, hearing, touch, taste, or smell?</td><td>Evaluate how the technology augments or changes the human sensory experience. This may involve amplifying a sense, providing new ways of experiencing sensory input, or enabling sensory experiences at a distance. Analyse and describe how the technology modifies the human sensory experience (sight, hearing, touch, taste, smell), the level of enhancement and its effects on perception.</td></tr>
<tr><td colspan="4">The Metaverse and virtual reality, by definition, completely alter our sensory experience, changing how we perceive the world. Indeed, in the Metaverse, we are experiencing a “non-existent” world. In this world, we experience many of the sensations that we would in the real world. For example, being on a roller-coaster ride with visual, auditory and haptic feedback can simulate reality to such an extent that the user can feel physically affected by the experience.

We can only imagine what the Metaverse would be once (if) it can carry all the senses, including taste and smell. Even now, users can explore virtual worlds, interact with objects and other users, and experience a wide range of sights and sounds in a way that feels more real than watching a video or playing a game on a screen.</td></tr>
</table>

	Criteria	Description	Evaluation
As mentioned in the previous criterion, Aggeler (2023) suggests that, as virtual reality technology continues to advance, it may become even more immersive and allow users to experience "phantom touch" or other physical sensations, which could deepen feelings of intimacy and connection. This could potentially extend users' senses beyond what is even possible in the physical world, allowing them to experience new and exciting sensations.			
4	Alteration of sense ratios	This refers to the way in which a technology may alter the balance or ratio among our senses, leading to different ways of perceiving and experiencing the world.	Evaluate how the technology changes the balance between the senses, and the implications this has for human perception and experience. Evaluate the impact of the technology on our reliance on, or use of, different senses and its implications for our experiences.
According to McLuhan, this ratio altering occurs "when any one sense of bodily or mental function is externalised in technological form", exactly as in the Metaverse. As previously mentioned, for now, the Metaverse is weighted to visual and auditory input, with some touch. What will the short-term and long-term implications be for someone who spends most of their time without using smell and taste? Will the user start seeing these senses as less important, or will they be all the more striking when experienced in the real world? Also, since a user could potentially experience the real and virtual worlds at the same time, this dual-sensory experience may lead to sensory overstimulation. On the other hand, this may enhance our cognitive capacities by allowing us to filter through two vessels of sensory input without confusing them or becoming overwhelmed.			
5	Acoustic space	The term “acoustic space”, drawn from McLuhan's work, refers to the sphere of aural perception created by technology.	Examine how the technology affects auditory experiences and how it reshapes our perceptual relationship with our surroundings.
As discussed in the literature review, one of the most immediate ways in which the Metaverse can impact acoustic space is through spatial audio technologies. These technologies enable a three-dimensional sound experience, whereby sounds can emanate from specific directions and distances, closely mimicking or even enhancing real-world acoustic environments. The concept of acoustic space extends beyond mere replication of real-world sounds. The Metaverse offers opportunities for creating entirely new soundscapes that can heighten emotional responses or			

	Criteria	Description	Evaluation
deliver specific narrative functions. This could involve anything from immersive ambient soundtracks to intricate compositions that engage users on an emotional or cognitive level. Acoustic spaces in the Metaverse also have significant implications for social interactions. Voice chat features, which can be spatially oriented to mimic real-world conversations, may add another layer of realism to virtual meetings or social gatherings. Hill (2022) discusses her experience of sound in the context of using the Meta Quest 2 headset to enter the Metaverse. The headset is equipped with microphones and speakers that allow users to communicate with others in the virtual environment. The article notes that Meta asks Horizon users to consent to having their audio recorded and that audio, which is stored on the user's headset, is only sent to Meta if someone files a report, e.g. a report for harassment. Her article also describes the sounds of the virtual environment, such as a gentle breeze and birds chirping in the mountainside villa that the author visits. The author notes that these sounds replace the cries of their young daughters and create a sense of immersion in the virtual environment. She suggests that sound is an important aspect of the Metaverse experience, both in terms of communication with other users and in creating a sense of immersion in the virtual environment. In my personal experience, auditory over-stimulation can also occur. For example, it is difficult to hear an avatar to whom you are talking when other avatars are too loud. Additionally, my experience in the “sound tunnel” caused some distress in the sense of feeling overwhelmed by the sound effects.			
6	Visual space	This term refers to the sphere of visual perception created or enhanced by technology.	Examine how the technology affects visual experiences and how it changes our perceptual relationship with the visible world
One of the fundamental attributes of the Metaverse is its capacity to offer full immersion in a 360-degree visual space. This enables a far more encompassing experience than typical screen-based media, providing the user with the ability to explore and interact within a virtual world. The Metaverse also allows for the augmentation of physical spaces through visual overlays. These can range from informational labels to complex interactive visual effects, seamlessly merging the digital and the physical. Traditional visual mediums often rely on a fixed perspective. In contrast, the Metaverse offers dynamic viewpoints that can be changed in real-time, allowing for experiences such as aerial views, microscopic examinations, or even perspectives that are impossible to achieve in the physical world, such as “inside” abstract objects or concepts. Facial expressions, body language and other non-verbal cues can be simulated to varying degrees of realism in the Metaverse, adding a rich layer of social dynamics to the visual space.			

	Criteria	Description	Evaluation
Hence, the Metaverse can offer visual enhancements by providing new ways of experiencing and interacting with visual content and entire new worlds. For example, as mentioned above, users may have enhanced visual experiences by using advanced graphics and visual effects, or they could interact with visual content in new and innovative ways. Aggeler's (2023) notes that virtual reality technology has come a long way since its inception in the late 1980s, but that it may not be able to replicate the subtle nuances of human facial expressions or body language.			
7	Tactility	This term "tactility" refers to the way/s in which technology may enhance or create new forms of tactile (touch-based) experiences.	Evaluate how the technology enhances or introduces new tactile experiences, and the implications this has for human interaction and perception.
The Metaverse has the potential to provide a more immediate and tactile experience than the Internet. Haptic feedback systems, such as gloves, suits or controllers designed with pressure sensors, aim to replicate experiences of sensations like vibration, texture, or even weight, allowing users to experience touch within a virtual setting. As an example, the company bHaptics has released a virtual reality haptic feedback vest, called the bHaptics TactSuit, which features haptic feedback on various trigger points across the user's abdomen, sending haptic vibrations across the vest for an immersive VR gaming experience. In other user accounts, it is also mentioned that the Metaverse could offer new ways of experiencing touch through haptic feedback or other technologies. For example, users could feel the sensation of touching virtual objects or other users in a way that feels more real than traditional virtual reality experiences. The article on dating in the Metaverse discusses the phenomenon of "phantom touch" in virtual reality, where users report feeling physical sensations in response to what is happening to their VR avatars. Some users report feeling as if they could actually feel it on their real arms when their VR arms are touched. This phenomenon can deepen feelings that arise with more chaste contact as well. However, the article notes that there are still limitations to what can be simulated realistically in terms of touch, and that virtual dating may be challenging, because users may not be able to gauge physical attraction or chemistry accurately, based on touch cues alone. Interestingly, the article by Hill (2022), which mentions physical aspects related to the Metaverse, also provides related negative implications, such as physical injuries that may occur while using VR headsets. The author notes that they have hurt themselves while blindly swinging their controllers and hitting objects in the physical world, such as a coffee table or the head of a two-year-old! The article		

	Criteria	Description	Evaluation
also mentions that some users have reported developing rashes on their faces after using virtual reality headsets.			
8	Typography	This criterion pertains to the way that technology influences or changes the appearance and arrangement of printed or digital text, potentially impacting communication and comprehension.	Evaluate how the technology influences or changes the way text is displayed and arranged, and the subsequent impact on communication and comprehension.
In a 3D environment like the Metaverse, text can exist as a spatial element around which users can navigate, offering an immersive reading experience unlike any flat, 2D platform. Words could float, rotate, or even adapt their form, depending on user interaction or contextual cues. Typography could be used in AR settings to label objects, offer contextual information, or guide users through virtual or augmented spaces. The design challenge would be to create typefaces and layouts that are both aesthetically pleasing and functional within complex visual scenes. Just as users can create their own worlds and avatars in the Metaverse, they may also be given the tools to create custom typefaces or text layouts, opening the field of type design and introducing a wealth of creative opportunities and challenges. Each of the different “worlds” visited in VRChat has its own unique theme, with all the type phases and digital layout of text, such as instructions to users aligning with the specific theme. This contributes to the over-all experience of that specific ‘’world’’. The layout of information in the Metaverse could also be different from traditional media, as users navigate through virtual environments and interact with objects and other users in three-dimensional space.			
9	Orality	Orality pertains to the spoken word and auditory communication. It is the primary mode of communication before the advent of written language and is deeply rooted in human traditions, stories and cultures and understanding technology's influence on orality.	Assess how the technology augments, suppresses or changes the way in which the spoken word and auditory communication occur. How does the technology influence or alter oral traditions and auditory communication? Does it promote or diminish the significance of spoken word in our society?

	Criteria	Description	Evaluation
The Metaverse is becoming a natural venue for public speaking events, lectures and performances that involve the spoken word. This could include everything from poetry readings and storytelling to academic lectures and political speeches – all experienced in an immersive, interactive setting. The subtleties of tone, pitch and rhythm in spoken interactions can be closely mimicked and even enhanced in the Metaverse, providing a rich medium for interpersonal communication that combines the best aspects of face-to-face and digital conversations. Hill (2022) remarks that the Metaverse will be used to create immersive environments for concerts, art exhibitions and other forms of entertainment. Users can experience these events in a way that feels more real and immersive than watching a livestream or even attending in person. The Metaverse lends itself to spatial and oral storytelling, with narrative elements embedded within the environment itself, much as in films or television, but in this case explorable and interactive. This can transform spaces into interactive storyboards, where the line between observer and participant is blurred, thereby altering the experience and perception of narrative time and space. Another feature of the Metaverse is the potential for spatial audio, where the sound, including spoken words, emanates from specific points in the virtual space. This could also enable more lifelike conversations and discussions, making interactions feel more natural and intuitive than in, for example, flat-screen video conferencing. As a common activity in the virtual reality dating scene, erotic role play (ERP) can also be seen as a form of storytelling. The article also mentions that some users have qualms about ERP taking place in public VRChat spaces, suggesting that there may be differing opinions on the appropriateness of this type of role play.			
10	Alteration of space perception	Technologies can redefine our perceptions of and interactions with space – both physical and virtual. How does the technology alter human perception of space, such as creating virtual spaces or enabling remote interaction?	Assess how the technology changes the way we perceive, navigate, or interact with space. This could include creating new spaces (like virtual reality), or changing how we experience physical spaces.
Unlike 2D screens or even 3D environments rendered on flat displays, the Metaverse offers the possibility of truly multidimensional experiences. This means that spatial perception is not confined to just height, width and depth, but could include other dimensions or conceptual spaces, offering entirely new canvases for interaction and exploration. Traditional concepts of boundaries and separations between spaces may blur or dissolve entirely in the Metaverse. The ability to move instantaneously between different environments – whether they are virtual representations of physical places or entirely			

	Criteria	Description	Evaluation
imaginative realms – alters our perception of distance, proximity and separation. For example, we could attend a virtual art exhibition that allows us to enter into the worlds depicted by any of the artworks. Additionally, physical space feels stable, continuous and three-dimensional, but there is no reason for the Metaverse to restrict itself to such a depiction. Space can change; can be made “granular”, like in old pixelled video games, and discontinuous, abruptly ending or changing into something different. The Metaverse has the potential to change our understanding of time and space fundamentally. As Avi Bar-Zeev (2021), co-creator of Google Earth and HoloLens, notes: virtual reality "strips away the most common constraints of reality: location and travel, physics, even sometimes time, where hours can often seem like minutes, and we can travel to the historical past or imagined futures". In her discussion of the perception of space in virtual reality, Aggeler’s (2023) remarks that VR can create a sense of presence and immersion that can be difficult to replicate in other forms of communication. Users may feel as though they were truly in the same space as their virtual dates – even though they are physically located elsewhere. In his description, Dodds (2022) observes that the Metaverse offers a unique platform for exploring virtual space and interacting with digital environments. Users can navigate these computerised worlds, moving their heads to look around and quickly accepting them as reality. He also suggests that the Metaverse may have implications for the way we think about physical space and our relationship to it. For example, users may be able to experience new places and environments without leaving their homes, which may have implications for travel, tourism and urban planning in the future.			
11	Alteration of time perception	Technologies can change our perceptions of time and alter the pace of life and communication. How does the technology alter human perception of time, such as enabling instantaneous communication or storing and replaying experiences?	Determine how the technology changes the way we perceive, measure or experience time. This may involve speeding up processes, enabling activities to occur simultaneously, or breaking down temporal boundaries.
Our sense of time may be drastically altered in the Metaverse, where there is no need for day and night. More subtly cues we use for time could also be changed, such as the speed at which objects move or fall. In a well-known example, even just playing video games can alter our concept of time. One group of players, who knew they would be asked to estimate how long they had been playing a game, overestimated the time, while another group who, did not know they would be asked for an estimate, grossly underestimated the time they had been playing the game. Due to the immersive nature of the experience and the lack of external cues such as clocks, users may lose track of time in the Metaverse. More basically, people are able to interact with one another in a			

	Criteria	Description	Evaluation
shared digital environment, regardless of their time zone. This has significant implications for various aspects of human life, such as communication, entertainment and accessibility. As a result, the Metaverse has the potential to alter our perception of time and how we experience it. Discussing time in the context of the Metaverse in her article, Hill (2022) notes that it is easy to lose track of time in the Metaverse, as there are no clocks on the walls and users may get absorbed in conversations and activities. She mentions that one user to whom she spoke, had been in the Metaverse for more than 12 hours. The article suggests that time can be both a challenge and a benefit in the Metaverse. Users can get absorbed in conversations and activities and lose track of time, but they may also struggle to find time to use the Metaverse outside of work or other obligations.			
12	Technology-identity relationship Impact on individual and collective identity	This criterion investigates how technology shapes our identity, roles and self-perception, and how it influences our interactions with others. Explore how the technology influences human identity, reflecting the idea of the shaping power of tools and technologies. How may the technology shape personal self-awareness and group identity?	Evaluate the impact of the technology on self-perception, roles, identity and social interactions. Consider both individual and group identity. Explore shifts in personal and collective self-perception and roles as influenced by the technology.
Images – such as mirror reflections, photographs and avatars – create a representation of the physical self that can be both self and other. These images that represent self, blur the lines between self and other, living and non-living, human and non-human, real and virtual. In particular, using avatars, users can change their gender identity, racial identity, or even their identity as a human being. Since the images we see in avatars play a crucial role in shaping our sense of self, with a complex interplay between the physical self and its various avatars, this may separate identity from physical form and lead to new modes of self-reflection, experimentation and self-presentation. Based on her experience, Aggeler (2023) also suggests that virtual reality may have an impact on users' identities by allowing them to experiment with different aspects of themselves, such as their sexual identity and gender expression. The option for anonymity or pseudonymity offered by avatars offers both freedom and complications. Hill (2022) article notes that pseudonymity and anonymity are part of the appeal for some users, and that revealing one's true identity may be met with suspicion or hostility			

<table>
<tr><th></th><th>Criteria</th><th>Description</th><th>Evaluation</th></tr>
<tr><td colspan="4">from others. This may be an indication that these are “other” selves and not to be taken as the “true” identity.

Interactions in the Metaverse may lead to relationships that are as meaningful as those in the physical world, influencing self-perception and personal growth. How we define social norms and values within these digital relationships may impact collective and individual identities. For example, could it become acceptable to have a “partner” in the Metaverse and in the real world, since the individuals are seen as “different” entities?

The Metaverse will also provide opportunities for collective identity formation, as users can interact with others in shared virtual environments and engage in collaborative activities. As mentioned, these new collective identities could be mutually antagonistic. As Bianzino (2022) notes:

“Without careful consideration of design choices, the metaverse could supercharge polarization and filter bubbles. Imagine not just different metaverse platforms for different political persuasions, but infinitely personalized experiences within the same platform. A liberal and a conservative walking through the same metaverse neighborhood could be shown different retailers, avatars, bots, and experiences – all customized to their political persuasion.”

Macdonald (2022) asserts that the promise of cyberspace has been that it makes us all equal, allowing us to be judged not by our physical presentation or limitations, but by what is in our minds, by how we want to be seen. This suggests that the Metaverse may be seen as a space where people can create and express their identities in new and different ways. However, Macdonald (2022) also notes that misogyny, homophobia and racism do exist in virtual worlds, and that the Metaverse may not be the utopia as which it is promoted.</td></tr>
<tr><td>13</td><td>Influence on thought patterns</td><td>Technologies can shape our cognitive processes and thought patterns.

Assess how the technology influences human thought patterns, aligning with the notion of technology shaping cognitive processes.</td><td>Evaluate the impact of the technology on cognitive processes, decision-making, and overall thought patterns.

Consider both individual and societal impacts.</td></tr>
<tr><td colspan="4">It is notoriously hard to evaluate the ways in which technology changes us and our thinking. Even for the smartphone, which has been around for decades, there is little research on whether the sum has been a benefit or a detriment. We seem to be “offloading” more memory tasks onto our phones than actually trying to remember things ourselves. In this article, research is also mentioned that devoted players of a certain video game navigate mazes differently to non-players.</td></tr>
</table>

	Criteria	Description	Evaluation
Since the experience in the Metaverse will be much more immersive and compelling than either smartphones or games, we can only speculate on how our thought patterns may be changed and influenced. Will the immersion into an educational environment, such as an underwater exploration, aid learning, or will students feel overwhelmed or distracted by “background” features? Virtual environments can provide immediate feedback on decisions, reinforcing learning through a trial-and-error process that could translate into more effective decision-making skills in real-world situations. For example, would we learn to play tennis faster in such an environment, were we can be exposed to the exact stimuli the coach wants? There is the real risk of “overlapping”, which occurred with the mushroom in Beres (2018), where our motives, desires and goals in the Metaverse could overlay those of the real world. If we are flying in the Metaverse all day, we could well subconsciously believe that we can, indeed, fly. There is enormous positive potential for therapy in the Metaverse. For example, using cognitive behaviour or desensitisation techniques in such a lifelike environment may be of tremendous help to many people. For example, reliving traumatic incidents safely is widely used as therapeutic technique – a capability that is intensely amplified in the Metaverse.			
14	Influence on perception	Technologies can change how we perceive the world, including our self-perception, perception of others and perception of our environment. Consider how the technology modifies human perception, aligning with McLuhan's concept of technology affecting how we interpret our world.	Assess the influence of the technology on perceptions of self, others and the environment. Evaluate how the technology changes our perceptions and the way we interpret the world. Consider both the intended and unintended consequences.
In her article, Hill (2022) discusses perception in the context of using the Meta Quest 2 headset to enter the Metaverse. The author notes that the headset completely takes up the user's vision, creating a sense of immersion in the virtual environment. They describe the experience of being transported to a mountainside villa and gazing at a distant river and golden sky dotted with hot-air balloons. Using the Meta Quest 2 headset to enter the Metaverse may create a powerful sense of immersion and alter the user's perception of reality. We have discussed how the immersive nature of the Metaverse may alter our perception of time and space. Users may also not notice “real world” perceptions, such as hunger and fatigue, if they are immersed and, therefore, completely distracted. Compare how well even a movie can do this, with us realising only after the movie that we really need the bathroom.			

	Criteria	Description	Evaluation
The Metaverse can influence user's perceptions in several ways, including: • Perception of reality • Emotional perception • Perception of time • Social perception • Spatial perception • Perception of self As observed by Macdonald (2022), virtual worlds can be used as an escape from the inequalities and injustices of the real world, and they can provide a sense of community and belonging for people who may feel isolated or marginalised in their physical lives. In this way, the Metaverse may change, for the better, the way people see themselves in their (virtual) lived environment. Will this make the real world all the more unbearable, or will this feeling of acceptance flow over into the real world? Macdonald (2022) also notes that the Metaverse is being constructed by people to whom the problems of the real world are mostly invisible, and that the prejudices and biases of the real world can be replicated in virtual worlds. Therefore, it is possible that the Metaverse could alter perceptions in both positive and negative ways. How we see ourselves is also malleable. As previously mentioned, Aggeler (2023) notes that virtual reality can provide a space for users to experiment with different aspects of themselves, such as their sexual identity and gender expression, which would affect how they perceive themselves and others. As users navigate the worlds of the Metaverse, their brains quickly begin to accept them as reality, and they may experience a sense of presence or immersion in the virtual environment. This may lead to changes in perception, as users may begin to see the world differently or develop new ways of thinking about themselves and their surroundings. For example, seeing many different virtual worlds, may make us see ours anew.			
15	Mind-body extension Extension of mental capabilities (combined)	Some technologies can extend cognitive functions or thought processes beyond the physical confines of the body. Determine how the technology extends the mind beyond the physical body, keeping in line with McLuhan's views on extended cognition.	Evaluate how the technology facilitates thought processes or cognitive functions outside the physical confines of the body.

