



## *The impact of virtual worlds metaverse on the communication process*

□ ثورة الميتافيرس وانعكاساتها على ديناميكية العملية الاتصالية

OULHI Hanène

Mohamed Cherif Messaadia University - Souk Ahras (Algeria), h.oulhi@univ-soukahras.dz

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### **Abstract:**

The paper is a research trying to explain the relationship between communication and metaverse, in particular how it may be enhanced by metaverse technology. The main point of the paper is that communication cannot be limited to science fiction and that it has become possible and practical through the development of important metaverse applications such as virtual reality, augmented reality, cloud computing and communication, immersive web-based display systems, semantic web, virtual worlds, virtual networks and other related areas. It will be developed through the development of metaverse applications such as virtual reality, augmented reality, virtual networking and other related areas. Before we start talking about what communications and media can be, we need to look at what metaverse is and what its types, platforms and realities are.

**Keywords:** *Augmented Reality; Communication; Media Format; Metaverse; Nature Of Media; Virtual Worlds.*

### **ملخص:**

نحاول في هذه الورقة البحثية شرح تمظهرات اندماج الاتصال مع الميتافيرس، حيث هدفت الدراسة إلى التعرف على تأثير العوامل الافتراضية على عملية الاتصال والاعلام، مع رصد جميع الملاحظات في جميع التفاعلات التي تجري فيها وعلى عدة مراحل. بغية إعادة تعريف مصطلح الاتصال وتحديد مستويات جديدة تتجاوز نطاق التفاعل الكلاسيكي. وتبلورت اشكالية البحث من خلال التساؤل المطروح: ما هي مظاهر اندماج عملية الاتصال مع الميتافيرس؟ نحتاج هنا إلى إلقاء نظرة على ماهية هذه الأخيرة وأنواعها ومنصاتها وواقعها. قبل أن نبدأ الحديث عما يمكن أن تكون عليه الاتصالات ووسائل الإعلام في ظل تكنولوجيا الميتافيرس.

كلمات مفتاحية: واقع معزز؛ اتصال؛ وسائط إعلام؛ ميتافيرس؛ عالم افتراضي.

## I. Introduction :

As communication has progressed over the centuries, so too have the technologies that support it. From the use of primitive Ancient civilizations relied on smoke signals, drums, and drawn images to transmit messages across long distances. Eventually, the development of written language allowed for more complex messages to be passed on. However, the most important communication development of all was the invention of the printing press by Johannes Gutenberg in the mid-15th century. This allowed for mass production of information and allowed for intellectual works to spread across the globe in an unprecedented manner. The effects of this printing press are still felt today, and it changed the way that people communicate. Communication continued to evolve in keeping with the requirements of the times, emerging inventions and new discoveries, such as radio, television and space broadcasting, after which mass media reached millions of individuals, and brought societies closer as humanity had never seen before, but at all these stages communication was written; Any sender sends a message to a recipient, without that receiver having an active role in the communication process, Until the Internet appeared that changed the concept of the process, it became a circular interactive participatory. The sender turned into a recipient, and the recipient into a sender, which we see today in social media sites and apps s life, which is irreplaceable in order to communicate and access information. Thanks to the internet and its many tools, people are now able to send messages and information quickly and conveniently.

With The emergence of virtual worlds metaverse, which refers is the newest frontier in digital communication, allowing people to interact in a virtual environment. has drastically changed the way people communicate, allowing users from all over the world to connect and interact with one another in a virtual environment. It has completely changed the way in which humans interact, allowing us to communicate more quickly, share more information, and reach across great distances. Not only has it impacted how we communicate with one another, but it has also allowed us to open up communication channels with technology such as artificial intelligence and virtual reality. This new communication process has also allowed us to explore new areas of human interaction that were not possible before. So today we are challenged to redefine the term communication, and to determine its new phase that exceed interactive, such as the phase of Interpersonal -virtual and mass -virtual communication.

In this essay, I will argue that the impact of virtual worlds metaverse on the communication has been both positive and negative, providing opportunities as well as potential risks. I will support this argument by examining the evidence from various studies, surveys, and reports. I will also discuss the possible implications of this issue and the possible solutions. In the following paragraphs, I will first explain metaverse's advantages, then discuss potential services and types, and finally explore the changes metaverse has made to the communication process.