	Criteria	Description	Evaluation
The Metaverse offers a new platform for collaborative problem-solving, changing the way we approach and resolve issues. Complex problems can be simulated, and solutions tested in virtual environments, helping us solve difficult problems. The limitless possibilities in virtual worlds can serve to stimulate imagination and creativity. It may help us to think “outside the box”. Also, various scenarios for situations could be simulated, which can develop decision-making skills. Think for example, of military mission training. As the Metaverse becomes more prevalent, it could extend our cognitive processes in ways that are yet to be understood.			
16	Type of technology or media Technological affordances	Identify the specific type of technology or media under evaluation (e.g. digital, mechanical, biological). Every media technology – from print to radio to social media platforms – has inherent affordances that shape how content is produced, distributed and consumed. These technological affordances or properties may influence user behaviour, content virality and the overall media experience.	Consider the inherent characteristics of this type and how they may affect its interactions with users and its wider impacts. Study the features of the platform, how users engage, and the possibilities it offers. Compare different media technologies or platforms based on their capabilities.
In the literature review, several characteristics of the digital technology of the Metaverse were identified, including interactivity; corporeality through the design of an avatar; and persistence. The Metaverse has been categorised into at least four models that coexist in the environment of a Metaverse: (i) games and virtual realities; (ii) mirror worlds; (iii) augmented reality; and (iv) digital recording systems that collect data from the environment (lifelogging). The Metaverse affords users a unique space to engage with virtual environments and collaborating, managing and communicating with peers. The Metaverse also generates a new space for social communication; a greater degree of freedom to create and share; and the opportunity to create disruptive learning experiences. The Metaverse has a number of affordances, or potential benefits and opportunities, which distinguish it from other forms of media and technology. These include: 1. Immersion: The Metaverse has the potential to create a highly immersive experience that engages multiple senses and allows users to feel present in a virtual environment.			

	Criteria	Description	Evaluation
2. Customisation: The Metaverse allows for a high degree of customisation, both in terms of the user's avatar and the virtual environment itself. 3. Social interaction: The Metaverse is designed to facilitate social interaction, allowing users to connect with others in a shared virtual space. 4. Novel experiences: The Metaverse offers the potential for users to have experiences that are not possible in the physical world, such as exploring fantastical environments or interacting with virtual objects. 5. Learning and Problem-Solving: The Metaverse can be designed to provide opportunities for learning and problem-solving, such as through educational games or simulations. To be specific to the affordances of the actual wearables under discussion (Meta Quest 2), it is clearly a headset, meant to be worn. The headset is bulky and loaded with cameras, microphones, speakers, eye displays and sensors, and the headset completely takes up the user's vision. Using the headset may be disorienting at first, as the user's vision is completely taken up by the virtual environment. Hill (2022) mentions experiencing a sense of itchiness and discomfort at first, but then becoming absorbed in the experience and losing track of time. The Meta Quest 2 goggles are a powerful tool for entering the Metaverse, but the experience may be disorienting and may have implications for productivity and mental health. Farad Manjoo (2022) describes his personal experience in using the headset to visit Horizon Worlds, the Meta virtual theme park. The author notes that the headset is more comfortable than older and cheaper versions, and its display and motion-tracking systems work much more smoothly, eliminating the slight sense of motion sickness and eye strain he has experienced with previous VR devices.			
17	Human-object interaction (engagement)	This criterion looks into the way technology changes the way we interact with objects and the surrounding environment. How does the technology mediate, change, or influence the human interaction with objects (physical or virtual)?	Evaluate the changes in user interaction and behaviour induced by the technology. Consider factors such as ease of use, intuitiveness and the changes in the nature of engagement with other objects. Evaluate the ways in which the technology changes how users interact with objects. This may include the way physical objects are manipulated, the use of virtual

	Criteria	Description	Evaluation
			interfaces, or the impact on a user's interaction with their environment.

Human-object interaction in the Metaverse constitutes a significant leap from conventional digital interfaces, blurring the boundaries between the tangible and intangible, the real and the virtual. Traditional interactions with objects in the physical world are mediated by our senses – touch, vision, hearing, smell and even taste. These sensory experiences have always been limited by the physics and biology of the real world. In the Metaverse, these limitations can be transcended, redefined, or even entirely rewritten.

As mentioned in several first-person experiences, one interacts with virtual objects extensively in the Metaverse, from throwing hoops to feeding ducks. One of the challenges for the Metaverse is making these interactions realistic (if that is the intention).

Hill (2022) reports that, in her experience, the virtual environment can create a sense of real immersion and presence that makes it feel as if the objects are real. The author describes the experience of walking through a virtual forest and feeling the crunch of leaves underfoot, as well as the experience of sitting on a virtual couch and feeling the softness of the cushions.

Another use of virtual reality in general, is to guide how we interact with real objects by overlaying our visual field with visual guides. This is used, for example, to help us assemble a complicated piece of furniture. The idea of interacting with virtual objects that are linked electronically to real objects and movements, such as in remote surgery, may become much more common when using the Metaverse, particularly if robotics develops in tandem with artificial intelligence (AI).

As virtual environments rise in popularity, what once were physical objects are becoming more compatible with virtual spaces, becoming more formless and losing their definition that differentiates them from digital objects. Take for example, the dictionary or encyclopaedia. In the Metaverse all real objects have obviously “become” virtual and this integration of physical and digital objects may lead to new ways of interacting with objects.

In her article on dating in the Metaverse, Aggeler (2023) accounts on engaging with the technology as object. She notes that virtual dating may come with technical difficulties, such as voice delays and avatar glitches, which could potentially affect how users perceive one another. Additionally, she suggests that users should be comfortable with the technology to enjoy the virtual dating experience fully. This may involve learning how to use VR devices and software, as well as troubleshooting technical issues that arise.

In his *Metaverse diary* Io Dodds (2022) describes the human-object interaction in the Metaverse as being similar to real life. Users can look down and see their virtual bodies, and they can move their

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<tr><td colspan="4">heads and hands to interact with virtual objects. He notes that users are given two controllers that track the position of their hands, allowing them to gesture and manipulate virtual objects.

In the future, Meta hopes to replace these controllers with a bracelet that decodes the electrical signals sent between the user's brain and fingers. This would make the human-virtual object interaction in the Metaverse alarmingly close to real life.</td></tr>
<tr><td>18</td><td>Cultural metaphors and terminology</td><td>How does the technology embed, alter or introduce new metaphors or terminology specific to it?</td><td>Examine the linguistic and symbolic nuances the technology introduces.

Evaluate how these metaphors or terminologies shape understanding, dialogue or discussions around the technology, and their broader implications within cultural contexts.</td></tr>
<tr><td colspan="4">The most common terms for virtual reality/the Metaverse probably come from The Matrix films, where the virtual reality in which almost all humans are trapped, is referred to “The Matrix” by those in the know. The terms “red pill” and “blue pill” from the films have also become commonplace references to the “dream state” (virtual) and the “waking state” (real) often used in political contexts.

Other metaphors include:

1. Virtual reality
2. Augmented reality
3. Mirror worlds
4. Lifelogging
5. Corporeality
6. Immersion in alternative reality
7. Telepresence

The following phrases help to describe the nature and characteristics of the Metaverse:

• "immersive internet"
• "gigantic, unified, persistent and shared realm"
• "fusion of biological, physical, and digital worlds"
• "virtual one"
• "digital landscape"
• "avatars or digital personas"
• "blurring of the virtual and the physical"
• "fusion of physical and digital objects"
• “three-dimensional internet”</td></tr>
</table>

	Criteria	Description	Evaluation
• "user-constructed spaces" • “embodied internet” • "expansive network of persistent, real-time rendered 3D worlds and simulations" With a surfeit of worlds, games and other virtual environments in the Metaverse, each with its own jargon and terminology, the Metaverse has a huge number of descriptive terms associated with it. Manjoo’s (2022) describes the virtual theme park of Meta, Horizon Worlds,, as a “cartoony wasteland” and a “post-apocalyptic United States of the Fallout games”. The author adds that the virtual world often feels more gloomy than fun and describes it as a "buggy, empty, low-fi mess".			
19	Impact on cultural patterns	How does the technology potentially shift cultural behaviours, traditions or values? How does the technology potentially influence societal structures and cultural norms?	Analyse the influence of the technology on established cultural practices, symbols, rituals and values. Identify any emerging cultural trends as a direct or indirect result of the presence or use of technology. Assess societal and cultural shifts, considering both enhancements and disruptions, as a result of technology adoption.
The impact of the Metaverse on culture is a topic of ongoing debate and concern. On the one hand, the Metaverse has the potential to facilitate cross-cultural exchange and understanding, as users from different parts of the world can connect and interact in a shared virtual space. Additionally, the Metaverse can provide a platform for the expression and celebration of diverse cultural identities. Virtual worlds and games have already had a significant impact on culture, with players forming meaningful relationships and having significant life experiences within them. Since gaming already forms a major part of numerous people’s live, we can expect that activities in the far more immersive environment will compound this. There are concerns that the Metaverse may lead to the homogenisation of culture, as users from around the world are exposed to the same virtual environments and experiences. This may lead to the loss of cultural diversity and the emergence of a single, global cultural identity. On the other hand, we have also the discussed the even worse possibility of “tribal” worlds emerging, mutually antagonistic towards one another (as occurring in several online forums) – with even worse consequences. The impact of the Metaverse on culture is likely to be complex and multifaceted, with both positive and negative effects. It will be important for designers and policymakers to consider these issues as the			

	Criteria	Description	Evaluation
Metaverse continues to develop and grow in popularity. The Metaverse has the potential to challenge our ideas of culture, human connection, reality, human consciousness and the human self. It will lead to changes in the behaviour and priorities of its users, affecting users' personal lives and relationships. At this point, we are only dimly aware of the possibilities. In her article on virtual dating, Aggeler (2023) remarks that virtual dating may be influenced by broader cultural trends and norms, such as the emphasis on physical attractiveness or the pressure to conform to gendered expectations. Will this change entirely, or will the Metaverse broadly follow these cultural aspects of real life?			
20	Changes in social interaction	How might the technology affect the ways people communicate, relate to each other, or build relationships?	Evaluate shifts in communication patterns, changes in interpersonal dynamics, and any transformation in the building and maintenance of relationships as influenced by the technology.
The Metaverse has the potential to impact these areas significantly by allowing users who are in need to meet in the real world, to connect and interact with others in a shared virtual space. This provides opportunities for socialisation and community-building that may not be possible in the physical world. Also, the use of avatars in the Metaverse may allow users to transcend physical limitations and create a sense of belonging and empowerment. The immersive nature of the Metaverse could enhance social interactions beyond the limitations of physical space, allowing individuals to connect with others from all over the world. However, it is important to consider the possible implications of such a reduction in physical, face-to-face communication, as there may be unique aspects of face-to-face interactions that even the best of the Metaverse cannot reproduce authentically. Additionally, it is important to consider the effects of virtual communication on social skills, as problematic Internet use has been associated with low empathy. While it is not clear whether the Metaverse will lead to a loss of subtle skills, such as empathy and emotional intelligence, it remains important to consider the possibility of this and to explore ways in which the Metaverse can actually be used to enhance – rather than replace – in-person connections. Hill (2022) describes the experience of entering the Metaverse and encountering other users, some of whom were friendly and welcoming, while others were rude or aggressive. She notes that the Metaverse has the potential to be a space for social connection and community-building. She describes the experience of participating in virtual activities as comedy shows and games, and notes that these activities may bring people together and create a sense of shared experience (Hill 2022). In			

	Criteria	Description	Evaluation
Macdonald's (2022) experience, the Metaverse could further blur the lines between the real and virtual worlds, potentially leading to a loss of meaningful social interaction in the real world. Farad Manjoo (2022) notes that, while the Metaverse promises to be a new frontier for human connection, most of the "worlds" he visited, were deserted. He also notes that conversations frequently go little deeper than "Hey" and "How you doin'?" The article suggests that, while the Metaverse has the potential to transform social interaction, the current investment of Meta in the technology has not yet resulted in a compelling and engaging virtual world that can attract enough users. In Aggeler's (2023) experience, virtual dating may change social interaction in a few ways. Firstly, it may provide a space for users to experiment safely with their sexual identity and/or gender expression, which could potentially change their interaction with others in the real world. It may allow users to connect with people whom they might not have met otherwise, such as those living in different parts of the world, or those who experience may social anxiety in the physical world. It can also create a sense of intimacy and connection that extends beyond physical proximity, as some VR users report physically feeling and experiencing what is happening to their VR avatars. It is also noted that virtual dating may be cliquey and drama-filled, similar to high school. The extent to which virtual dating will supplement or replace actual dating is impossible to predict.			
21	The role of technology in media ecosystem	How does the technology fit into and influence the broader media ecosystem?	Analyse the interaction of technology with other media, its contribution to the media landscape, and the dynamics it introduces or modifies within the media ecosystem.
The literature review suggests that the introduction of a new medium into an ecosystem creates a dynamic and complex process of change and adaptation. The response of existing media to the new medium depends on a variety of factors, including the affordances of the new medium, the cultural context, and the goals and values of media producers and consumers. The Metaverse may lead to a movement away from traditional communication media, such as the touchscreen, keyboard and mouse, and a demand for more interactive body-language and voice-based communication. In Mark Zuckerberg's vision, the Metaverse will become the natural successor to meeting tools, such as Zoom and Microsoft Teams. The impact of The Metaverse is likely to be complex and multifaceted, with both potential for disruption and potential for synergy. The Metaverse may influence social media in such a way as to lead social media platforms to increase their focus to an immersive, interactive social media interaction that involves a multitude of our sensory capacities, instead of remaining focused on the interactions between people across 2D digital pages.			

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<tr><th></th><th>Criteria</th><th>Description</th><th>Evaluation</th></tr>
<tr><td colspan="4">Because the Metaverse allows individuals to connect in a more interactive, visceral way, it may even replace existing social media platforms that rely on text and image. Users could, for example, prefer the immersive social experience of the Metaverse and prefer communicating via their virtual avatars in a shared digital environment.

In his Metaverse diary, Io Dodds (2022) suggests that the Metaverse may have disruptive implications for a wide range of industries, including gaming, entertainment, e-commerce and social media.</td></tr>
<tr><td>22</td><td>Level of involvement</td><td>How actively and frequently does a user need to engage with the technology?

The level of involvement and interaction that users have with the media, such as commenting, sharing, or creating content.</td><td>Evaluate the degree of immersion, duration and frequency required of users when interacting with the technology, and the potential implications of this involvement level on users and their environment.</td></tr>
<tr><td colspan="4">As confirmed by several books and films about virtual reality, as gaming in 2D-worlds has become the most compelling part of numerous people’s lives, this phenomenon may expand exponentially with the Metaverse. If you could be living the perfect virtual life, where you have can have everything of which you can dream, how much time would you spend living it?

The extent of involvement may obviously vary, depending on factors such as access, interest and cultural context. Some users may be highly involved in the Metaverse, spending significant amounts of time and resources in immersive virtual environments, while others may have more limited involvement, using the Metaverse primarily for specific purposes, such as socialising or entertainment. Some early adopters of the Metaverse prefer to use it during late-night hours, when it is at its peak.

Reporting on her experience in the Metaverse, Hill (2022) notes that numerous users spend long hours in the Metaverse, participating in virtual activities such as comedy shows and games. She describes the experience of people altering their sleep schedule, in order to spend time in the Metaverse, noting that some users may become obsessed with the technology.

The Metaverse may be overwhelming and may have implications for mental health and well-being.</td></tr>
<tr><td>23</td><td>Content diversity, or content favoured by media</td><td>This criterion involves the richness and variety within the media landscape.

A diverse content spectrum ensures a multiplicity of voices, sources, opinions and narratives.</td><td>Examine a sample of media content for the diversity of sources, topics and perspectives.</td></tr>
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<tr><th></th><th>Criteria</th><th>Description</th><th>Evaluation</th></tr>
<tr><td colspan="4">Since the Metaverse is a whole world in itself, it has the potential to accommodate any and all types of media, and the types of content that can be found in the Metaverse are likely to be limited by the creativity and imagination of its users only.

Currently, the main uses appeared to be social and games and, to a smaller extent, meetings. However, it is possible that it will become a primary environment for other media, such as news media, and compete with existing social media platforms relying on text and image. The specific content that will be available in the Metaverse will depend on a variety of factors, including the goals and values of media producers and consumers, the cultural context and the affordances of the technology.

Dodd (2022) asserts that the types of content that can be found in the Metaverse are likely to be diverse and varied, including text, images, videos and audio. Users can create and share their own content, such as virtual objects, clothing and other items for their avatars. Additionally, companies are exploring the creation of virtual marketplaces, where users can buy and sell digital goods, such as furniture, artwork, and other items.</td></tr>
<tr><td>24</td><td>Access, inclusivity and reach</td><td>This criterion relates to the ease and equality with which different societal groups can access and participate in the media environment.

A truly inclusive media environment ensures that there are no barriers (economic, physical, or social) preventing certain groups from consuming or producing content.

It also involves the number of people with access to the media and the frequency with which they use it.

New technologies may change the way in which people consume media, resulting in shifts in audience preferences and behaviours.</td><td>Test platforms with various tools and techniques to check their inclusivity.

Assess the variety and diversity of communities in the Metaverse.</td></tr>
<tr><td colspan="4">The literature review notes that early adoption of technology is often determined by who can afford it. Therefore, how easily the Metaverse becomes widespread in terms of its usage will largely depend on the affordability of access. Although expensive headsets (currently, Meta VR headset costs around $400) are a popular way of accessing the Metaverse, they are not the only way.</td></tr>
</table>

	Criteria	Description	Evaluation
Designing a Metaverse that embraces diversity, equity and inclusion is not only about creating a sense of belonging and respect in the digital space, but begins ahead of the process, with people needing to acquire new skills to access technologies, in order to enter the Metaverse experience. Therefore, businesses can ensure that the cost of accessing the Metaverse is not a significant factor in its adoption and widespread usage. From personal experience, the fact that Horizon Worlds of Facebook is not available in South Africa was rather disappointing. It was clear that one was limited to virtual spaces for which one did not have to pay. An expansive world of options is available, depending on how much one is willing to pay. As far as accommodating users with disabilities, Hill (2022) notes that there are efforts underway to make the Metaverse more accessible and inclusive. For example, some virtual worlds are designed to be accessible to users with disabilities, and there are ongoing discussions on how to make the technology more accessible to a wider range of users. In the account on dating in the Metaverse, Aggeler (2023) mentions that it can provide a space for users who may have limited physical mobility, or who live in remote areas to connect with others and potentially form romantic relationships. For example, the article notes that some Nevermet users live in small towns or are confined to assisted living, and virtual dating may offer them a way to connect with others and feel like their best selves.			
25	Ownership, control, regulation and policy	Concentration of media ownership may lead to a monopolisation of voices and perspectives. A diverse ownership landscape ensures a variety of editorial stances and decreases the likelihood of a single narrative dominating the media environment. New technologies may also disrupt the existing media regulatory frameworks, creating new challenges for policymakers and regulators. For example, the rise of social media has led to new challenges around issues such as privacy, data protection and content moderation, which require new regulatory approaches.	Chart out the owners and stakeholders of media entities. Use metrics to measure the concentration of media ownership.

	Criteria	Description	Evaluation
Who owns the Metaverse? In Kashmir Hill's (2022) article on her experience in the Metaverse, she discusses the issues of ownership, regulation, policy and control in the Metaverse. She mentions that, the continuous development of the Metaverse results in questions as to who will own and control the virtual spaces and experiences within it. There are ongoing discussions on how to address these issues and create a more stable and secure Metaverse. Hill (2022) suggests that it will be important for policymakers, developers and users to work together to create a Metaverse that is safe, inclusive and accessible to all. Macdonald (2022) mentions that companies like Epic Games and Facebook are investing billions of dollars in the Metaverse, viewing it as a new frontier for media and entertainment. However, she also raises concerns about the potential for the Metaverse to become another platform for corporate exploitation and surveillance, with companies using it to track users' attention and monetise their experiences. In his narrative about his Metaverse experience, Dodd (2022) discusses ownership in the context of virtual assets within the Metaverse. As users create and interact with digital objects in the Metaverse, questions arise about who owns these assets and how they can be bought, sold or traded. He notes that some companies are already exploring the creation of virtual marketplaces, where users can buy and sell digital goods, such as clothing, furniture and other items for their avatars. Legal and ethical implications of virtual ownership are still being debated, and it is unclear how ownership rights will be enforced in the Metaverse. The issue of ownership is an important one for the future of the Metaverse, and it is likely to be the subject of ongoing discussion and debate as this technology continues to evolve.			
26	Ethical standards	The ethical frameworks within which media operate, play a pivotal role in ensuring trustworthiness. Ethical standards cover everything from reporting accuracy and fairness to transparency in conflicts of interest.	Examine the code of ethics of a media entity. Track and analyse incidents of ethical breaches.
Hill (2022) observes that there are currently only a few regulations governing the Metaverse, and that this lack of oversight may lead to issues around privacy, security and content moderation. She notes that some virtual worlds have their own rules and policies around behaviour and content, but that there is no overarching regulatory framework for the metaverse as a whole. The literature review suggests that the use of virtual avatars raises important ethical questions about the responsibilities that come with using them in social contexts. For example, intentionally or unintentionally deceiving others about our physical identity by creating an avatar that is significantly different from our physical appearance raises concerns about potential deception and manipulation in virtual environments. Some virtual dating platforms have policies to address these issues, such as			

	Criteria	Description	Evaluation

requiring users to verify their identities or prohibiting certain types of avatars. Virtual dating raises important ethical questions that require careful consideration and discussion Aggeler (2023). Additionally, instances of sexual assault or harassment have been reported in the Metaverse, highlighting the need for ethical standards and regulations to ensure the safety and well-being of users. Hill (2022) describes the experience of encountering harassment and aggression from other users, noting that Meta asks users to consent to having their audio recorded to address these issues.

Hill (2022) asserts that, as the technology continues to develop, there are numerous questions about how to ensure that the Metaverse is a safe and ethical space for users. One of the main ethical issues discussed in the article is the potential for harassment and abuse in the Metaverse. While several virtual worlds have rules and policies around behaviour and content, there is still a risk of users engaging in harmful behaviour towards others. It will be important for developers and policymakers to create tools and policies that can help prevent harassment and abuse in the Metaverse.

Another ethical issue discussed in Hill's (2022) article is the potential of addiction and overuse of the technology. Some users may spend long hours in the Metaverse, potentially to the detriment of their physical and mental health. It will be important for users to be mindful of their use of the technology and for developers to create tools and policies that encourage healthy use of the Metaverse.

Macdonald (2022) also notes that one of the main concerns is the potential for the Metaverse to replicate and amplify the inequalities and injustices of the real world, such as worker exploitation, misogyny, homophobia and racism. The article also raises questions about the role of big tech companies in shaping the Metaverse and the potential of these companies to prioritise profit over the well-being of users. Additionally, the article discusses the issue of privacy and data collection in the Metaverse, remarking that companies such as Meta have patented technology that could track users' movements and target advertisements at them (Macdonald 2022).

Aggeler's (2023) article on dating in the Metaverse discusses several ethical considerations involved in virtual dating. One of the main concerns is consent, particularly in ERP (erotic roleplay) scenarios where users may engage in sexual activities with their avatars. Aggeler (2023) notes that some users may not fully understand the implications of their actions or may feel pressured to engage in certain activities. As a result, some virtual dating platforms have implemented consent mechanisms to ensure that all parties involved are comfortable with the interactions.

As demonstrated in popular video games, the Metaverse is likely to adopt certain rules in which certain behaviours, phrases, etc. are censored, with the aim of ensuring safety and privacy. There are technologies designed – e.g. those designed Horizon – to ensure this safety, which include mechanisms created to deter both virtual assaults and other threatening behaviours, including elements such as a personal-space bubble that other avatars cannot enter; a "safe mode" that gives users an opportunity

	Criteria	Description	Evaluation
to escape a situation with a “solitary confinement cell”, which is a function that mutes other users; and a voting function that allows a group to vote for another user to be kicked out for being disruptive. Along with this, Horizon participants must also agree to their audio input being recorded by Meta, so that, if someone files a report, this audio can be retrieved for evidence of such a case.			
27	Adaptability and resilience	The media landscape is constantly evolving. This criterion evaluates the capacity of media entities to adapt to technological advancements, changing audience preferences and external challenges.	Look into the way in which media have evolved over time. Examine specific instances of media adaptation in challenging situations.
The literature review suggests that the Metaverse has the potential to revolutionise the entertainment industry and force the film industry and other forms of entertainment to mould and reshape themselves to fit its form. However, the success of the Metaverse in gaining the necessary traction it needs to become a widespread phenomenon remains to be seen. The literature review also discusses the potential for the Metaverse to adapt to changing technologies and user needs, such as the development of finer-grained input controls and physics-based video games. Overall, the adaptability of the Metaverse is an important consideration for its future success and growth. Additionally, the Metaverse may influence social media platforms in terms of increasing their focus on an immersive, interactive social media interaction that involves a multitude of our sensory capacities. The development of the Metaverse requires a certain degree of adaptability and resilience on the part of developers, policymakers and users. Another challenge is the high cost of developing and maintaining a Metaverse. Meta has invested billions of dollars in its Metaverse business and Reality Labs division of the company has spent more than $10 billion in 2023, on pace to exceed the $12 billion it spent on the Metaverse last year. Companies like Meta face significant challenges in creating a successful and profitable Metaverse, including creating a compelling user experience and managing the high costs of development and maintenance.			
28	Incorporation of old technology	Does the technology build on or repurpose the content and functionalities of preceding technologies?	Does the technology incorporate elements of older media forms into its design or functionality?

	Criteria	Description	Evaluation
		Does it build upon the strengths of older media, or does it aim to eliminate their perceived weaknesses?	Assess if the technology acts as a supplementary tool to existing media, or if it poses a threat to make them obsolete.
The Metaverse is reliant on new and existing technology and code and special equipment, such as headsets. The Metaverse may obviously incorporate older media, such as text, images and videos, into its virtual environments. For example, users could create virtual art galleries or museums that showcase classic works of art, or they could design virtual libraries that house digital copies of books and other written materials. Additionally, the Metaverse could provide a platform for live performances, such as concerts or theatre productions, that incorporate elements of older media. In her article on dating in the Metaverse, Aggeler (2023) also mentions several existing technologies involved in virtual dating. The most obvious is virtual reality (VR), which allows users to create and interact with digital avatars in a simulated environment. However, virtual dating also incorporates other technologies, such as haptic feedback devices that simulate touch and motion, and voice recognition software that allows users to communicate with one another using natural language. Additionally, some virtual dating platforms use machine learning algorithms to match users, based on their interests and preferences.			
29	Relationship to other media	Does the technology converge multiple media forms into one, or does it introduce a wholly novel experience?	Examine if the new technology converges multiple media forms, thereby leading to a singular media experience, e.g. the way smartphones converge cameras, music players and phones into one device.
The Metaverse converges various forms of media and technology, effectively serving as a natural evolution of the Internet. While the concept borrows elements from video games like Second Life and Minecraft, it aims to be far more immersive. Therefore, the experience is also a “wholly novel experience”. Hill (2022) discusses the relationship between the Metaverse and other forms of media, such as social media, gaming and virtual events. The Metaverse has the potential to offer a more immersive and interactive experience than traditional social media platforms, allowing users to connect with others in a more meaningful way. She also discusses the use of the Metaverse for gaming, noting that it offers a new level of physical engagement and exercise through games like Beat Saber. Additionally, she			

<table>
<tr><th></th><th>Criteria</th><th>Description</th><th>Evaluation</th></tr>
<tr><td colspan="4">mentions the use of the Metaverse for virtual events, such as the Just For Laughs comedy show that was filmed in Horizon Workrooms.

Overall, the Metaverse represents an amalgamation of multiple technological realms, with new technology and equipment, with the goal of delivering an entirely novel experience.</td></tr>
<tr><td>30</td><td>Changes in human environment</td><td>Technology may also change the physical and social environments in which we live, work and communicate, e.g. the development of transportation technologies has made it possible to travel and communicate across vast distances, creating new opportunities for cultural exchange and globalisation.</td><td>What impact has technology had on modes of communication?

Has technology made public spaces more or less social?

How has technology affected mental health or well-being?

What is the impact of technology on time spent with family or social circles?

How has technology changed the way we perceive and navigate space?</td></tr>
<tr><td colspan="4">The Metaverse will change where we live:

Since virtual reality, and the Metaverse in particular, is a fully immersive environment, the “environment” in which we live, may become almost anything. In this sense, the “lived” environment could change drastically and dramatically. More so, if people start to give up on real world problems, such as global warming, and decide that they would rather spend their time in a virtual idyll.

The Metaverse will change how we socialise:

The Metaverse has enormous potential to influence social media platforms to increase their focus on an immersive, interactive social media interaction that involves a multitude of our sensory capacities.

As a caveat, Aggeler’s (2023) article on dating in the Metaverse mentions that virtual dating may also be isolating and may exacerbate feelings of loneliness or disconnection, thereby making our social interactions much worse. Additionally, some users may become overly reliant on virtual dating to avoid the challenges and risks of in-person dating, which may ultimately harm their mental health and well-being.</td></tr>
</table>

6.3 Summary

This chapter has presented a comprehensive set of criteria for evaluating the nature and impact of technology, with a specific focus on the Metaverse. The criteria are based on McLuhan's theory of "technology as extensions of man" and media ecology, which emphasises the importance of understanding how technology shapes our perceptions, behaviours and interactions with the world. The criteria cover a wide range of factors, including the extension of physical capabilities, the alteration of sensory experience, the impact on social relationships, the influence on cognitive processes, and the changes to the environment.

By applying these criteria, we can gain a deeper understanding of the potential benefits and adverse effects of new technologies and their impact on society. The criteria can be used to guide the development of new technologies, ensuring that they are designed with the needs and values of users in mind. They also provide a valuable framework for evaluating the impact of technology and highlight the importance of considering the broader social and cultural context in which technology operates.

In the following chapter, the applied criteria will inform the tetrad analysis. By applying these criteria to the Metaverse, the conclusions for the four questions of the tetrad will naturally arise.

CHAPTER 7: TETRAD ANALYSIS AND CONCLUSIONS

7.1 Introduction

The laws of media are a framework developed by Marshall and Eric McLuhan, who explored the metaphorical meanings of media as extensions of humans. They were interested in exploring the effects of media on human consciousness and culture. The laws of media, which are visualised as a tetrad, were developed as a hermeneutic tool for understanding creations of the human mind (Wach 2012). See also Figure 7.1.

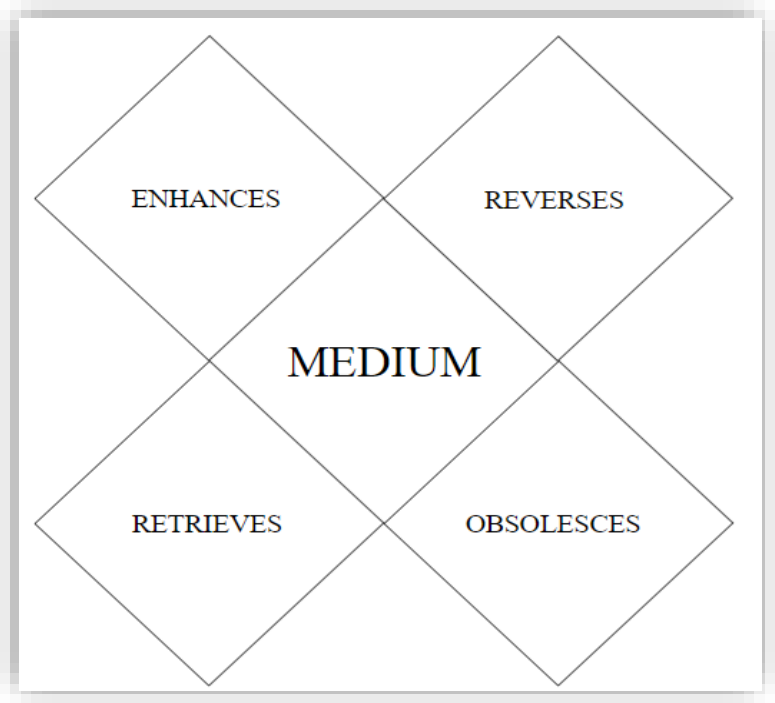

Figure 7.1: The basic tetrad as created by Marshall McLuhan and Eric McLuhan

Source: Brier 2019

Marshall and Eric McLuhan drew inspiration from various sources, including the work of thinkers such as Francis Bacon, Giambattista Vico, Sir Karl Popper and George Steiner. The laws of media were formulated to understand how different media affect human perception and behaviour. The laws of media can function both as theory and method (Grodsky, Hildebrand & Hakanen 2018).

This chapter firstly provides a brief theoretical discussion on the four questions of the tetrad. The criteria as applied in the previous chapter will then be used to answer the four questions of the tetrad. In answering the four questions, the research questions of this study will also be addressed. Lastly, the main research problem will be resolved. In the conclusion, certain limitations and potential for further research will be discussed.

7.2 Tetrad of media effects

The tetrad is a diagrammatic representation of the fourfold processes in field theory. It is used to illustrate the interrelated and simultaneous nature of the four processes, which are enhancement, obsolescence, retrieval and reversal (Zhang & McLuhan 2016). The ideas and principles related to media ecology and technology as extensions of man are closely linked and explored in the tetrad of media effects. The tetrad was introduced in Chapter 1 and addressed in all the relevant sections of the literature review.

The following sections summarise the four elements, after which these elements will be applied to the Metaverse, thereby directly addressing the four research questions of this study.

7.2.1 Enhancement (Amplification)

Each medium, according to McLuhan, enhances or extends some human capacity or function. For instance, a car extends our ability to travel and a telephone extends our ability to communicate. This aspect of a medium is usually the most apparent and often the intended purpose of its creation. According to the laws of media, “enhancement” refers to how a medium amplifies or intensifies a particular human sense or ability (McLuhan & McLuhan 1988).

Media can enhance our perception, cognition and communication in various ways. For example, the electronic screen enhances our visual sense by providing high-resolution images and videos that are more vivid and lifelike than traditional media, such as print or radio. Similarly, social media enhance our ability to connect and communicate with others by providing instant feedback and a global reach.

Media can also enhance our memory by providing easy access to information and allowing us to store and retrieve data more efficiently. Media enhancement is not always positive, as it may also lead to sensory overload, addiction and other negative effects on human behaviour and culture (Grodsky, Hildebrand & Hakanen 2018).

7.2.2 Obsolescence

According to McLuhan and McLuhan (1988), “obsolescence” refers to how a medium renders certain practices or technologies obsolete. Although obsolescence does not always involve complete eradication, each new medium makes something else obsolete, or at least less significant. For example, the advent of television changed the nature of radio, although it did not eliminate it. This happens when a new medium emerges that is more efficient, effective, or appealing than the previous one. For example, the rise of digital photography has made traditional film photography almost obsolete. Similarly, streaming services have made physical media such as DVDs (digital video disks) less popular (Grodsky, Hildebrand & Hakanen 2018).

McLuhan and McLuhan (1988) argue that obsolescence is a natural part of media evolution and that it can have both positive and negative effects on society. While it can lead to greater efficiency and progress, it can also result in the loss of valuable cultural artefacts and practices (Grodsky, Hildebrand & Hakanen 2018).

7.2.3 Retrieval (Revival)

In the context of the laws of media, “retrieval” refers to how a medium can bring back or revive certain practices or technologies that have previously been obsolete or forgotten. Each new medium retrieves or revives something that has previously been obsolesced, which is often a slightly unexpected or unplanned effect. An example could be how e-books have retrieved the practice of marginal annotation, a practice that has become less common with printed books.

Retrieval can happen when a new medium incorporates elements of an older medium, or when a new generation discovers and reinterprets an older cultural artefact. The resurgence of vinyl records in recent years is an example of retrieval. Younger generations have rediscovered and embraced this older technology (Grodsky, Hildebrand & Hakanen 2018) as a counter to the era of streaming, where everything is available, but the music is not owned and cannot be touched as an object.

McLuhan and McLuhan (1988) argue that retrieval can have both positive and negative effects on society, as it may lead to renewed interest in cultural heritage and traditions, but it can also result in nostalgia and resistance to change.

7.2.4 Reversal (Flip)

When a medium is pushed to its extreme limit, it can reverse into something else. According to McLuhan and McLuhan (1988), “reversal” refers to how a medium can flip or invert its original purpose or meaning. McLuhan uses the car as an example: when pushed to its limits with speed and volume, it may lead to traffic jams, effectively reversing mobility – its original function.

Reversal can happen when a medium becomes so dominant that it changes the way we perceive reality and ourselves. For example, the electronic screen can reverse our perception of space and time by compressing and fragmenting information into a two-dimensional format. Similarly, social media can reverse our sense of privacy and intimacy by blurring the boundaries between public and private spheres. The McLuhans argue that reversal is a natural part of media evolution, but it can have both positive and negative effects on society. While it may lead to new forms of creativity and innovation, it can also result in confusion, disorientation, and loss of identity (Grodsky, Hildebrand & Hakanen 2018).

These laws provide a comprehensive means of analysing the impact of any technology or medium. They not only aim at understanding the intended effects, but also the side-effects and unintended consequences, thereby providing a holistic view of the interplay between technology, communication and society. These laws have been used to understand new media technologies, such as the Internet and social media platforms, and how they impact our society and the individual.

7.3 Tetrad and the Metaverse

This discussion on the Metaverse draws from all the theoretical sections. It will be informed by the collected data and the application of the criteria to the data. All the mentioned data and the criteria will inform the application of the tetrad to the Metaverse.

The Metaverse is still in a phase of full manifestation and some aspects are based on predictions of what the Metaverse can become (Ball 2022). As indicated in Chapter 1, this discussion also sets out to answer and address each of the four questions and steers towards conclusions on the main research problem.

The discussion in the following sections will be an application of the laws of media to the Metaverse and it will directly address the research questions set out in Chapter 1. As mentioned in Section 5.2, some aspects discussed are also based on predictions.

Marshall McLuhan's laws of media and the tetrad of media effects propose that any new medium or technology simultaneously enhances, obsoletes, retrieves and reverses certain human behaviours or societal practices (McLuhan & McLuhan 1988).

7.3.1 What is enhanced or improved by the Metaverse?

7.3.1.1 Enhancement of interaction, experience and physical abilities

As explored in Criteria 1 and 20, the Metaverse has the potential to extend our physical capabilities beyond what is currently possible in the physical world. For example, it allows us to interact with digital objects in ways that mimic physical interactions, and it may allow us to experience virtual environments that are too dangerous or impractical to experience in the physical world. The use of avatars in the Metaverse can also allow users to transcend physical limitations and create a sense of belonging and empowerment.

The Metaverse significantly enhances human interaction and experience. It provides a sophisticated, immersive medium through which individuals can engage with one another and their environment. Users can interact in ways that surpass the constraints of physical reality, manipulating and navigating through the digital world with enhanced perceptions, allowing for an enriched, immersive experience.

The Metaverse amplifies connectivity, thereby enabling individuals from different parts of the world to interact, socialise and collaborate in real-time. It transforms the way in which we connect, fostering global interactions and facilitating the establishment of diverse communities. This can directly relate to the criteria of alternation of space perception.

7.3.1.2 Enhancement of sensory abilities

As addressed in Criteria 3–7, the Metaverse has the potential to engage our senses in new and exciting ways. Advanced technologies such as virtual reality and augmented reality can create immersive and interactive experiences that engage multiple senses. For example, VR headsets can create a sense of presence and immersion, allowing users to feel as if they are actually in a different place. Virtual environments can be designed to stimulate our senses in ways that would have been impossible in the physical world, such as by creating fantastical landscapes or allowing us to fly. Additionally, virtual events can incorporate music, sound effects and other sensory elements to create a more engaging experience. This is evident in the discussion on my personal immersion in the Metaverse.

7.3.1.3 Enhancement of mental capabilities

The Metaverse has the potential to enhance mental capabilities by providing a platform for users to engage in complex thinking and develop skills that can be transferred to the physical world. For example, virtual reality experiences in the Metaverse can create immersive learning environments that promote critical thinking, collaboration and communication skills.

Furthermore, the Metaverse can provide new opportunities for creativity and self-expression, allowing users to create and share content in new and innovative ways by using tools and technologies that are not available in the physical world.

By engaging in these activities, users can develop their creative skills and enhance their ability to process and manipulate information in new and innovative ways. Therefore, the Metaverse has the potential to expand our cognitive or mental capabilities, such as information processing, memory, problem-solving, calculation and creativity.

7.3.1.4 Improvement in content consumption and creation

This aspect is addressed in Criterion 23. In the Metaverse, the way content is consumed and created is improved, moving from linear and static forms to more dynamic and interactive formats. Users can experience content in new, engaging ways; participate in interactive entertainment; and immerse themselves in various forms of media. This amplified interaction with content allows for a more enriched and diversified user experience.

Additionally, the Metaverse provides a vast canvas for creative expression, enabling users to create, modify and share digital creations, expanding the possibilities for artistic expression and innovation. There is a wide range of content available in the Metaverse, and users have a great deal of flexibility and creativity in terms of the types of experiences they can create and participate in.

Additionally, companies are exploring the creation of virtual marketplaces, where users can buy and sell digital goods, such as furniture, artwork and other items. The Metaverse also offers a platform for communication and collaboration, allowing users to share information and interact with one another in new and innovative ways.

7.3.1.5 Enhancement of learning and development

The Metaverse may enhance learning experiences and opportunities for development by providing interactive and immersive educational content. It offers personalised learning experiences, thereby enabling users to explore and interact with educational material in innovative ways.

This immersive learning environment is conducive to a deeper understanding and retention of information, facilitating the development of new skills and knowledge.

Referring to Criterion 2, the Metaverse has the potential to enhance learning and development. Virtual reality experiences in the Metaverse may be used to create immersive and interactive learning environments that can help users to develop new skills and knowledge. For example, virtual reality simulations can be used to train medical professionals, pilots and other professionals in a safe and controlled environment.