From here, the question arises as to **what The impact of virtual worlds metaverse on the communication process?** It emerges from a range of sub-questions:

- a. What metaverse Are?
- b. What are its c services and Types?
- c. What are the manifestations of the fusion of the communication process with metaverse?
- d. What is the future of communication with metaverse?

**1. Highlights:**

- a. Impact of virtual worlds on communication and communication process.
- b. Monitoring observations in all interactions in which they take place and at several phases.
- c. Redefining the term "communication" and identifying new levels beyond interactive.

**II. The rise of metaverse :****1. historical background:**

Although the concept of metaverse became popular in October 2021, when Mark Zuckerberg announced that Facebook would change its name to Meta and make significant investments in metaverse, it is not a new concept. In their extensive work on metaverse, Lee et al. take the history of metaverse back to the book/game *Dungeons & Dragons* published in 1974. Then, *Neuromancer*, a cyber frenzy science fiction novel by William Gibson, which was released in 1984, is considered as another critical milestone for the development of metaverse. The novel *Neuromancer* has also been the subject of films such as *The Matrix* and *Ghost*. (Inceoglu & Ciloglulil , 2022, pp. 171–184) The word metaverse was first used in 1992 in the science fiction novel *Snow Crash* which was written by Neal Stephenson ( Peukert, Weinhardt, Hinz , & van der Aalst, 2022, p. 401\_406)

The years between 1992 and 2016 are referred as the period of virtual worlds and multiplayer online gaming platforms. Some of the milestones for multiplayer virtual world concept can be expressed as *Active World* released in 1995, (vinesauce, 2016) (*Active Worlds*, s.d.) *Online Traveler* realized in 1996, *Second Life* launched in 2003 and *Minecraft* launched in 2011. ( Henningson, 2022) *Pokemen Go*, (pokemon, s.d.) which was released in 2016, *VR Chat*, (vrchat, 2017) which was released in 2017, *Super Mario AR*, (supermario, s.d.) which appeared in the same year, *CryptoKitties* in 2017 (cryptokitties, s.d.) and *Alien Worlds* in 2020 (alienworlds, s.d.) can be listed as more recent cornerstones of this period. The announcement of Facebook founder Mark Zuckerberg in 2021 that Facebook would change its name to Meta, and South Korea's statement that it would make metaverse a state policy, and sharing of important strategic plans and policies in this direction with the public [21, 22] clearly reveals why a new era has begun for metaverse structure. The movie *Ready Player One* (released in 2018) was adapted from the 2011 novel of the same name by Ernest Cline. The movie is about people who are bored with their lives in cities, and spend a lot of time in the virtual world called OASIS by using their avatars in 2045. (Inceoglu & Ciloglulil , 2022)

**2. The Connotation of Meta and Verse:**

The first core word is the prefix meta. You can see from the dictionary that this word has many meanings, for example, it can be said to surpass existing objects and existing disciplines. This is one of its meanings. And there is a higher level of abstraction. For example, there is a philosophy called metaphilosophy, which is the philosophy of philosophy, and metalinguistics, which is the linguistics of linguistics. These are the example benefits of meta. If you want to add meta to a specific target, for example, a picture on the wall, there is meta data behind the picture, and the meta data is not visible on this picture. There is a lot of information in the painting. In addition to the handprints, the meta information may include when and under what circumstances the painting was constructed. So if you add meta to an existing target or object, you can see a lot of useful information behind it.

Some words that everyone is more familiar with, for example, are called metadata. Metadata is data about data. For example, many schemas in XML are all metadata. These metadata will tell you what standard was used to construct this data, when it was constructed, what tool was used to construct it, and all the extra data beyond your data is metadata.