VR games, which are a part of the Metaverse, may help hone search techniques, neural networks and deep learning – all of which involve mental abilities. The Metaverse can also offer new opportunities for creativity and self-expression, providing new outlets for artistic expression, as well as new opportunities for people to develop their creative skills.

7.3.1.6 Enhancement of work and professional collaboration

By offering virtual workspaces equipped with advanced collaborative tools, the Metaverse improves the way in which we work and collaborate. It allows professionals to conduct meetings, collaborate on projects, and interact with colleagues in a virtual environment, thereby potentially enhancing productivity and fostering a sense of community among remote workers.

This issue is addressed in Criteria 3 and 15. The Metaverse has the potential to enhance work and professional collaboration. The Metaverse can offer new platforms for collaborative problem-solving, changing the way we approach and resolve issues. Virtual environments in the Metaverse can be used for remote work and collaboration, thereby allowing individuals to cooperate in a shared virtual space, regardless of their physical location.

This can be particularly useful for teams that are geographically dispersed or for individuals working from home. The Metaverse can also provide new opportunities for networking and professional development, allowing individuals to connect with others in their field and to participate in virtual conferences and events

7.3.2 What is replaced or pushed aside by the Metaverse?

7.3.2.1 Physical limitations

The advent of the Metaverse renders the limitations of physical space and geography obsolete. The Metaverse shapes a dimension in which spatial and geographical constraints are irrelevant, enabling people from disparate locations to interact and engage in real-time. This obsolescence of physical barriers opens up new landscapes for human interaction and collaboration, enabling more inclusive and diversified experiences and opportunities. People can interact and engage with one another in real-time, regardless of their physical locations.

As discussed in Criteria 1 and 20, the use of avatars in the Metaverse allows users to transcend physical limitations and create a sense of belonging and empowerment. The immersive nature of the Metaverse could potentially enhance social interactions beyond the limitations of physical space, allowing individuals to connect with others from all over the world.

Virtual reality experiences in the Metaverse can provide a form of exercise that is both fun and challenging, which can be beneficial for people with physical limitations. The Metaverse can also offer new opportunities for people with disabilities, allowing them to interact with others and explore virtual worlds in ways that may not have been possible in the physical world. The Metaverse has the potential to provide new opportunities for individuals to push physical limitations aside and to engage in activities and experiences that may not have been possible in the physical world.

7.3.2.2 Traditional gaming platforms

As discussed in Criterion 28, it is not entirely certain how the Metaverse impacts on traditional gaming platforms. Although it is not certain, it is possible for the Metaverse to push traditional gaming platforms aside. As mentioned in Criterion 28, companies like Meta (formerly Facebook) face significant challenges in creating a successful and profitable Metaverse, including creating a compelling user experience and managing the high costs of development and maintenance.

7.3.2.3 Conventional social media

The Metaverse is predicted to supersede conventional social media platforms by providing more interactive, immersive and holistic experiences. It fosters a dimension where users can craft, share and experience content in unprecedented ways, going beyond the static and bounded experiences offered by current social media platforms. This forms part of the discussion on Criterion 21, where it is indicated that it is possible for the Metaverse to push conventional social media aside. The immersive and interactive nature of the Metaverse offers a unique platform for communication and social interaction that may replace existing social media platforms that rely on text and image. However, while the Metaverse does have the potential to transform social media, it is still too early to predict how it will actually impact conventional social media platforms.

In Criterion 21, the relationship between social media and the Metaverse is addressed. If a Metaverse is where the real and virtual worlds collide, then Instagram can be viewed as a Metaverse. This suggests that the Metaverse may be seen as a new form of media that combines elements of the real and virtual worlds. It is mentioned that communication behaviour in the Metaverse is still evolving and that there are both opportunities and challenges associated with this new form of social interaction.

In Criteria 24 and 25, questions are raised about who gets to decide what the Metaverse looks like and how it is used, and whether companies such as Meta and Microsoft can be trusted to moderate and regulate the Metaverse in a responsible and ethical manner.

7.3.2.4 Current eCommerce models

As addressed in Criterion 20, the Metaverse is set to transform the eCommerce landscape. It is likely to expand current online shopping experiences vastly. With immersive, 3D interactive environments, allowing users to experience products virtually before making purchasing decisions. This elevated level of interactivity and immersion may make conventional, 2D online shopping interfaces a thing of the past for particular types of goods, such as luxury clothing. It is possible that the Metaverse could push current eCommerce models aside, in that it offers a new frontier for eCommerce with virtual storefronts, where users can browse and purchase virtual goods and services.

7.3.2.5 Standard work environment

As discussed in Criterion 20, the Metaverse also has the potential to redefine professional settings and work environments. Traditional offices and workspaces may become obsolete, replaced by virtual environments that offer flexibility, inclusivity and enhanced collaboration. This reimagining of workspaces alters the way in which individuals perceive and interact in professional settings, potentially fostering more equitable and adaptable working conditions. The Metaverse offers new opportunities for remote work and collaboration, with virtual offices and meeting spaces that can be accessed from anywhere in the world. Standard work environments have a large and established infrastructure, and it is possible that they could adapt and incorporate elements of the Metaverse into their own practices.

7.3.2.6 Current educational models

As indicated in Criterion 20, education is another domain where the Metaverse could bring about revolutionary changes. It holds the potential to make conventional educational structures and learning environments obsolete, paving the way for more immersive, interactive and customised learning experiences. This transformation may lead to a rethinking of the role and structure of classrooms and teaching methodologies, possibly resulting in more equitable and effective educational paradigms.

With virtual classrooms and simulations that can enhance traditional educational practices, the Metaverse offers new opportunities for immersive and interactive learning experiences. These models have a large and established infrastructure and it is possible for them to adapt and incorporate elements of the Metaverse into their own practices (as mentioned in Criterion 20). While the Metaverse does have the potential to transform educational models, it is still too early to make an exact prediction of how it will impact current educational practices.

7.3.2.7 Text-based communication

As mentioned in Criterion 9, the Metaverse may challenge the dominance of text-based interactions in the realm of communication. It may introduce more intuitive and rich multimodal interactions, such as augmented reality (AR) displays and holographic projections, rendering traditional text-based communication methods obsolete and reshaping interpersonal communication paradigms. The Metaverse may differ from traditional media, as users navigate through virtual environments and interact with objects and other users in three-dimensional space.

7.3.3 What is regained by the Metaverse that was lost?

7.3.3.1 Retrieval of communal experience

The Metaverse revives the essence of communal experience and interaction that was once integral to human societies, but that was lost with individualised media consumption through personal devices.

By allowing users from across the globe to inhabit the same virtual spaces, the Metaverse brings back the shared, collective experience, allowing the user to experience and interact with the digital environment and one another in real-time. As suggested in Criterion 20, the Metaverse has the potential to facilitate social interaction and community-building that may not have been possible in the physical world. While the Metaverse may offer new opportunities for communal experiences, it is important to consider the potential trade-offs and limitations of virtual interactions compared to physical ones.

7.3.3.2 Revival of tangible interaction

In a digital setting, the Metaverse retrieves the tangible, visceral interaction with the environment and objects that have been lost in traditional, two-dimensional digital media. Through advanced technologies like VR and AR, users can touch, manipulate and interact with objects and entities in the Metaverse, thereby recreating a semblance of physical interaction in the digital realm.

As mentioned in Criterion 7, the Metaverse has the potential to provide a more immediate and tactile experience of the Internet through haptic feedback systems, such as gloves, suits and controllers designed with pressure sensors, which aim at replicating experiences of sensations like vibration. It is possible that the Metaverse may offer new ways of experiencing touch through haptic feedback or other technologies, allowing users to experience the sensation of touching virtual objects or other users in a way that feels more real than traditional VR experiences.

7.3.3.3 Regaining of a multisensory experience

With more conventional media primarily focusing on visual and auditory senses, the multisensory, immersive experiences that have been part of early human interaction with the environment were relegated. The Metaverse retrieves this by offering a multisensory approach, where users can see, hear and even feel the digital environment, reviving a more holistic sensory engagement.

The Metaverse has the potential to enhance or expand our sensory capabilities by allowing for the development of another means of sensory input – one that can exist independently of the physical body (as discussed in Criterion 3). This may allow us to experience the Metaverse in ways that have previously been impossible, extending our sensory capabilities beyond what is currently possible in the physical world. It is possible that the Metaverse could offer a multisensory experience that goes beyond what is currently possible in the physical world.

7.3.3.4 Retrieval of mythical and fantastical realities

In terms of the criteria of orality, storytelling and fantastical avatars and diverse world can be explored. The Metaverse revives elements of mythology, folklore and fantastical realms that were integral to human culture and storytelling traditions. It enables the creation and experience of worlds untethered by the constraints of physical reality, thereby allowing users to explore and inhabit spaces that are reminiscent of the mythical and fantastical narratives of the past. As discussed in Criterion 3, the Metaverse may offer the possibility of experiencing mythical and fantastical realities through virtual and augmented reality technologies, which could create immersive environments mimicking these realities.

In Criteria 9 and 10, orality is explained as pertaining to the spoken word and auditory communication, and is deeply rooted in human traditions, stories and cultures.

The criteria suggest that the Metaverse has the potential to transform storytelling by embedding narrative elements within the environment itself, blurring the line between observer and participant and altering the experience and perception of narrative time and space. The Metaverse offers the potential for spatial audio, where sound, including spoken words, emanates from specific points in the virtual space, enabling more lifelike conversations and discussions.

The aspect of role-play in terms of fantastical realities, which is also addressed in Criteria 9 and 10, proves to be a popular aspect in the Metaverse. The set-out criteria mention role play in the Metaverse in a few different places. One article on dating in the Metaverse mentions ERP as a common activity in the VR dating scene. The article notes that some users enjoy ERP, which may be seen as a form of storytelling. The article describes ERP as a type of virtual sex in which some users engage, highlighting that it can feel more immersive than traditional forms of online sexual content.

Another article notes that role play can be used in the Metaverse for a variety of purposes, including education, training and entertainment. Therefore, while role play is not the main focus of the source, it is mentioned as a common, and potentially valuable, activity in the Metaverse.

7.3.3.5 Reclamation of personal narratives and identity exploration

The ability to create and modify avatars and inhabit different roles and identities in the Metaverse retrieves the lost tradition of personal narrative creation and exploration of multiple identities, reminiscent of role-playing and masquerade in traditional cultures. It provides a space for individuals to explore and express different facets of their identity and experience diverse narratives.

The discussion in Criterion 12 explains that the use of digital avatars in the Metaverse may lead to significant changes in the way we think about identity. Users may be able to change their gender identity, racial identity, or even their identity as a human being, which may separate identity from physical form and lead to new modes of self-reflection and self-presentation. The Metaverse may provide opportunities for exploring and experimenting with identity in ways that have previously been impossible in the physical world.

The option for anonymity or pseudonymity in the Metaverse offers both liberation and complications, as interactions in the Metaverse may lead to relationships that are as meaningful as those in the physical world, influencing self-perception and personal growth. As mentioned in Criteria 12 and 14, our definition of social norms and values in these digital relationships may impact collective and individual identities. The Metaverse may also provide opportunities for collective identity formation, as users can interact with others in shared virtual environments and engage in collaborative activities. By offering new modes of self-reflection, self-presentation and collective identity formation, the Metaverse has the potential to impact social and personal identity significantly.

7.3.4 Expressions of the Metaverse in its extreme form

7.3.4.1 Over-saturation and desensitisation

Criterion 13 explains that the Metaverse offers a wealth of information, often in real-time, which may lead to cognitive overload, if not managed effectively. The abundance of information in the Metaverse requires new skills in information selection, filtering and interpretation, which may lead to overstimulation and cognitive fatigue. Additionally, the use of virtual reality technology, such as the headset used to access the Metaverse, may cause side effects such as nausea, seizures and blurred vision, which may further contribute to overstimulation (see Criterion 30).

Therefore, it is important to consider the potential risks associated with the use of the Metaverse and to develop strategies for managing information overload, while and minimising the risk of adverse effects.

At its extremes, the Metaverse may lead to an over-saturation of stimuli, resulting in users becoming desensitised to experiences, both digital and real. This flip may make users crave more heightened experiences, leading to an ever-escalating chase for more immersive and impactful stimuli, possibly causing real-world experiences to seem dull and uninteresting in comparison.

In pursuit of increasingly immersive experiences, users may engage in virtual reality games and simulations that are so intense and realistic that they find ordinary, everyday real-world interactions boring and unstimulating. For example, someone may find a sunset in the real world less beguiling after experiencing enhanced, surreal sunsets in the Metaverse.

7.3.4.2 Loss of individual privacy

In Criterion 25, it is explained that the rise of the Metaverse raises new questions about privacy and data protection. As users engage in virtual environments and interact with others, they may share personal information that may be used for commercial or other purposes (Criterion 12). Additionally, the use of digital avatars and pseudonyms may create new challenges for identity verification and authentication, which may further complicate privacy and security issues. Therefore, it is important to find methods for protecting personal information and ensuring user privacy.

While the Metaverse allows users to explore different aspects of their identities, the extreme flip could be a complete loss of individual privacy, where every action, interaction and preference is monitored, analysed and potentially exploited by corporations or malicious entities. This may lead to unprecedented levels of surveillance and manipulation, impacting users' autonomy and freedom.

7.3.4.3 Social isolation

Despite its premise to connect people from across the globe in shared virtual spaces, in its extreme, the Metaverse could isolate individuals further. As users increasingly immerse themselves in virtual worlds, real-world social bonds may weaken, leading to a society in which interpersonal, physical relationships are replaced by shallow, transient digital interactions, potentially affecting mental health and community structures.

In Criterion 20, it is explained that the Metaverse has the potential to facilitate and hinder social interaction. On the one hand, the Metaverse can provide opportunities for socialisation and community-building that may not be possible in the physical world. For instance, users can connect and interact with others in a shared, virtual space from anywhere in the world. The immersive nature of the Metaverse could potentially lead to a reduction in physical, face-to-face communication, which may result in social isolation. Additionally, problematic Internet use has been associated with low empathy, and it is not clear whether the Metaverse will lead to a loss of subtle skills, such as empathy and emotional intelligence. Therefore, it is vital to explore ways in which the Metaverse can be used to enhance – rather than replace – in-person connections.

The theme of “losing oneself” in a virtual reality has often been explored. In scenarios where the user loses all interest in the “real world”. More extreme situations have also been explored: In the film, *Don’t worry darling*, the male has his partner live in a virtual male-dominated reality without her knowing this. It is only through “glitches” in the world that she eventually realises something is amiss. She is, in fact, lying on a bed in a low-income house and her body is being kept alive by her partner, while she is “in” the virtual world.

7.3.4.4 Accessibility and inclusivity

The expansion of the Metaverse may lead to a stark divide between those who can access and benefit from it and those who cannot, thereby exacerbating existing inequalities. The reversal can see the Metaverse as an exclusive realm for the privileged, leaving behind those without the resources or skills to participate, potentially widening socio-economic gaps.

Criterion 24 provides a discussion on the accessibility and inclusivity of the Metaverse. Early adoption of technology is often determined by who can afford it and, in this way, the affordability of accessing the Metaverse is a significant factor in its adoption and widespread usage. Designing a Metaverse that embraces diversity, equity and inclusion is not only about creating a sense of belonging and respect in the digital space, but begins ahead of the process, with people needing to acquire new skills to access technologies to enter the Metaverse experience.

It is important to consider the potential barriers to access and to develop strategies for ensuring that the Metaverse is accessible to all users, regardless of their economic, physical, or social status (Criterion 24).

7.3.4.5 Reality and virtuality blurring

The Metaverse may blur the lines between reality and virtuality, to an extent where distinguishing between the two becomes challenging. The reversal could manifest as users living more in virtual realms than in the real world, leading to existential questions about what is real, what is perceived, and the nature of existence, potentially fundamentally altering human consciousness and perception.

It is possible for the Metaverse in its extreme form to lead to a complete transformation of human experience, blurring the lines between the physical and virtual worlds and creating new forms of social interaction, identity and culture (as mentioned in Criterion 12).

As indicated in Criterion 20, some have even suggested that the Metaverse could become a new dominant form of reality, replacing the physical world as we know it. However, it is important to consider the potential implications of such a transformation, as it may lead to new forms of inequality, discrimination and social fragmentation.

7.3.4.6 Personal physical injury

While engaging in the Metaverse through VR headsets or AR glasses, users may lose awareness of their real-world surroundings and inadvertently collide with objects, furniture, or walls, leading to physical injuries. Therefore, further developments should be made into ensuring users' safety in their "real-world" environment while in the Metaverse.

In Criteria 9 and 30, it is explained that the use of VR technology, such as VR headsets, may lead to injuries. Some users have reported hitting their hands against furniture or other objects while swinging their controllers, which may interfere with visual development and hand-eye coordination. However, such incidents appear to be relatively rare, with only one serious injury reported in the consumer injury database of the United States federal government. Additionally, some users have reported developing rashes on their faces after using virtual reality headsets. Further, prolonged usage of VR/AR devices without taking breaks may lead to eyestrain, headaches, or other health issues related to extended exposure to screen-based technology, suggesting that ideas such as a notification every 30 minutes informing the user how long they have been in the Metaverse may be beneficial.

In Criterion 30, it is mentioned that the product safety manual for the Meta Quest 2 headset advises that children under the age of 13 should not use the headset, while those over 13 should not use it for "prolonged periods," as it could have side effects such as nausea, seizures and blurred vision.

7.3.4.7 Direct or indirect impact on others

Individuals immersed in the Metaverse may neglect their real-world responsibilities, affecting those dependent on them, like children or pets, by not attending to their needs or well-being in a timely manner. Spending extensive time in the Metaverse may lead to social withdrawal, affecting relationships with family and friends who may feel neglected or alienated. The Metaverse can have both direct and indirect impacts on others – a phenomenon that is already real with people who become immersed in games and barely do anything else. How much worse can total immersion cause this to become?

Additionally, the immersive nature of the Metaverse may alter our perception of time and space, potentially leading to a reduction in physical, face-to-face communication and social isolation (Criterion 14). As stated in Criterion 30, as the Metaverse continues to develop and become more widely available, it will be interesting to see how immersive the experience becomes and how this affects user behaviour and social interaction.

7.3.4.8 Cultural concerns

In Criteria 19 and 20, concerns are raised that the Metaverse may lead to the homogenisation of culture, as users from around the world are exposed to the same virtual environments and experiences, potentially leading to the loss of cultural diversity and the emergence of a single, global cultural identity. Whether this is good or bad, obviously depends on one's point of view.

7.3.4.9 Ethical considerations

Criterion 26 provides a detailed discussion on ethical concerns in the Metaverse. One of the main ethical issues discussed, is the potential for harassment and abuse in the Metaverse. Instances of sexual assault or harassment have been reported in the Metaverse, highlighting the need for ethical standards and regulations to ensure the safety and wellbeing of users.

Deceiving others intentionally or unintentionally about our physical identity by creating an avatar that is significantly different from our physical appearance raises concerns about potential deception and manipulation in virtual environments. In Criterion 30, it is also noted that the Metaverse has the potential to replicate and amplify the inequalities and injustices of the real world, such as worker exploitation, misogyny, homophobia and racism.

The role of big tech companies in shaping the Metaverse and the potential for these companies to prioritise profit over the wellbeing of users is also a concern. The potential for addiction and overuse of the technology is another ethical issue discussed. It will be important for developers and policymakers to create tools and policies that can help prevent harassment and abuse; encourage healthy use of the Metaverse; and ensure that the Metaverse is a safe and ethical space for users.

7.4 Conclusion

Marshall McLuhan's tetrad of media effects offers a way to examine the effects of a medium on society through four different dimensions. The tetrad poses the following four questions: what does the medium enhance, obsolesce, retrieve, and reverse? Using the tetrad offers a comprehensive understanding of the potential impacts of the Metaverse.

The preceding discussion clearly and elaborately answers the four research questions involved in this study. Similar to all media, the final effects depend on how society incorporates and interacts with the medium. Given its immersive and interconnected nature, the Metaverse holds the potential to significantly reshape many facets of our lives.

One of McLuhan's most famous aphorisms is "the medium is the message”. This means that the medium itself – not only the content it carries – influences society.

If the Metaverse is the new medium, then its very structure, design and existence communicate a message about society's values, priorities and future direction. It addresses our desire for alternative experiences or even lives, hyper-connectivity, instant gratification and perhaps even a merging of digital and physical selves.

Through the thirty criteria developed for the evaluation of the Metaverse in terms of extensions of man and its impact on media ecology and the tetrad analysis, the main research issue is also clearly explained. From a McLuhanesque media-ecological perspective, the Metaverse can, indeed, be seen as an extension of man. As shown in detail, it amplifies several human capabilities, reshapes human perceptions and influences societal structures and norms. The tetrad analysis also provides insights into the nature and effects of the Metaverse. Similar to all technologies, the Metaverse offers a trade-off, extending certain faculties, while potentially numbing others, as evident in the criteria and tetrad analysis. As the Metaverse continues to evolve, understanding it through the lens of media ecology will be crucial for grasping its broader societal implications.

One of the major contributions of this study is the criteria developed for the operationalisation of McLuhan’s notions of technology as extensions of man and aspects related to media ecology. The thirty criteria are structured in terms of description and methods for evaluation of each criterion. These criteria are presented as a suggested method that can evaluate any type of technology.

A limitation of this study may be that it emphasises McLuhan's perspective, to the detriment and neglect of other, perhaps equally valid ones. Therefore, it is crucial to complement this approach with insight from other disciplines and theoretical frameworks, which will ensure a holistic understanding of the complex and multifaceted phenomenon that is the Metaverse.

This study is also limited in scope, with the potential for major further investigation. As mentioned in the discussion on personal experience, the investigation was done by a novice user of the Metaverse. The discussed experiences in the Metaverse merely scrape the surface of what the Metaverse has to offer. In terms of potential for further research with ChatGPT and other large language models, numerous people have realised that we have crossed the point of no return. Researchers and thought leaders realise that the world will probably look very different in a few years, as artificial intelligence affects everything.

As we approach artificial general intelligence (AGI) – the ability of AI to surpass our own capabilities (Rogers 2023) – the Metaverse is, in some sense, just a passenger on the rapid development of AI. Once AGI has been reached, nothing will remain unchanged and the Metaverse will also vastly expand in scope and impact.

It is more important, more than ever to answer the question, what is our technology doing to us? As usual, McLuhan (1964:3) is prescient:

> "… the Western world is imploding …Today, after more than a century of electric technology, we have extended our nervous system itself in a global embrace, abolishing both space and time as for as our planet is concerned. Rapidly, we approach the final phase of extensions of man – the technological simulation of consciousness".

SOURCES CONSULTED

Adam, I. 2016. What would McLuhan say about the smartphone? Applying McLuhan's tetrad to the smartphone. *Glocality,* 2(1):1–7.

Aggeler, M. 2023. "Phantom touch" and the (real) pleasures of virtual dating. Just a girl looking for love in the Metaverse. *The New York Times*, 21 June.

Al-Abebneh MM. 2020. Linking ontology, epistemology and research methodology. *Science & Philosophy*, 8(1):75–91.

Anderson, J & Rainie, L. 2022. *The Metaverse in 2040*. Pew Research Centre. [O]. Available: https://www.pewresearch.org/internet/2022/06/30/the-metaverse-in-2040/ Accessed on 2023/03/19.

Armat, M, Assarroudi, A, Rad, M, Sharifi, H & Heydari, A. 2018. Inductive and deductive: ambiguous labels in qualitative content analysis. *The Qualitative Report*, 23(1):219–221.

Azcarate, M. 2022. *Can you feel in the Metaverse? Are digital senses closer than we think? The Next Cartel.* [O]. Available: https://thenextcartel.com/discover/can-you-feel-in-the-metaverse-are-digital-senses-closer-than-we-think Accessed on 2022/11/09.

Ball, M. 2022. *The Metaverse and how it will revolutionize everything*. New York: Liveright.

Bar-Zeev, A. 2021. *Finding meaning in the Metaverse*. https://uxdesign.cc/finding-meaning-in-xr-3d730a75a4b1. Accessed on 2023/06/30.

Barile, N & Sugiyama, S. 2018. Wearing data: from McLuhan's "extended skin" to the integration between wearable technologies and a new algorithmic sensibility. *Fashion Theory*, 24(2):211–227.

BasuMallick, C. 2022. *What Is the Metaverse? Meaning, features and importance.* [O]. Available: https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-metaverse/ Accessed on 2023/04/12.

Benedetti, P & DeHart, N. 1997. *On McLuhan, forward through the rearview mirror.* Canada: Prentice-Hall.

Beres, D. 2018. *How will virtual reality change our consciousness?* Big Think. [O]. Available: https://bigthink.com/technology-innovation/how-will-virtual-reality-change-our-consciousness/ Accessed on 2023/03/25.

bHaptics 2023. *Suit up. Sync in. The new TactSuit X Series*. [O]. Available https://www.bhaptics.com/tactsuit Accessed on 2023/07/04.

Bobbit, D. 2012. Scale in the media theory of Marshall McLuhan: an application to electronic money and the Internet. *Media Fields Journal*, 1(4):1–13.

Bobbitt, D & College, W. 2011. Teaching McLuhan: understanding understanding media. *Enculturation: a Journal of Rethoric, Writing and Culture*. [O]. Available: http://enculturation.net/teaching-mcluhan Accessed on 2023/05/20.

Boffey, PM. 2019. *Do violent video games lead to violence? A neuroethics viewpoint.* [O]. Available: https://dana.org/article/do-violent-video-games-lead-to-violence/ Accessed on 2022/12/13.

Boldea, I & Sigmirean, C. 2019. *Identity and dialogue in the era of globalisation.* Romania: Arhpelag.

Borgstede, M & Scholz. 2021. Quantitative and qualitative approaches to generalization and replication: a representationalist view. *Frontiers in Psychology*, 12(1):1–9.

Brier, N. *Nostalgia & McLuhan's tetrad*. [O] Available : https://www.noahbrier.com/archives/2019/03/nostalgia-mcluhans-tetrad Accessed on 2023/09/02.

Browning, K. 2023. Apple debuts its next big product, a virtual reality headset. *The New York Times,* 5 June.

Bryman, A & Bell, E. 2014. *Research methodology: business and management contexts*. Cape Town: Oxford.

Buchanan, RA. 2023. History of technology, in *Britannica*. [O]. Available: https://www.britannica.com/technology/history-of-technology Accessed on 2023/06/30.

Burdea, G. 1999. *Haptic feedback for virtual reality*. Paper read at the Virtual Reality and Prototyping Workshop, June 1999, Laval, France. [O]. Available: http://www.ti.rutgers.edu/publications/papers/2000_ijdir.pdf Accessed on 2024/01/26.

Butler, S. 2022. *What is presence in VR and why is it so important?* How-To Geek. [O]. Available: https://www.howtogeek.com/772410/what-is-presence-in-vr-and-why-is-it-so-important Accessed on 2023/03/24.

Carey, J. 1989. *Communication as culture: essays on media and society*. New York: Routledge.

Campbell, RJ. 2000. Descending into the maelstrom of the 21st century with Marshall McLuhan. *Educational Technology*, 40(5):18–27.

Carrier, LM, Spradlin, A, Bunce, JP & Rosen, LD. 2015. Virtual empathy: positive and negative impacts of going online upon empathy in young adults. *Computers in Human Behaviour*, 52(1):39–48.

Carmigniani, J & Furht, B. 2021. *Augmented reality: an overview. handbook of augmented reality*. New York: Springer Science.

Castells, M. 1996. *The rise of the network society*. Sussex. John Wiley.

Chandler, C. 2011. Marshall Arts: an inventory of common criticisms of McLuhan's media studies. *Explorations in Media Ecology,* 10(3 & 4):279–293.

Cherp, A, Vinichenko, V & Jewell, J. 2018. Integrating techno-economic, socio-technical and political perspectives on national energy transitions: a meta-theoretical framework. *Energy Research & Social Science*, 37(1):175–190.

Clark, A & Chalmers, D.1998. The extended mind. *Analysis*, 58(1):7–19.

Clark, PA. 2021. *The Metaverse has already arrived. Here's what that actually means.* [O]. Available: https://time.com/6116826/what-is-the-metaverse/ Accessed on 2023/05/24.

Cleland, K. 2008. *Image avatars: self-other encounters in a mediated world.* Sydney: University of Technology (Doctoral thesis).

De-Lima-Santos, M & Mesquita, L. 2021. Data journalism beyond technological determinism. *Journalism Studies,* 22(11):1416–1435.

Dionisio, J, Burns, G & Gilbert, R. 2013. 3D virtual worlds and the Metaverse: current status and future possibilities. *ACM Computing Surveys,* 45(3):34–39.

Dixon, VK. 2009. Understanding the implications of a global village. *Inquiries Journal/Student Pulse*. [O]. Available: http://www.inquiriesjournal.com/a?id=1681 Accessed on 2022/10/23.

Dodds, I. 2022. My Metaverse diary: what it's like to live, work and shop inside the Internet. *The Telegraph*, 8 October.

Du Plessis, D & Du Plessis, C. 2018. Afrikaans on Twitter in a global village: a McLuhanian perspective. *Tydskrif vir Geesteswetenskappe,* 58(4):788–808.

Du Toit, J & Swer GM. 2021. Virtual limitations of the flesh: Merleau-Ponty and the phenomenology of technological determinism. *Phenomenology and Mind,* (20):20–31.

Entman, RM. How the media affect what people think: an information processing approach. *The Journal of Politics*, 51(2):347–370.

Echelson, D, Fialka, G & Logan, RK. 2022. Expanding and enriching the McLuhan tetrad. *New Explorations, Studies in Culture & Communication,* 2(2):223.

Euchner, J. 2021. Marshall McLuhan and the next normal. *Research Technology management.* 64(6):9–13.

Federman, M. 2003. *The cultural paradox of the global village*. Keynote presentation: McLuhan Program in Culture and Technology. University of Toronto. [O] Available: Accessed on 2024/01/25.

Fridman, L. 2023. *Transcript for Mark Zuckerberg: first interview in the Metaverse. Lex Fridman Podcast #398*. [O]. Available: https://individual.utoronto.ca/markfederman/CulturalParadoxOfTheGlobalVillage.pdf Accessed on 24/01/24.

Fishman, DA. 2006. Rethinking Marshall McLuhan: reflections on a media theorist. *Journal of Broadcasting & Electronic Media.* 50(3):567–574.

Fletcher, AJ. 2017. Applying critical realism in qualitative research: methodology meets method. *International Journal of Social Research Methodology*, 20(2):181–194.

Frenkel, S & Benner, K. 2021. The Metaverse's dark side: here comes harassment and assaults. *The New York Times,* 30 December. [O]. Available: https://www.nytimes.com/2021/12/30/technology/metaverse-harassment-assaults.html Accessed on 2023/05/03.

Firth, TS. 2019. The "online brain": how the Internet may be changing our cognition. *World Psychiatry,* (18):119–129.

Gau, X & Han, H. 2021. *Five senses' experience model of mirroring online shopping in IoT*. (2021 International Conference on Artificial Intelligence and Electromechanical Automation (AIEA), 14–16 May 2021, Guangzhou, China).

Goldkuhl, G, 2012. Pragmatism vs interpretivism in qualitative information systems research. *European Journal of Information Systems*, (21)2:135–146.

Gordon, WT, Hamaji, E & Albert, J. 2007. *Everyman's McLuhan.* New York: Mark Batty.

Grodsky, N, Hildebrand, J & Hakanen, E. 2018. Screens as human and non-human artifacts: explaining the McLuhan's tetrad. *Explorations in Media Ecology,* 17(1):23–39.

Gorski, PS. 2013. What is critical realism? And why should you care? *Contemporary Sociology: A Journal of Reviews*, 42(1):658–670.

Grosswiler, P. 2010. *Transforming McLuhan: cultural, critical and postmodern perspectives.* New York: Peter Lang.

Hall, SB & Baier-Lentz, M. 2022. *3 Technologies that will shape the future of the Metaverse – and the human experience*. World Economic Forum, 7 February 2022. [O]. Available: https://www.weforum.org/agenda/2022/02/future-of-the-metaverse-vr-ar-and-brain-computer/ Accessed on 2022/10/32.

Han, DD, Bergs, Y & Moorhouse, N. 2022. Virtual reality consumer experience escapes: preparing for the Metaverse. *Virtual Reality*, [O]. Available: https://doi.org/10.1007/s10055-022-00641-7 Accessed on 2023/06/28.

Hemmer, H. 2009. Impact of text messaging on communication. *Journal of Undergraduate Research at Minnesota State University*, 9(5):1–20.

Herrea, J. 2019. *Game on!* [O]. Available: https://askabiologist.asu.edu/plosable/game Accessed on 2022/12/10.

Hill, K. 2022. This is life in the Metaverse. *The New York times*, 7 October. [O]. Available: https://www.nytimes.com/2022/10/07/technology/metaverse-facebook-horizon-worlds.html Accessed on 2023/12/25.

Hodgkinson, M. 2021. *How the world caught up with media visionary Marshall McLuhan. South China Morning Post*, 23 January. [O]. Available: https://www.scmp.com/magazines/post-magazine/long-reads/article/3118630/how-world-caught-media-visionary-marshall Accessed on 2023/04/23

Horst, HA, Herr-Stephenson, B & Robinson. 2010. Media ecologies. *Scholar Commons,* 1(1):29–78.

Hsu, J. 2015. *Why most 4D movies fail at immersion*. [O]. Available: https://www.discovermagazine.com/technology/why-most-4d-movies-fail-at-immersion Accessed on 2023/05/16.

Huddleston, T. 2022. *“This is creating more loneliness”: the Metaverse could be a serious problem for kids, experts say.* [O]. Available: https://www.cnbc.com/2022/01/31/psychologists-metaverse-could-be-a-problem-for-kids-mental-health.html Accessed on 2022/12/17.

Ikram, M & Kenayathulla, HB. 2022. Out of touch: comparing and contrasting positivism and interpretivism in social science. *Asian Journal of Research in Education and Social Sciences*, 4(2)39–49.

Illiescu, AB, 2023. *AI: the driving force behind the Metaverse revolution*. AI for Good, 28 April 2023. [O]. Available: https://aiforgood.itu.int/ai-the-driving-force-behind-the-metaverse-revolution/ Accessed on 6/10/2023.

Isaac, M. 2021. Facebook renames itself Meta. *The New York Times,* 10 November. https://www.nytimes.com/2021/10/28/technology/facebook-meta-name-change.html Accessed on 203/04/25.

Islas, O. 2016. Understanding media: the extensions of man (1964), the foundations of Marshall McLuhan's tetrad. *Explorations in Media Ecology,* 15(1):80–91.

Ivanhoe, P, Owen, J, Harrison, V, Sarkissian, H & Schwitzgebel, E. 2018. *The Oneness hypothesis: beyond the boundary of self*. New York: Columbia University Press.

Jenkins, H. 2006. *Convergence culture: where old and new media collide*. New York: New York University.

Jensen, AP. 2012. Technology and the soul. *Y Magazine,* Fall 2012. [O]. Available: https://magazine.byu.edu/article/technology-and-the-soul/ Accessed on 2023/06/17.

Jensen, M. 2022. *The accessibility and affordability of the Metaverse in education right now.* [O]. Available: https://www.forbes.com/sites/forbestechcouncil/2022/08/24/the-accessibility-and-affordability-of-the-metaverse-in-education-right-now/?sh=340015367f8f Accessed on 2023/05/17.

Joshi, A. 2022. The Metaverse: a universe without culture. *The Stanford Review*, 22 June 2022. [O]. Available: https://stanfordreview.org/the-metaverse-a-universe-without-culture/ Accessed on 2022/06/19.

Katz, R & Katz, E. 1998. McLuhan: where did he come from, where did he disappear? *Canadian Journal of Communication,* 23(3):1–10.

Kellner, D. 1995. *Media culture: cultural studies, identity and politics between the modern and the postmodern*. New York: Routledge.

Kelly, O. 2011. *McLuhan's tetrads: what they are and how they work*. [O]. Available: owenkelly.net: https://www.owenkelly.net/984/mcluhans-tetrads/ Accessed on 2022/10/23.

Khan, A. 2020. Understanding McLuhan: the times and relevance. *International Journal of Knowledge Management and Practices,* 8(1):41–44.

Kinash, S. 2014. Does social media breed learner laziness? *Educational Technology Solutions*, 58(1):56–59.

Klemens, B. 2022. I Spent hundreds of hours working in VR. Here's what I learned. *Wired,* 6 January 2022. [O]. Available: https://www.wired.com/story/hours-working-vr-tips/ Accessed on 2023/04/21

Kornelsen, J. 1989. *Virtual reality? Marshall McLuhan and a phenomenological investigation of the construction of virtual worlds*. Simon Fraser University. (Masters dissertation).

Koss, H. 2022. *What is the Metaverse, really?* Built In, 6 October 2022. [O]. Available: https://builtin.com/media-gaming/what-is-Metaverse Accessed on 2023/05/13.

Kraus, S. 2022. Facebook and the creation of the Metaverse: radical business model innovation or incremental transformation? *International Journal of Entrepreneurial Behaviour & Research,* 28(3):52–76.

Kroeze, JH. 2012. *Interpretivism in IS – a postmodernist (or postpositivist?) knowledge theory*. Paper read at the 18th Americas Conference on Information Systems (AMCIS 2012), Seattle, Washington, 9–11 August 2012. [O]. Available: https://uir.unisa.ac.za/handle/10500/6983 Accessed on 2024/01/26.

LaFrance, A. 2015. 17 Of the best Internet reactions to the original iPhone. *The Atlantic,* 10 November. [O]. Available: https://www.theatlantic.com/technology/archive/2015/11/17-of-the-best-internet-reactions-to-the-original-iphone/415095/ Accessed on 2022/11/15.

Lambreti, E. 2017. Printing a film to make it resonate: Sorel Etrog and Marshall McLuhan's spiral. *Imaginations,* 8(3):25–37.

Landes, D. 2020. Marshall McLuhan's theory of attention: how to become a media psychonaut. *Explorations in Media Ecology*, 19(4):453–477.

Lau, W. 2023. The Metaverse: what is it? *Search Engine Journal,* 9 June 2023. [O]. Available: https://www.searchenginejournal.com/metaverse/484803/#close Accessed on 2023/04/28.

Lee, L, Braud, T, Zhou, P, Wang, L, Xu, D, Lin, Z & Hui, P. 2021. All one needs to know about metaverse: a complete survey on technological singularity, virtual ecosystem and research agenda. *Journal of Latex Class Files*, 14(2):1–67.

Levinson, P. 1999. *Digital McLuhan, a guide to the information millennium.* New York: Routledge.

Levinson, P. 2000. McLuhan and media ecology. *Proceedings of the Media Ecology Association,* 1(1):17–22.

Liang, H, Shi, Y, & Lu. 2016. VRMController: an input device for navigation activities in virtual reality environments. Paper read at the 15th ACM SIGGRAPH Conference, 3–5 November 2022, Guanajuato Mexico.

Logan, R. 2004. The alphabet effect: a media ecology understanding of the making of western civilisation. *OCAD University Open Research Repository*, (1):9–10.

Logan, RK. 2013a. *McLuhan, energy exploration and the overextensions of man.* [O]. Available: https://www.redalyc.org/articulo.oa?id=199528904017 Accessed on 2023/05/13.

Logan, RK. 2013b. McLuhan extended and the extended mind thesis (EMT). *The Journal of the Philosophical-Interdisciplinary Vanguard*, 4(2):45–58.

Logan, RK. 2016a. *Understanding new media, extending Marshall McLuhan.* 2nd edition. New York, Peter Lang.

Logan, R. 2016b. McLuhan's philosophy of media ecology: an introduction. *Philosophies*, 1(1):133–140.

Laskowsa, M & Marcynski, K. 2019. Media ecology: (un)necessary research perspective in Communication and Media Studies. *Mediatisation studies,* (3):53–68.

MacDonald, K. 2022. I've seen the Metaverse and I don't want it. *The Guardian*, 25 January. [O]. Available: https://www.theguardian.com/games/2022/jan/25/ive-seen-the-metaverse-and-i-dont-want-it Accessed on 2023/04/12.

Macloughlin, A. 2021. A review of McLuhan in reverse by Robert K. Logan. *New Explorations, Studies in Culture & Communication,* (2)1:202–204.

Maher, D. 2022. *Creativity in the metaverse: how the creative industry is embracing the next virtual frontier.* [O]. Available: https://www.itsnicethat.com/features/creativity-in-the-metaverse-creative-industry-040422 Accessed on 2023/04/22.

Mandal, S. 2013. Brief introduction of virtual reality & its challenges. *International Journal of Scientific & Engineering Research,* 4(4):304–317.

Mangen, A, Olivier, G & Velay, J. 2019. Comparing comprehension of a long text read in Print Book and on Kindle: where in the text and when in the story? *Frontiers in Psychology,* 10(1):1–10.

Manjoo, F. 2022. My sad, lonely, expensive adventures in Zuckerberg's V.R. *The New York Times*, 4 November. [O]. Available: https://www.nytimes.com/2022/11/04/opinion/facebook-meta-zuckerberg-virtual-reality.html Accessed on 2024/01/26.

Marr, B. 2022. *The future of social media in the metaverse*. [O]. Available: https://www.forbes.com/sites/bernardmarr/2022/08/24/the-future-of-social-media-in-the-metaverse/?sh=18c9689e1023 Accessed on 2023/05/10.

Maximilian, S, Hall, BD & Nebeling, M. 2019. *What is mixed reality?* Paper read at the CHI Conference on Human Factors in Computing Systems, 4–9 May 2019, Glasgow, Scotland.

McDowell, P. 2021. Reading McLuhan reading (and not reading). *Textual Practice,* 35(9):1391–1417. [O] Available: https://www.tandfonline.com/doi/full/10.1080/0950236X.2021.1964751 Accessed on 2024/01/25.

McLuhan, E. 1998. *Understanding the message: electric language.* Toronto: St. Martin's Buzz.

McLuhan, E. 2008. Marshall McLuhan's theories of communication: the yegg. *Global Media Journal: Canadian Edition,* 1(1):25–43.

McLuhan, E. & Zingrone, F. (eds.). *Essential McLuhan*. London: Routledge.

McLuhan, M. 1962a. *The Gutenberg galaxy*. London: Routledge & Kegan Paul.

McLuhan, M. 1962b. *The making of typographic man*. Toronto: University of Toronto.

McLuhan, M. 1964. *Understanding media, the extensions of man*. New York: McGraw-Hill.

McLuhan, M. 1969. The Playboy interview. *Playboy Magazine,* March 1969.

McLuhan, M. 1970. *Counterblast.* London: Rapp & Whiting.

McLuhan, M. 1987. *Letters of Marchal McLuhan.* Toronto: Oxford University.

McLuhan, M. 1995. Playboy interview: a candid conversation with the high priest of popcult and metaphysician of media, in *Essential McLuhan*, edited by E McLuhan & F Zingrone. London: Routledge:233–269.

McLuhan, M. 2006. The presence of the senses, in *Empire of the senses: the sensual culture reader,* edited by D Howes. New York: Berg:43–58.

McLuhan, M & Fiore, Q. 1970. *The medium is the massage.* New York: Bantam Books.

McLuhan, M & McLuhan, E. 1988. *Laws of media: the new science.* Toronto: University of Toronto Press.

McLuhan, M & McLuhan, E. 2017. *The lost tetrads of Marshall McLuhan.* New York: OR Books.

McLuhan, M & Powers, BR. 1989. *The global village: transformations in world life and media in the 21st century.* New York: Oxford University.

Melchers, MM, Li, M, Chen, Y, Zhang, W & Montag, C. 2015. Low empathy is associated with problematic use of the Internet: empirical evidence from China and Germany. *Asian Journal of Psychiatry*, 17(1):56–60.

Melzer, J. 2014. Head-mounted displays, in *The digital avionics handbook,* edited by CR Spitzer. 3rd edition. Boca Raton, FL: CRC Press.

Mesch, GS & Talmud, I. 2010. Internet connectivity, community participation and place attachment: a longitudinal study. *American Behavioral Scientist*, 53(8):1095–1110.

Miani, M. 1999. *McLuhan and the theory of communication*. (Unpublished paper, University of California, Los Angeles). [O]. Available: https://noemalab.eu/ideas/mcluhan-and-the-theory-of-communication/ Accessed on 2023/02/25.

Michel, A. 2018. *How technology shapes thoughts, feelings and actions*. [O]. Available: https://www.psychologicalscience.org/observer/how-technology-shapes-thoughts-feelings-and-actions Accessed on 2023/05/19.

Mijwil, MM & Abttan, RA. 2021. Artificial intelligence: a survey on evolution and future trends. *Asian Journal of Applied Sciences*, 9(2):87–93.

Milmo, D. 2021. Enter the Metaverse: the digital future Mark Zuckerberg is steering us toward. *The Guardian,* 28 October. [O]. Available: https://www.theguardian.com/technology/2021/oct/28/facebook-mark-zuckerberg-meta-metaverse Accessed on 2023/04/27.

Mileva, G. 2023. *52 Metaverse Statistics: market size & growth, 2023*. [O]. Available: https://influencermarketinghub.com/Metaverse-stats Accessed on 2021/05/14.

Mir, A. 2021. McLuhan and resettling into the digital. *Human as media*, 25 January 2021. https://human-as-media.com/2021/01/25/mcluhan-and-resettling-into-the-digital/ Accessed on 2023/06/25.

Mohajan, H. 2018. Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People*, 7(1):23–48.

Molinaro, M, McLuhan, C & Toye, W. 1987. *Letters of Marshall McLuhan.* Oxford: Oxford University Press.

Morrissey, CS. 2016. Analogy and the semiotic animal: reading Marshall McLuhan with John Deely. *The American Journal of Semiotics*, 32(4):49–78.

Muzari, T, Shava, GN & Shonhiwa. 2022. Qualitative research paradigm, a key research design for educational researchers, processes and procedures: a theoretical overview. *Indiana Journal of Humanities and Social Sciences,* 3(1):14–20.

Mystakidis S. 2022. Metaverse, in *Encyclopaedia*, 2:486–497. [O] Available: https://doi.org/10.3390/encyclopedia2010031 Accessed on 2024/01/24.

Nakamura, S. 2009. Overcoming the language barrier with speech translation technology. *Science and Technology Trends Quarterly Review*, 36–48.

O'Brien, C & Chan, K. 2021. *Explainer: what is the Metaverse and how will it work?* [O]. Available: https://apnews.com/article/meta-facebook-explaining-the-metaverse Accessed on 2023/03/28.

O'Flaherty, K. 2022. The security challenge of the century: security in the Metaverse. *Infosecurity Magazine,* 16 February 2022. [O]. https://www.infosecurity-magazine.com/magazine-features/security-in-the-metaverse Accessed on 2023/03/04.

Packard, MD. 2017. Where did interpretivism go in the theory of entrepreneurship? *Journal of Business Venturing*, 32(1):536–549.

Paul, K & Bhuiyan, J. 2023. *Meta AI division aims to develop "real" Metaverse, says Mark Zuckerberg.* [O]. Available: https://www.theguardian.com/technology/2023/may/11/meta-artificial-intelligence-metaverse-mark-zuckerberg Accessed on 2023/04/12.

Postman, N. 2000. The humanism of media ecology. *Proceedings of the Media Ecology Association,* 1(1):10–16.

Postman, N. 2006. Media ecology education. *Explorations in Media Ecology*, (5):5–14.

Postman, N. 2013. *What is media ecology?* Media Ecology Association. [O]. Available: https://www.media-ecology.org/What-Is-Media-Ecology Accessed on 2022/12/14.

Patomaki, H & Wight, C. 2000. After postpositivism? *The Promises of Critical Realism International Studies Quarterly*, 44(1):213–237.

Patterson, D & Bidar, M. 2022. You've heard of the Metaverse. Here is wat it looks like. *CBC NEWS*, 3 March 2022. [O]. Available: https://www.cbsnews.com/news/what-the-metaverse-looks-like/ Accessed on 2024/01/24.

Purdy, M. 2022. How the Metaverse could change work. *Harvard Business Review,* 5 April 2022.

Rauschnabel, PA, Felix, R, Hinsch, C, Shahab, H & Alt, F. 2022. What is XR? Towards a framework for augmented and virtual reality. *Computers in Human Behavior*, 133(1):1–33.

Revenscraft, E. 2023a. I threw a holiday party in Horizon World. It didn't go well. *WIRED*, 3 January 2023. [O]. Available: https://www.wired.com/story/holiday-party-horizon-worlds-the-metaverse-doesnt-exist/ Accessed on 2024/01/24.

Ravenscraft, E. 2023b. What is the metaverse, exactly? *WIRED,* 15 June 2023. [O]. Available: https://www.wired.com/story/what-is-the-metaverse/ Accessed on 2024/01/24.

Riva, G & Wiederhold, BK. 2022. What the Metaverse is (really) and why we need to know about it. *Cyberpsychology, Behaviour and Social Networking*, 25(6):355–359.

Robertson, A & Peters, J. 2022. *What is the Metaverse, and do I have to care?* [O]. Available: https://www.theverge.com/22701104/metaverse-explained-fortnite-roblox-facebook-horizon Accessed on 2023/03/17.

Roeder, O. 2023. On your marks, headset, go: my surprising, scary trip to the Metaverse. *The Financial Times*, 24 February 2023. [O]. Available: https://www.ft.com/content/151b1d9b-4eb3-4016-a20e-75c387b94e0b Accessed on 2024/01/24.

Rogers, R. 2023. What's AGI and why are AI experts skeptical? *WIRED,* 28 April 2023. [O] Available: https://www.wired.com/story/what-is-artificial-general-intelligence-agi-explained/ Accessed on 2024/01/24.

Roncallo-Dow, S & Scolari, CA. 2013. Marshall McLuhan: the possibility of re-reading his notion of medium. *Philosophies*. (1):141–152.

Roos, D. *7 Ways the printing press changed the world.* [O]. Available: https://www.history.com/news/printing-press-renaissance Accessed 2023/7/24.

Ryan, G. 2018. Introduction to positivism, interpretivism and critical theory. *Nurse Researcher*, 25(4):41–49.

Ruotsalainen, J & Heinonen, S. 2015. Media ecology and the future ecosystemic society. *European Journal of Futures Research*, 8(3):1–8.

Rushkoff, D. 2021. What Zuckerberg's Metaverse means to our humanity. [O]. Available: https://edition.cnn.com/2021/10/28/opinions/zuckerberg-facebook-meta-rushkoff/index.html Accessed on 2023/01/07.

Saker, M & Frith, J. 2022. Contiguous identities: the virtual self in the supposed metaverse. *First Monday*, 27(3):2–22.

Sanstrom, G. 2014. *Human extension: an alternative to evolutionism, creationism and intelligent design*. New York: Palgrave Macmillan.

Saunders, MN, Lewis, P & Thornhill, A. 2019. *Research methods for business students.* Harlow: Pearson.

Schmidgen, H. 2022. Surface media: McLuhan, the Bauhaus and the tactile values of TV. *Body & Society,* 28(2):121–153.

Schultze, U & Avital, M. 2011. Designing interviews to generate rich data for information systems research. *Information and Organisation*, 21(1):1–16.

Scott, D. 2014. Critical realism and empirical research methods in Education. *Journal of Philosophy of Education*, 39(4):633–646.

Scolari, CA. 2012. Media ecology: exploring the metaphor to expand the theory. *Communication Theory,* 22(2):204–225.

Shaan Puri. 2021, 29 October. *Hot take: everyone is wrong about the Metaverse*. Twitter. [O]. Available: https://twitter.com/ShaanVP/status/1454151237650112512 Accessed on 2023/04/15.

Sokolowski, M & Ershova, RV. 2022. Eternal present? From McLuhan's global village to artificial intelligence. *RUDN Journal of Psychology and Pedagogics,* 19(2):393–405.

Sima, R. 2022. New tech conveys emotional touch long-distance. *Scientific American,* May 2022. [O]. Available: https://www.scientificamerican.com/article/new-tech-conveys-emotional-touch-long-distance/ Accessed on 2023/01/25.

Spear, B. 2008. James Watt: the steam engine and the commercialization of patents. *World Patent Information*, 30(1):53–58.

Speicher, M, Hall, BD & Nebeling, M. 2019. *What is mixed reality?* Paper read at the Conference on Human Factors in Computing Systems Proceedings, 4–9 May 2019, 2019, Glasgow, Scotland.

Stephenes, NP. 2014. Towards a more sustainable media ecology: Postman's metaphor versus posthuman futures. *International Journal of Communication,* 8(8):2027–2025.

Stern, J. 2021. I spent 24 hours in the Metaverse. I Made Friends, did work and panicked about the future. *Wall Street Journal,* 12 November 2021. [O]. Available: https://www.wsj.com/articles/metaverse-experience-facebook-microsoft-11636671113 Accessed on 2023/06/25.

Strate, L. 2004. A media ecology review. *Communication Research Trends,* 23(2):3–48.

Strate, L. 2008. Studying media AS media: McLuhan and the media ecology approach. *Media Tropes,* 1:127–142.

Symes, B. 1995. Marchal McLuhan's global village. *Studylib.* [O]. Available: https://studylib.net/doc/8047078/marshall-mcluhan-s--global-village Accessed on 2023/02/15.

Terre Blanche, M, Durrheim, K & Painter, D. 2010. *Research in practice, applied methods for the social sciences.* Cape Town: University of Cape Town Press.

Tessema, D. 2021. Technological determinism versus social determinism: a critical discussion. *Ethiopian Journal of Science and Sustainable Development*, 8(2):65–72.

Van der Merwe, D. 2021. *The Metaverse as virtual heterotopia*. Paper read at the 3rd World Conference on Research in Social Sciences, 22–24 October 2021, Vienna, Austria.

Vassiliou, K. 2018. A synaptic common sense? McLuhan's tactility and electronic media rhythms. *The Senses and Society,* 13(2):179–189.

Vieta, M & Ralon, L. 2013. Being-in-the-technologically-mediated-world: the existential philosophy of Marshall McLuhan. *The Popular Culture Studies Journal*, 1(1 & 2):1–25.

Viseu, A. 1999. A multidisciplinary approach to the mutual shaping process in electronic identities, or “We shape the tools and thereafter they shape us”. [O]. Available: https://static1.squarespace.com/static/5241d50be4b0609bedb26b7c/t/524609cce4b05a24380afe95/1380321740767/Viseu_cybid+we+shape+tools+they+shape+us_1999.pdf Accessed on 2024/01/24.

Wach, AM. 2012. *The triptych tetrad: Marchall McLuhan’s neo-medieval communication theory*. Duquesne University. (Doctoral thesis).

Wagner, C, Kawulich, B & Garner, M. 2012. *Doing social research: a global context.* Berkshire: McGraw-Hill.

Yun, K, Rogers, J & Ko, S. 2022. Materials and devices for immersive virtual reality. *Nature Reviews Materials*, 1:841–843.

Zalan, T & Barbesino, P. 2023. Making the Metaverse real. *Digital Business*, 3(1):1–7.

Zallio, M & Clarkson, PJ. 2022. Designing the Metaverse: a study on inclusion, diversity, equity, accessibility and safety for digital immersive environments. *Telematics and Informatics*, 75(1):1–12.

Zhang, P & McLuhan, E. 2016. The interological turn in media ecology. *Canadian Journal of Communication,* 41(1):207–225.

Zhu, Y. 2022. The historical evolution of the media in McLuhan's theory. *Cross-Currents: An International Peer-Reviewed Journal on Humanities & Social Sciences*, 8(6):85–90.

Zimmer, M. 2005. Media ecology and value sensitive design: a combined approach to understanding the biases of media technology. *Proceedings of the Media Ecology Association*, 6(1):1–15.

Ziyad, S. 2019. Artificial intelligence: definition, ethics and standards. *Electronics and Communications: Law, Standards and Practice*, 2(1):1–13.

ADDENDUM A: TRANSCRIPT FOR MARK ZUCKERBERG: FIRST INTERVIEW IN THE METAVERSE I LEX FRIDMAN PODCAST #398

Transcript for Mark Zuckerberg: First Interview in the Metaverse I Lex Fridman Podcast #398

This is a transcript of Lex Fridman Podcast #398 with Mark Zuckerberg. The timestamps in the transcript are clickable links that take you directly to that point in the main video. Please note that the transcript is human generated and may have errors. Here are some useful links:

- Go back to this episode's main page
- Watch the full YouTube version of the podcast

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Here are the loose "chapters" in the conversation. Click link to jump approximately to that part in the transcript:

Introduction

Lex Fridman

(00:00:00) The following is a conversation with Mark Zuckerberg, Inside the Metaverse. Mark and I are hundreds of miles apart from each other in physical space, but it feels like we're in the same room because we appear to each other as photorealistic Kodak Avatars in 3D with spatial audio. This technology is incredible, and I think it's the future of how human beings connect to each other in a deeply meaningful way on the internet. These avatars can capture many of the nuances of facial expressions that we humans use to communicate and motion to each other. Now, I just need to work on upgrading my emotion expressing capabilities of the underlying human. This is the Lex Fridman Podcast. And now, dear friends, here's Mark Zuckerberg. This is so great. Lighting change? Wow.

Mark Zuckerberg

(00:01:16) Yeah, we can put the light anywhere.

Lex Fridman

(00:01:19) And it doesn't feel awkward to be really close to you.

Mark Zuckerberg

(00:01:22) No, it does. I actually moved you back a few feet before you got into the headset. You were right here.

Lex Fridman

(00:01:27) I don't know if people can see this, but this is incredible. The realism here is just incredible. Where am I? Where are you, Mark? Where are we?

Mark Zuckerberg

(00:01:39) You're in Austin, right?

Lex Fridman

(00:01:41) No. I mean this place. We're shrouded by darkness with ultra realistic face, and it just feels like we're in the same room. This is really the most incredible thing I've ever seen. And sorry to be in your personal space. We have done jujitsu before.

Mark Zuckerberg

(00:01:58) Yeah. I was commenting to the team before that I feel like we've choked each other from further distances than it feels like we are right now.

Lex Fridman

(00:02:08) This is just really incredible. I don't know how to describe it with words. It really feels like we're in the same room.

Mark Zuckerberg

(00:02:17) Yeah.

Lex Fridman

(00:02:17) It feels like the future. This is truly, truly incredible. I just wanted to take it in. I'm still getting used to it. It's you, it's really you, but you're not here with me. You're there wearing a headset and I'm wearing a headset. It's really, really incredible. Can you describe what it takes currently for us to appear so photo realistic to each other?

Mark Zuckerberg

(00:02:44) Yeah. So, for background, we both did these scans for this research project that we have at Meta called Kodak Avatars. And the idea is that instead of our avatars being cartoony and instead of actually transmitting a video, what it does is we've scanned ourselves and a lot

of different expressions, and we've built a computer model of each of our faces and bodies and the different expressions that we make and collapsed that into a Kodak that then when you have the headset on your head, it sees your face, it sees your expression, and it can basically send an encoded version of what you're supposed to look like over the wire. So, in addition to being photorealistic, it's also actually much more bandwidth efficient than transmitting a full video or especially a 3D immersive video of a whole scene like this.

Lex Fridman

(00:03:47) And it captures everything. To me, the subtleties of the human face, even the flaws, that's all amazing. It makes it so much more immersive. It makes you realize that perfection isn't the thing that leads to immersion. It's the little subtle flaws like freckles and variations in color and just ...

Mark Zuckerberg

(00:04:11) Wrinkles.

Lex Fridman

(00:04:12) ... all stuff about noses.

Mark Zuckerberg

(00:04:12) Asymmetry.

Lex Fridman

(00:04:14) Yeah, asymmetry, and just the corners of the eyes, what your eyes do when you smile, all that kind of stuff.

Mark Zuckerberg

(00:04:20) Eyes are a huge part of it.

Lex Fridman

(00:04:22) It's just incredible.

Mark Zuckerberg

(00:04:23) There's all these studies that most of communication, even when people are speaking, is not actually the words that they're saying. It's the expression and all that. And we try to capture that with the classical expressive avatar system that we have. That's the more cartoon designed one. You can put those expressions on those faces as well. But there's obviously a certain realism that comes with delivering this photo realistic experience that, I don't know, I just think it's really magical. This gets to the core of what the vision around virtual and augmented reality is, of delivering a sense of presence as if you're there together no matter where you actually are in the world. This experience I think is a good embodiment of that, where we're in two completely different states halfway across the country, and it looks like you're just sitting right in front of me. It's pretty wild.

Lex Fridman

(00:05:17) Yeah. I'm almost getting emotional. It feels like a totally fundamentally new experience. For me to have these kinds of conversations with loved ones, it would just change every- thing. Maybe just to elaborate, I went to Pittsburgh and went through the whole scanning procedure, which has so much incredible technology, software and hardware, going on, but it is a lengthy process. So what's your vision for the future of this in terms of making this more accessible to people?

Mark Zuckerberg

(00:05:50) It starts off with a small number of people doing these very detailed scans. That's the version that you did and that I did, and before there were a lot of people who we've done this a scan for, we probably need to over collect expressions when we're doing the scanning because we haven't figured out how much we can reduce that down to a really streamlined process and extrapolate from the scans that have already been done. But the goal, and we have a project that's working on this already, is just to do a very quick scan with your cell phone where you just take your phone, wave it in front of your face for a couple of minutes, say a few sentences, make a bunch of expressions, but, overall, have the whole process just be two to three minutes and then produce something that's of the quality of what we have right now.

(00:06:44) So I think that that's one of the big challenges that remains, and right now we have the ability to do the scans if you have hours to sit for one. And with today's technology, you're using a Meta headset that exists. It's a product that's for sale now. You can drive these with that, but the production of these scans in a very efficient way is one of the last pieces that we still need to really nail. And then, obviously, there's all the experiences around it. Right now we're sitting in a dark room, which is familiar for your podcast, but I think part of the vision for this over time is not just having this be a video call. That's fine, it's cool, it feels like it's immersive, but you can do a video call on your phone.

(00:07:35) The thing that you can do in the Metaverse that is different from what you can do on a phone is doing stuff where you're physically there together and participating in things together. And we could play games like this. We could have meetings like this in the future. Once you get mixed reality and augmented reality, we could have Kodak Avatars like this and go into a meeting and have some people physically there and have some people show up in this photorealistic form superimposed on the physical environment. Stuff like that is going to be super powerful. So we've got to still build out all those applications and the use cases around it. But I don't know, I think it's going to be a pretty wild next few years around this.

Lex Fridman

(00:08:17) I'm actually almost at a loss for words. This is just so incredible. This is truly incredible. I hope that people watching this can get a glimpse of how incredible it is. It really feels like we're in the same room. I guess there's an uncanny valley that seems to have been crossed here. It looks like you.

Mark Zuckerberg

(00:08:38) There's still a bunch of tuning that I think we'll want to do where different people emote to different extents, so I think one of the big questions is, when you smile, how wide is your smile? And how wide do you want your smile to be? And I think getting that to be tuned on a per person basis is going to be one of the things that we're going to need to figure out. It's like to, what extent do you want to give people control over that? Some people might prefer a version of themselves that's more emotive in their avatar than their actual faces. So, for example, I always get a lot of critique and shit for having a relatively stiff expression. I might feel pretty happy, but just make a pretty small smile.

(00:09:31) So maybe, for me, it's like I'd want to have my avatar really be able to better express how I'm feeling than how I can do physically. So I think that there's a question about how you want to tune that, but, overall, yeah, we want to start from the baseline of capturing how people actually emote and express themselves. And I think the initial version of this has been pretty impressive. And like you said, I do think we're beyond the uncanny valley here where it does feel like you. It doesn't feel weird or anything like that.

Lex Fridman

(00:10:05) That's going to be the meme that the two most monotone people are in the Metaverse together, but I think that actually makes it more difficult. The amazing thing here is that the subtleties of the expression of the eyes, people say I'm monotone and emotionless, but I'm not. It's just maybe my expression of emotion is more subtle, usually, with the eyes. And that's one of the things I've noticed is just how expressive the subtle movement of the corners of the eyes are in terms of displaying happiness or boredom or all that stuff.

Mark Zuckerberg

(00:10:39) I am curious to see, just because I've never done one of these before, I've never done a podcast as one of these Kodak Avatars, and I'm curious to see what people think of it. Because one of the issues that we've had in some of the VR and mixed reality work is it tends to feel a lot more profound when you're in it than the 2D videos capturing the experience. So I think that this one, because it's photorealistic, may look as amazing in 2D for people watching it as it feels, I think, to be in it. But we've certainly had this issue where a lot of the other things, it's like you feel the sense of immersion when you're in it that, that doesn't quite translate to a 2D screen. But I don't know, I'm curious to see what people think.

Lex Fridman

(00:11:21) Yeah, I'm curious to see if people could see that my heart is actually beating fast now. This is super interesting that such intimacy of conversation could be achieved remotely. I don't do remote podcasts for this reason, and this breaks all of that. This feels like just an incredible transition to something else, the different communication. It breaks all barriers, like geographic physical barriers. You mentioned, do you have a sense of timeline in terms of how many difficult things have to be solved to make this more accessible to like scanning with a smartphone?

Mark Zuckerberg

(00:12:02) Yeah. I think we'll probably roll this out progressively over time. So it's not going to be like we roll it out and one day everyone has a Kodak Avatar. We want to get more people scanned and into the system, and then we want to start integrating it into each one of our apps, making it so that I think that for a lot of the work style things, productivity, I think that this is going to make a ton of sense. In a lot of game environments, this could be fine, but games tend to have their own style where you almost want to fit more with the aesthetic style of the game. But I think for doing meetings, one of the things that we get a lot of feedback on Workrooms where people are pretty blown away by the experience and this feeling that you can be remote but feel like you're physically there around a table with people, but then we get some feedback that people have a hard time with the fact that the avatars are so expressive and don't feel as realistic in that environment.

(00:12:58) So I think something like this could make a very big difference for those remote meetings. And especially with Quest Three coming out, which is going to be the first mainstream mixed reality product where you're really taking digital expressions of either a person or objects and overlaying them on the physical world, I think the ability to do remote meetings and things like that where you're just remote hang sessions with friends, I think that that's going to be very exciting. So rolling it out over the next few years, it's not ready to be a mainstream product yet, but we'll keep tuning it and keep getting more scans in there and rolling it out and into more of the features. But, yeah, definitely in the next few years you'll be seeing a bunch more experiences like this.

Lex Fridman

(00:13:44) Yeah, I would love to see some celebrities scanned and some non-celebrities and just more people to experience this. I would love to see that. My mind blown. I'm literally at a loss for words because it's very difficult to just convey how incredible this is, how I feel the emotion, how I feel the presence, how I feel the subtleties of the emotion in terms of work meetings or in terms of podcasts. This is awesome. I don't even need your arms or legs.

Mark Zuckerberg

(00:14:17) Well, we got to get that. That's its own challenge.

Lex Fridman

(00:14:22) Okay.

Mark Zuckerberg

(00:14:22) And part of the question is also, so you have the scan, then it takes a certain amount of computer to go drive that, both for the sensors on the headset and then rendering it. So one of the things that we're working through is, what is the level of fidelity that is optimal? You could do the full body in a Kodak and that can be quite intensive, but one of the things that we're thinking about is, all right, maybe you can stitch a somewhat lower fidelity version of your body and have the major movements, but your face is really the thing that we have the most resolution on in terms of being able to read and express emotions. Like you said, if you move your eyebrows a millimeter, that really changes the expression

and what you're emoting whereas moving your arm like an inch probably doesn't matter quite as much. So, yes, I think that we do want to get all of that into here, and that'll be some of the work over the next period as well.

Quest 3

Lex Fridman

(00:15:27) So you mentioned Quest Three. That's coming out. I've gotten a chance to try that too. That's awesome. How'd you pull off the mix? So it's not just virtual reality, it's mixed reality.

Mark Zuckerberg

(00:15:37) I think it's going to be the first mainstream mixed reality device. Obviously, we shipped Quest Pro last year, but it was $1,500. And part of what I'm super proud of is we try to innovate not just on pushing the state-of-the-art and delivering new capabilities, but making it so it can be available to everyone. And we have this, and it's coming out, it's $500, and in some ways, I think the mixed reality is actually better in Quest Three than what we're using right now in Quest Pro. And I'm really proud of the team for being able to deliver that kind of an innovation and get it out. But some of this is just software you tune over time and get to be better. Part of it is you put together a product and you figure out, what are the bottlenecks in terms of making it a good experience?

(00:16:26) So we got the resolution for the mixed reality cameras and sensors to be multiple times better in Quest Three, and we just figured that, that made a very big difference when we saw the experience that we were able to put together for Quest Pro. And part of it is also that Qualcomm just came out with their next generation chip set for VR and MR that we worked with them on, on a custom version of it. But that was available this year for Quest Three and it wasn't available in Quest Pro. So in a way, Quest Three, even though it's not the Pro product, actually has a stronger chip set in it than the Pro line at a third of the cost. So I'm ...

Mark Zuckerberg

(00:17:00) ...line at a third of the cost. So I'm really excited to get this in people's hands. It does all the VR stuff that Quest 2 and the others have done too. It does it better because the display is better and the chip is better. So you'll get better graphics. It's 40% thinner, so it's more comfortable as well. But the MR is really the big capability shift. And part of what's exciting about the whole space right now is this isn't like smartphones, where companies put out a new smartphone every year, and you can almost barely tell the difference between that and the one the year before it.

(00:17:36) For this, each time we put out a new headset, it has a major new capability. And the big one now is mixed reality. The ability to basically take digital representations of people or objects and superimpose them on the world. And basically, there's one version of this is you're going to have these augments or holograms and experiences that you can bring into your living room or a meeting space or office.

(00:18:06) Another thing that I just think is going to be a much simpler innovation, is that there are a lot of VR experiences today that don't need to be fully immersive. And if you're playing a shooter game or you're doing a fitness experience, sometimes people get worried about swinging their arms around, like, am I going to hit a lamp or something and am I going to run into something? So having that in mixed reality, actually, it's just a lot more comfortable for people. You kind of still get the immersion and the 3D experience and you can have an experience that just wouldn't be possible in the physical world alone. But by being anchored to and being able to see the physical world around you, it just feels so much safer and more se- cure. And I think a lot of people are really going to enjoy that too. So yeah, I'm really excited to see how people use it. But yeah, Quest 3 coming out later this fall.

Lex Fridman

(00:18:53) And I got to experience it with other people sitting around and there's a lot of furniture. And so you get to see that furniture, you get to see those people, and you get to see those people enjoy the ridiculousness of you swinging your arms. I mean, presumably their friends of yours, even if they make fun of you, there's a lot of love behind that and I got to experience that. So that's a really fundamentally different experience than just pure VR with zombies coming out of walls and-

Mark Zuckerberg

(00:19:20) Yeah, it's like someone shooting at you and you hide behind your real couch in or- der to duck the fire. Yeah.

Lex Fridman

(00:19:26) It's incredible how it's all integrated, but also subtle stuff, like in a room with no windows, you can add windows to it and you can look outside as the zombies run towards you, but it's still a nice view outside. And so that's pulled off by having cameras on the outside of the headset that do the pass through. That technology is incredible to do that on a small headset.

Mark Zuckerberg

(00:19:50) Yeah, and it's not just the cameras. You basically, you need multiple cameras to capture the different angles and sort of the three-dimensional space, and then it's a pretty complex compute problem, an Al problem to map that to your perspective because the cam- eras aren't exactly where your eyes are because no two people's eyes are, you're not going to be in exactly the same place. You need to get that to line up and then do that basically in real time and then generate something that kind of feels natural and then superimpose whatever digital objects you want to put there.

(00:20:24) So yeah, it's a very interesting technical challenge and I think we'll continue tuning this for the years to come as well. But I'm pretty excited to get this out because I think Quest 3 is going to be the first device like this that millions of people are going to get that's mixed reality. And it's only when you have millions of people using something that you start getting the whole developer community really starting to experiment and build stuff because now

there are going to be people who actually use it. So I think we got some of that flywheel going with Quest Pro, but I think it'll really get accelerated once Quest 3 gets out there. So yeah, I'm pretty excited about this one.

Lex Fridman

(00:21:01) Plus there's hand tracking, so you don't need to have a control, so the cameras aren't just in the pass through of the entire physical reality around you. It's also tracking the details of your hands in order to use that for gesture recognition, this kind of stuff.

Mark Zuckerberg

(00:21:17) Yeah, we've been able to get way further on hand recognition in a shorter period of time than I expected, so that's been pretty cool. I don't know, did you see the demo experience that we built around?

Lex Fridman

(00:21:29) Piano?

Mark Zuckerberg

(00:21:30) Yeah, the piano. Learning to play piano.

Lex Fridman

(00:21:32) Yeah, it's incredible. You're basically playing piano on a table, and that's without any controller. And how well it matches physical reality with no latency, and it's tracking your hands with no latency and it's tracking all the people around you with no latency. Integrating physical reality and digital reality, obviously that connects exactly to this Codec Avatar, which is in parallel allows us to have ultra realistic copies of ourselves in this mixed reality.

(00:22:06) So it's all converging towards an incredible digital experience in the Metaverse. To me, obviously I love the intimacy of conversation, so even this is awesome, but do you have other ideas of what this unlocks, of something like Codec Avatar unlocks in terms of applications, in terms of things we're able to do?

Mark Zuckerberg

(00:22:28) Well, there's what you can do with avatars overall, in terms of superimposing digital objects on the physical world, and then there's psychologically, what does having photorealistic do? So I think we're moving towards a world where we're going to have something that looks like normal glasses, where you can see the physical world, but you'll also see holograms. And in that world, I think that there are going to be, not too far off, maybe by the end of this decade, we'll be living in a world where there are as many holograms when you walk into a room as there are physical objects. And it really raises this interesting question about what are ... A lot of people have this phrase where they call the physical world the real world.

(00:23:19) And I kind of think increasingly, the physical world is super important, but I actually think the real world is the combination of the physical world and the digital worlds coming together. But until this technology, they were sort of separate. It's like you access the digital world through a screen and maybe it's a small screen that you carry around or it's a bigger

screen when you sit down at your desk and strap in for a long session, but they're kind of fundamentally divorced and disconnected. And I think part of what this technology is going to do is bring those together into a single coherent experience of what the modern real world is, which is, it's got to be physical because we're physical beings. So the physical world is always going to be super important.

(00:24:01) But increasingly, I think a lot of the things that we kind of think of can be digital holograms. I mean, any screen that you have can be a hologram, any media, in any book, art. It can basically be just as effective as a hologram, as a physical object. Any game that you're playing, a board game or any kind of physical game, cards, ping pong, things like that, they're often a lot better as holograms. Because you could just snap your fingers and instantiate them and have them show up. It's like you have a ping pong table show up in your living room, but then you can snap your fingers and have it been gone. So that's super powerful. So I think that it's actually an amazing thought experiment of how many physical things we have today that could actually be better as interactive holograms.

(00:24:52) But then beyond that, I think the most important thing obviously is people. So the ability to have these mixed hangouts, whether they're social or meetings where you show up to a conference room, you're wearing glasses or a headset in the very near term, but hopefully by over the next five years, glasses or so. And you're there physically. Some people are there physically, but other people are just there as holograms, and it feels like it's them who are right there.

(00:25:23) And also by the way, another thing that I think is going to be fascinating about being able to blend together the digital and physical worlds in this way, is we're also going to be able to embody Als as well. So I think you'll also have meetings in the future where you're basically, maybe you're sitting there physically and then you have a couple of other people who are there as holograms, and then you have Bob, the Al, who's an engineer on your team who's helping with things, and he can now be embodied as a realistic avatar as well, and just join the meeting in that way. So I think that that's going to be pretty compelling as well.

(00:26:03) Okay, so what can you do with photorealistic avatars compared to the more expressive ones that we have today? Well, I think a lot of this actually comes down to acceptance of the technology. And because all of the stuff that we're doing, I mean, the motion of your eye- brows, the motion of your eyes, the cheeks and all of that, there's actually no reason why you couldn't do that on an expressive avatar too. I mean, it wouldn't look exactly like you, but you can make a cartoon version of yourself and still have it be almost as expressive.

(00:26:38) But I do think that there's this bridge between the current state of most of our interactions in the physical world and where we're getting in the future with this kind of hybrid, physical and digital world, where I think it's going to be a lot easier for people to take some of these experiences seriously with the photorealistic avatars to start. And then I'm actually really curious to see where it goes longer term. I could see a world where people stick to the photorealistic and maybe they modify them to make them a little bit more interesting, but maybe fundamentally, we like photorealistic things.

(00:27:14) But I can also see a world that once people get used to the photorealistic avatars and they get used to these experiences, that I actually think that there could be a world where people actually prefer being able to express themselves in kind of non, ways that aren't so tied to their physical reality. And so that's one of the things that I'm really curious about. And I don't know, in a bunch of our internal experiments on this, one of the things that I thought was psychologically pretty interesting is, people have no issues blending photorealistic stuff and not.

(00:27:50) So for this specific scene that we're in now, we happen to sort of be in a dark room. I think part of that aesthetic decision I think was based on the way you like to do your podcast, but we've done experiences like this, where you have a cartoony background, but photorealistic people who you're talking to, and people just seem to just think that that is completely normal. It doesn't bother you; it doesn't feel like it's weird.

(00:28:21) Another thing that we have experienced with, is basically you have a photorealistic avatar that you're talking to, and then right next to them you have an expressive kind of cartoon avatar. And that actually is pretty normal too. It's not that weird to basically interact with different people in different modes like that. So I'm not sure, I think it'll be an interesting question, to what extent these photorealistic avatars are a key part of just transitioning from being comfortable in the physical world to this kind of new, modern, real world that includes both the digital and physical, or if this is the long-term way that it stays? I think that there are going to be uses for both the expressive and the photorealistic over time. I just don't know what the balance is going to be.

Lex Fridman

(00:29:08) Yeah. It's a really good, interesting philosophical question, but to me, in the short term, the photorealistic is amazing. To where I would prefer, you said the workroom, but on a beach with a beer, just to see a buddy of mine remotely on a chair next to me, drinking a beer. I mean that, as realistic as possible, is an incredible experience. So I don't want any fake hats on him. I don't want any, just chilling with a friend, drinking beer, looking at the ocean, while not being in the same place together. I mean, that experience is just, it's a fundamentally, it's just a high quality experience of friendship. Whatever we seek in friendship, it seems to be present there in the same kind of realism I'm seeing right now. This is totally a game changer. So to me, this is, I can see myself sticking with this for a long time.

Mark Zuckerberg

(00:30:01) Yeah, and I mean it's also, it's novel. And it's also a technological feat, right? It's like being able to pull this off, it's a pretty impressive and I think to some degree, it's just this kind of awesome experience.

Nature of reality

Lex Fridman

(00:30:15) But I'm already, sorry to interrupt, I'm already forgetting that you're not real. This really-

Mark Zuckerberg

(00:30:22) Well, I am real.

Mark Zuckerberg

(00:30:23) It's novel.

Mark Zuckerberg

(00:30:24) This is just an avatar version of me.

Lex Fridman

(00:30:26) That's a deep philosophical question. Yes.

Mark Zuckerberg

(00:30:29) But here's some of the... So I put this on this morning and I was like, "All right." It's like, okay, my hair is a little shorter in this than my physical hair is right now. I probably need to go get a haircut. And I actually, I did happen to shave this morning, but if I hadn't, I could still have this photorealistic avatar that is more cleanly shaven, even if I'm a few days in, physically. So I do think that there are going to start to be these subtle questions that seep in where the avatar is realistic in the sense of, this is kind of what you looked like at the time of capture, but it's not necessarily temporarily accurate to exactly what you look like in this moment. And I think that there are going to end up being a bunch of questions that come from that over time, that I think are going to be fascinating too.

Lex Fridman

(00:31:22) You mean just the nature of identity of who we are? You know how people do summer beach body? Where people will be, for the scan, they'll try to lose some weight and look their best and sexiest with the nice hair and everything like that. It does raise the question of if a lot of people interacting with the digital version of ourselves, who are we really? Are we the entity driving the avatar or are we the avatar?

Mark Zuckerberg

(00:31:52) Well, I mean, I think our physical bodies also fluctuate and change over time too. So I think there's a similar question of which version of that are we? And it's an interesting identity question because all right, it's like, I don't know, it's like weight fluctuates or things like that. I think most people don't tend to think of themselves as the... Well, I don't know. It's an interesting psychological question. Maybe a lot of people do think about themselves as the kind of worst version, but I think a lot of people probably think about themselves as the best version.

(00:32:26) And then it's like what you are on a day-to-day basis doesn't necessarily map to either of those. Yeah, there will definitely be a bunch of social scientists and folks will have to, and psychologists, really, there's going to be a lot to understand about how our perception of ourselves and others has shifted from this.

Lex Fridman

(00:32:51) Well, this might be a bit of a complicated and a dark question, but one of the first feelings I had experiencing this is I would love to talk to loved ones. And the next question I have is I would love to talk to people who are no longer here that are loved ones. So if you look into the future, is that something you think about? Who people who pass away, but they can still exist in the metaverse, you could still have, talk to your father, talk to your grandfather and grandmother and a mother once they pass away. The power of that experience is one of the first things my mind jumped because it's like, this is so real.

Mark Zuckerberg

(00:33:30) Yeah, I think that there are a lot of norms and things that people have to figure out around that. There's probably some balance, where if someone has lost a loved one and is grieving, there may be ways in which being able to interact or relive certain memories could be helpful. But then there's also probably an extent to which it could become unhealthy. And I mean, I'm not an expert in that, so I think we'd have to study that and understand it in more detail. We have a fair amount of experience-

Mark Zuckerberg

(00:34:00) ... understand it in more detail. We have a fair amount of experience with how to handle death and identity, and people's digital content through social media already, unfortunately. Unfortunately people who use our services die every day and their families often want to have access to their profiles, and we have whole protocols that we go through where there are certain parts of it that we try to memorialize so that way the family can get access to it so that the account doesn't just go away immediately. But then there are other things that are important, private things that person has. We're not going to give the family access to someone's messages, for example.

AI in the Metaverse

(00:34:42) So I think that there's some best practices, I think from the current digital world that will carry over. But I think that this will enable some different things. Another version of this is how this intersects with AIs because one of the things that we're really focused on is we want the world to evolve in a way where there isn't a single AI super intelligence, but where a lot of people are empowered by having AI tools to do their jobs and make their lives better.

(00:35:19) And if you're a creator and if you run a podcast like you do, then you have a big community of people who are super interested to talk to you. I know you'd love to cultivate that community and you interact with them online outside of the podcast as well. But I mean, there's way more demand both to interact with you, and I'm sure you'd love to interact with the community more, but you just are limited by the number of hours in the day.

(00:35:46) So at some point, I think making it so that you could build an AI version of yourself that could interact with people not after you die, but while you're here to help people fulfill this desire to interact with you and your desire to build a community. And there's a lot of interesting questions around that, and obviously, it's not just in the metaverse. I think we'd want to make that work across all the messaging platforms, WhatsApp, and Messenger, and Instagram Direct. But there's certainly a version of that where if you could have an avatar version of yourself in the metaverse that people can interact with, and you could define that sort of an AI version where people know that they're interacting with an AI, that it's not the physical version of you, but maybe that AI, even if they know it's an AI, is the next best thing be- cause they're probably not going to necessarily all get to interact with you directly.

(00:36:45) I think that could be a really compelling experience. There's a lot of things that we need to get right about it that we're not ready to release the version that a creator can build a version of themselves yet, but we're starting to experiment with it in terms of releasing a number of AIs that people can interact with in different ways. I think that that is also just going to be a very powerful set of capabilities that people have over time.

Lex Fridman

(00:37:13) So you've made major strides in developing these early AI personalities with the idea where you can talk to them across the Meta apps and have interesting, unique kind of conversations. Can you describe your vision there and these early strides and what are some technical challenges there?

Mark Zuckerberg

(00:37:34) Yeah. So a lot of the vision comes from this idea that... I don't think we necessarily want there to be one big super intelligence. We want to empower everyone to both have more fun, accomplish their business goals, just everything that they're trying to do. We don't tend to have one person that we work with on everything, and I don't think in the future we're going to have one AI that we work with. I think you're going to want a variety of these. So there are a bunch of different uses. Some will be more assistant oriented. There's a sort of the plain and simple one that we are building is called just Meta AI. It's simple. You can chat with it in any of your Threads. It doesn't have a face.

(00:38:22) It's just more vanilla and neutral and factual, but it can help you with a bunch of stuff. Then there are a bunch of cases that are more business oriented. So let's say you want to contact a small business. Similarly, that business probably doesn't want to have to staff someone to man the phones, and you probably don't want to wait on the phone to talk to someone. But having someone who you can just talk to in a natural way who can help you if you're having an issue with a product or if you want to make a reservation or if you want to buy something online, having the ability to do that and have a natural conversation rather than navigate some website or have to call someone and wait on hold think is going to be re- ally good both for the businesses and for normal people who want to interact with businesses.

(00:39:11) So I think stuff like that makes sense. Then there are going to be a bunch of use cases that I think are just fun. So I think people are going to... I think there will be AIs that I can tell jokes, so you can put them into chat thread with friends. I think a lot of this, because we're like a social company. I mean we're fundamentally around helping people connect in different ways. Part of what I'm excited about is how do you enable these kind of AIs to facilitate connection between two people or more, put them in a group chat, make the group chat more interesting around whatever your interests are, sports, fashion, trivia.

Lex Fridman

(00:39:51) Video games. I love the idea of playing. I think you mentioned Baidur's Gate, an incredible game. Just having an AI that you play together with. I mean, that seems like a small thing, but it could deeply enrich the gaming experience.

Mark Zuckerberg

(00:40:08) I do think that AI will make the NPCs a lot better in games too. So that's a separate thing that I'm pretty excited about. I mean, one of the AIs that we've built that just in our internal testing people have loved the most is an adventure text-based like a dungeon master.

Lex Fridman

(00:40:30) Nice.

Mark Zuckerberg

(00:40:31) I think, part of what has been fun, and we talked about this a bit, but we've gotten some real cultural figures to play a bunch of these folks and be the embodiment in the avatar of them. So Snoop Dogg is the dungeon master, which I think is just hilarious.

Lex Fridman

(00:40:48) Yes. In terms of the next steps of, you mentioned Snoop, to create a Snoop AI, so basically AI personality replica a copy... Or not a copy, maybe inspired by Snoop, what are some of the technical challenges of that? What does that experience look like for Snoop to be able to create that AI?

Mark Zuckerberg

(00:41:11) So starting off, creating new personas is easier because it doesn't need to stick exactly to what that physical person would want, how they'd want to be represented. It's like it's just a new character that we created. So Snoop in that case, he's basically an actor. He's playing the Dungeon Master, but it's not Snoop Dogg, it's whoever the dungeon master is. If you want to actually make it so that you have an AI embodying a real creator, there's a whole set of things that you need to do to make sure that that AI is not going to say things that the creator doesn't want and that the AI is going to know things and be able to represent things in the way that the creator would want, the way that the creator would know.

(00:42:06) So I think that it's less of a question around having the avatar express them. I mean that I think where it's like, well, we have our V1 of that that we'll release soon after Connect. But that'll get better over time. But a lot of this is really just about continuing to make the

models for these Als that they're just more and more, I don't know, you could say reliable or predictable in terms of what they'll communicate so that way when you want to create the Lex assistant Al that your community can talk to. You don't program them like normal computers, you're training them. They're Al models, not normal computer programs, but you want to get it to be predictable enough so that way you can set some parameters for it.

(00:42:59) And even if it isn't perfect all the time, you want it to generally be able to stay within those bounds. So that's a lot of what I think we need to nail for the creators, and that's why that one is actually a much harder problem, I think, than starting with new characters that you're creating from scratch. So that one I think will probably start releasing sometime next year. Not this year, but experimenting with existing characters and the assistant, and games, and a bunch of different personalities and experimenting with some small businesses. I think that that stuff we'll be ready to do this year. And we're rolling it out basically right after Connect.

Lex Fridman

(00:43:42) Yeah. I'm deeply entertained by the possibility of me sitting down with myself and saying, "Hey, man, you need to stop the dad jokes or whatever."

Mark Zuckerberg

(00:43:52) I think the idea of a podcast between you and Al assistant Lex podcast.

Lex Fridman

(00:43:59) I mean, there is just even the experience of an avatar, being able to freeze yourself like basically first mimic yourself, so everything you do, you get to see yourself do it. That's a surreal experience. That feels like I was an ape looking in a mirror for the first time, realizing, "Oh, that's you." But then freezing that and being able to look around like I'm looking at you, I don't know how to put it into words, but it just feels like a fundamentally new experience. I'm seeing maybe color for the first time. I'm experiencing a new way of seeing the world for the first time because it's physical reality, but it's digital. And realizing that that's possible, it's blowing my mind. It's just really exciting.

(00:44:50) I lived most of my life before the internet and experiencing the internet and experiencing voice communication, video communication. You think like, "Well, there's a ceiling to this, but this is making me feel like there might not be, there might be that blend of physical reality and digital reality. That's actually what the future is."

Mark Zuckerberg

(00:45:12) Yeah, I think so.

Lex Fridman

(00:45:13) It's a weird experience. It feels like the early days of a totally new way of living, and there's a lot of people that kind of complain, "Well, the internet, that's not reality. You need to turn all that off and go in nature." But this feels like this will make those people happy. I feel like, because it feels real, the flaws in everything.

Mark Zuckerberg

(00:45:37) Yeah. Well, I mean, a big part of how we're trying to design these new computing products is that they should be physical, but I think that's a big part of the issue with computers and TVs and even phones is like, "Yeah, maybe you can interact with them in different places." But they're fundamentally like you're sitting, you're still. I mean, people are just not meant to be that way. I mean, I think you and I have this shared passion for sports and martial arts and doing stuff like that. We're just moving around. It's so much of what makes us people is like, you move around. You're not just like a brain and a tank. It's where the human experience is a physical one.

(00:46:17) So it's not just about having the immersive expression of the digital world, it's about being able to really natively bring that together. I do really think that the real world is this mix of the physical and the digital. There's too much digital at this point for it to just be siloed to a small screen, but the physical is too important. So you don't want to just sit down all day long at a desk. I do think that this is the future. This is, I think the kind of philosophical way that I would want the world to work in the future is a much more coherently, blended, physical and digital world.

Lex Fridman

(00:46:56) There might be some difficult philosophical and ethical questions we have to figure out as a society. Maybe you can comment on this. So the metaverse seems to enable, sort of unlock a lot of experiences that we don't have in the physical world. And the question is what is and isn't allowed in the metaverse? In video games, we allow all kinds of crazy stuff. And in physical reality, a lot of that is illegal. So where's that line? Where's that gray area between video game and physical reality? Do you have a sense of that?

Mark Zuckerberg

(00:47:37) I mean, there are content policies and things like that in terms of what people are allowed to create, but I mean, a lot of the rules around physical... I think we try to have a society that is as free as possible, meaning that people can do as much of what they want unless you're going to do damage to other people and infringe on their rights. And the idea of damage is somewhat different in a digital environment.

(00:48:02) I mean, when I get into some world with my friends, the first thing we start doing is shooting each other, which obviously we would not do in the physical world because you'd hurt each other. But in a game, it's just fun. And even in the lobby of a game, it's not even bearing on the game, it's just kind of a funny sort of humorous thing to do. So it's like, is that problematic? I don't think so because fundamentally you're not causing harm in that world. So I think that part of the question that I think we need to figure out is what are the ways where things could have been harmful in the physical world that we'll now be freed from that? And therefore there should be fewer restrictions in the digital world.

(00:48:48) And then there might be new ways in which there could be harm in the digital world that weren't the case before. So there's more anonymity. It's when you show up to a restaurant or something, it's like all the norms where you pay the bill at the end. It's because

you have one identity. And if you stiff them, then life is a repeat game and that's not going to work out well for you. But in a digital world where you can be anonymous and show up in different ways, I think the incentive to act like a good citizen can be a lot less, and that causes a lot of issues and toxic behavior. So that needs to get sorted out.

(00:49:28) So I think in terms of what is allowed, I think you want to just look at what are the damages, but then there's also other things that are not related to harm, less about what should be allowed and more about what will be possible that are more about the laws of physics. It's like if you wanted to travel to see me in person, you'd have to get on a plane, and that would take a few hours to get here. Whereas we could just jump in a conference room and put on these headsets, and we're basically teleported into a space where it feels like we're together.

(00:50:04) So that's a very novel experience that it breaks down some things that previously would've defied the laws of physics for what it would take to get together. And I think that that will create a lot of new opportunities. One of the things that I'm curious about is there are all these debates right now about remote work or people being together. I think this gets us a lot closer to being able to work physically in different places, but actually have it feel like we're together. So I think that the dream is that people will one day be able to just work wherever they want, but we'll have all the same opportunities because you'll be able to feel like you're physically together. I think we're not there today with just video conferencing and the basic technologies that we have, but I think part of the idea is that with something like this, over time, you could get closer to that and that would open up a lot of opportunities, right? Because then people could live physically where they want while still being able to get the benefits of being physically or feeling like you're together.

Mark Zuckerberg

(00:51:00) ... to get the benefits of being physically or feeling like you're together with people at work, all the ways that that helps to build more culture and build better relationships and build trust, which I think are real issues that if you're not seeing people in person ever. So yeah, I don't know. I think it's very hard from the first principles to think about all the implications of a technology like this and all the good and the things that you need to mitigate. So you try to do your best to envision what things are going to be like and accentuate the things that they're going to be awesome and hopefully mitigate some of the downside things. But the reality is that we're going to be building this out one year at a time. It's going to take a while, so we're going to just get to see how it evolves and what developers and different folks do with it.

Large language models

Lex Fridman

(00:51:52) If you could comment, this might be a bit of a very specific technical question, but Llama 2 is incredible. You've released it recently. There's already been a lot of exciting developments around it. What's your sense about its release and is there a Llama 3 in the future?

Mark Zuckerberg

(00:52:15) Yeah, I mean, I think on the last podcast that we did together, we were talking about the debate that we were having around open sourcing Llama 2. And I'm glad that we did. I think at this point there's the value of open sourcing, a foundation model like Llama 2. It's significantly greater than the risks in my view. I mean, we spent a lot of time, took a very rigorous assessment of that and red teaming it. But I'm very glad that we released Llama 2. I think the reception has been... It's just been really exciting to see how excited people have been about it. It's gotten way more downloads and usage than I would've even expected, and I was pretty optimistic about it. So that's been great.

(00:53:05) Llama 3, I mean, there's always another model that we're training. So for right now, we train Llama 2, and we released it as an open source model. And right now the priority is building that into a bunch of the consumer products, all the different AIs and a bunch of different products that we're basically building as consumer products. Because Llama 2 by it-self, it's not a consumer product, right? It's more of a piece of infrastructure that people could build things with.

(00:53:36) So that's been the big priority, is continuing to fine tune and just get Llama 2 and the branches that we've built off of it ready for consumer products that hopefully hundreds of millions of people will enjoy using those products in billions one day. But yeah, I mean we're also working on the future foundation models. I don't have anything new or news on that. I don't know exactly when it's going to be ready. I think just like we had a debate around Llama 2 and open sourcing it, I think we'll need to have a similar debate and process to red team this and make sure that this is safe. And my hope is that we'll be able to open source this next version when it's ready too. But we're not close to doing that this month. I mean, that's a thing that we're still somewhat early and working on.

Lex Fridman

(00:54:37) Well, in general, thank you so much for open sourcing Llama 2 and for being trans-parent about all the exciting developments around AI. I feel like that's contributing to a really awesome conversation about where we go with AI. And obviously, it's really interesting to see all the same kind of technology integrated into these personalized AI systems with the AI personas, which I think when you put in people's hands and they get to have conversations with these AI personas, you get to see interesting failure cases where the things are dumb, or they go into weird directions. And we get to learn as a society together what's too far, what's interesting, what's fun, how much personalization is good, how much generic is good. And we get to learn all of this. And you probably don't know this yourself. We have to all figure it out by using it, right?

Mark Zuckerberg

(00:55:31) Yeah, I mean part of what we're trying to do with the initial AI's launch is having a diversity of different use cases just so that people can try different things because I don't know what's going to work. I mean, are people going to like playing in the tech-based adventure games or are they going to like having a comedian who can add jokes to threads,

or they can want to interact with historical figures? We made one of Jane Austin and one of Marcus Aurelius, and I'm curious to see how that goes.

Lex Fridman

(00:56:03) I'm excited for both. Aa a big fan, I'm excited for both. I have conversations with them. And I am also excited to see, the internet, I don't know if you heard, can get kind of weird and I applaud them for it. So-

Mark Zuckerberg

(00:56:18) I've heard that, yeah.

Lex Fridman

(00:56:19) Yeah. So it'd be nice to see how weird they take it, what kind of memes are generated from this. And I think all of it is, especially in these early stages of development as we progress towards AGI, it's good to learn by playing with those systems and interacting with them at a large scale like you said.

Mark Zuckerberg

(00:56:38) Yeah, totally. I mean, that's why we're starting out with a set. And then we're also working on this platform that we call Al Studio that's going to make it so that over time anyone will be able to create one of these Al almost like they create any other UGC content across the platform. So I'm excited about that. I think that to some degree we're not going to see the full potential of this until you just have the full creativity of the whole community being able to build stuff, but there's a lot of stuff that we need to get. So I'm excited to take this in stages. I don't think anyone out there is really doing what we're doing here. I think that there are people who are doing fictional or consumer-oriented character type stuff, but the extent to which we're building it out with the avatars and expressiveness and making it so that they can interact across all of the different apps, and they'll have profiles and we'll be able to engage people on Instagram and Facebook, I think it's going to be really fun.

Future of humanity

Lex Fridman

(00:57:49) Well, we're talking about Al, but I'm still blown away this entire time that I'm talking to Mark Zuckerberg. And you're not here, but you feel like you're here. I've done quite a few intimate conversations with people alone in a room, and this feels like that. So I keep forgetting for long stretches of time that we're not in the same room. And for me to imagine a future where I can with a snap of a finger do that with anyone in my life, the way we can just call right now and have this kind of shallow 2D experience, to have this experience like we're sitting next to each other is like... I don't think we can even imagine how that changes things where you can immediately have intimate one-on-one conversations with anyone. In a way, we might not even predict change civilization.

Mark Zuckerberg

(00:58:44) Well, I mean this is a lot of the thesis behind the whole Metaverse, is giving people the ability to feel like you're present with someone. I mean, this is the main thing I talk about all the time, but I do think that there's a lot to process about it. I mean, from my perspective, I'm definitely here. We're just not physically in the same place. You're not talking to an Al. So I think the thing that's novel is the ability to convey through technology a sense of almost physical presence. So the thing that is not physically real is us being in the same physical place, but everything else is. And I think that that gets to this somewhat philosophical question about what is the nature of the modern real world? And I just think that it really is this combination of physical world and the presence that we feel, but also being able to combine that with this increasingly rich and powerful and capable digital world that we have and all of the innovation that's getting created there.

(00:59:52) So I think it's super exciting because I mean, the digital world is just increasing in its capability and our ability to do awesome things, but the physical world is so profound, and that's a lot of what makes us human is that we're physical beings. So I don't think we want to run away from that and just spend all day on a screen. It's one of the reasons why I care so much about helping to shape and accelerate these future computing platforms. I just think this is so powerful. And even though the current version of this is like you're wearing a head-set, I just think this is going to be by far the most human and social computing platform that has ever existed. And that's what makes me excited.

Lex Fridman

(01:00:36) Yeah, I think just to linger on this kind of changing nature of reality of what is real, maybe shifting it towards the sort of consciousness. So what is real is the subjective experience of a thing that makes it feel real versus necessarily being in the same physical space, be- cause It feels like we're in the same physical space. And that the conscious experience of it, that's probably what is real. Not like that the space time, the physics of it. You're basically breaking physics and focusing on the consciousness. That's what's real. Just whatever's going on inside my head.

Mark Zuckerberg

(01:01:17) But there are a lot of social and psychological things that go along with that experience that was previously only physical presence, right? I think that there's an intimacy, a trust. There's a level of communication because so much of communication is nonverbal and is based on expressions that you're sharing with someone when you're in this kind of environment. And before, those things would've only been possible had I gotten on a plane and flown to Austin and sat physically with you in the same place. So I think we're basically short cutting those laws of physics and delivering the social and psychological benefits of being able to be present and feel like you're there with another person, which I are real benefits to anyone in the world.

(01:02:10) Like you said, I think that is going to be a very profound thing. A lot of that is that's the promise of the Metaverse and why I think that that's the next frontier for what we're working on. I started working on social networks when they were primarily text, where the first ver-sion of Facebook, your profile, you had one photo and the rest of it was lists of things that you were interested in. And then we kind of went through the period where we were doing photos. And now we're kind of in the period where most of the content is video, but there's a clear trend where over time the way that we want to express ourselves and kind of get insight and content about the world around us gets increasingly just richer and more vivid.

(01:02:57) And I think the ability to be immersed and feel present with the people around you or the people who you care about is, from my perspective, clearly the next frontier. It just so happens that it's incredibly technologically difficult. It requires building up these new computing platforms and completely new software stacks to deliver that, but I kind of feel like that's what we're here to do as a company.

Lex Fridman

(01:03:21) Well, I really love the connection you have through conversation. And so for me, this photo realism is really, really exciting. I'm really excited for this future and thank you for building it. Thanks to you and thanks to the amazing Meta teams that I've met, the engineers and just everybody I've met here. Thank you for helping to build this future. And thank you, Mark, for talking to me inside the Metaverse. This is blowing my mind. I can't quite express. I would love to measure my heart rate this whole time. It would be hilarious if you're actually sitting in a beach right now.

Mark Zuckerberg

(01:04:00) I'm not. I'm in a conference room.

Lex Fridman

(01:04:02) Okay. Well, I'm at a beach and not wearing any pants. I'm really sorry about that for anyone else who's watching me in physical space. Anyway, thank you so much for talking to-day. This really blew my mind. It's one of the most incredible experiences in my life, so thank you for giving that to me.

Mark Zuckerberg

(01:04:17) Awesome. Awesome. Glad you got to check it out. And it's always fun to talk. All right, I'll catch you soon. See you.

Lex Fridman

(01:04:23) See you later. This is so, so amazing, man. This is so, amazing man.

ADDENDUM B: ETHICAL CLEARANCE

UNISA university of south africa

COLLEGE OF HUMAN SCIENCES RESEARCH ETHICS REVIEW COMMITTEE

11 July 2023

NHREC Registration # :
Rec-240816-052
CREC Reference # :
34176241_CREC_CHS_2023

Dear Mrs Therise Bertha Davie

Decision:
Ethics Approval from 11 July 2023 to 11 July 2024

Researcher(s): Name: Mrs. T. B. Davie
Contact details: breett@unisa.ac.za
Supervisor(s): Name: Prof. D. F. Du Plessis
Contact details: dplesdf@unisa.ac.za

Title: Technology as the extensions of man. The use of Marshall McLuhan's Tetrad of media effects in an analysis of the Metaverse. A media ecological perspective.
Purpose: Masters

Thank you for the application for research ethics clearance by the Unisa College of Human Science Ethics Committee. Ethics approval is granted for one year.

The ***negligible risk application*** *was reviewed by* College of Human Sciences Research Ethics Committee, in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the

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confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No fieldwork activities may continue after the expiry date **(11 July 2024).** Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

*The reference number **34176241_CREC_CHS_2023** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Signature: 

Prof. KB Khan
CHS Research Ethics Committee Chairperson
Email: khankb@unisa.ac.za
Tel: (012) 429 8210

Signature: PP 

Prof ZZ Nkosi
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ADDENDUM C: LANGUAGE EDITING CERTIFICATE

10 Jack Nicklaus Drive

Pecanwood Golf Estate

Hartbeespoort 0216

13 February 2024

TO WHOM IT MAY CONCERN

Please be advised that I, EM (Lucia) Geyer (ID Number 580425 0023 082), edited the Master's dissertation of **Ms Therise B. Davie (Student Number 34176241)** entitled

> ***TECHNOLOGY AS EXTENSIONS OF MAN: THE USE OF MARSHALL MCLUHAN'S TETRAD OF MEDIA EFFECTS IN AN ANALYSIS OF THE METAVERSE: A MEDIA ECOLOGICAL PERSPECTIVE***

The editing exercise included the following:

- Language editing and correcting;
- Structuring;
- Formatting; and
- Bibliographic control: checking of text references and bibliographic entries.

I edited this dissertation to the best of my ability, based on my extensive experience as an academic in Information Science and an academic editor.

I take no responsibility for the suggestions and changes that I made to the manuscript that the student has not accepted.

Sincerely

EM (Lucia) Geyer

lgeyer@gmail.com

Mobile: 081 368 9014

ADDENDUM D: TURNITIN REPORT

Thesis

ORIGINALITY REPORT

19%	16%	11%	10%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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