Give you an example about the metadata of a picture. I took a picture in a museum. It is a phonograph with many 0101 perforations. It records a certain part of the music, but what is the camera that took this picture and the time it was taken? This is called metadata for images.

this is the value brought by meta. In 1999, at MIT's Media Lab, Professor Janet Murray and her team used IBM's "HotVideo" technology to support meta for video to construct links and automatic switching of multiple completely different video scenes. Extending a person's role into the past and the future, and using this technology to re-tell how the future film industry and

video industry will develop, so she took the name “eTV”, which is enhanced TV. (Zhang , 2022, pp. 102–120)

As you can see, there are actually many scenarios you can imagine. The concept of meta is not only used in a streaming video over the Internet, but also in real-time live video or digital TV programs. When digital TV programs are on the air, you can insert a variety of information, including product information, at any desired time node and location. ( Zhang, Chung, Liu, Lipscomb, & Zhou, 2002)It can be seen that meta has been accompanied by the development of the entire Internet. Various other content can be embedded in the live broadcast. This is the value that meta brings for live broadcasting. It helps us think about how to surpass existing goals and surpass existing resources to extend them to bring more value when constructing various digital worlds in the metaverse.

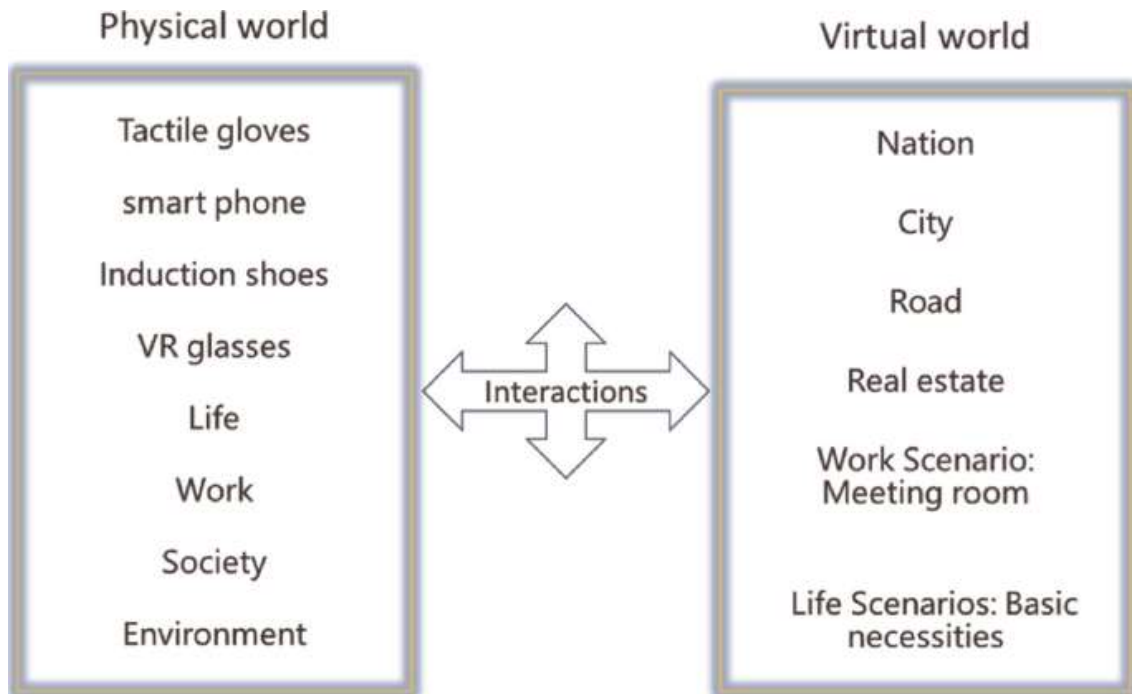
The second word is verse. There are some explanations of verse in the dictionary, but in the word metaverse, a better annotation is the abbreviation of universe [17], which will help us construct the metaverse in the future. The universe is a combination of known or hypothetical objects and all phenomena in the entire space. This is actually the same as the “heaven, earth and everything in one body” mentioned in Chinese philosophy. It also talks about the universe including the whole world, especially about human beings. It is also mentioned that the universe is a world or domain in which something exists or prevails, which means that the universe can be industrial, territorial, and regional. Especially in the field of science and technology, there is such a definition of the universe. It refers to the combination of matter, energy and space. It also includes the content between the solar system, galaxies and galaxies, and the universe is still expanding. These insights are all can be used to help build the future metaverse. In the digital metaverse to be built, you can extend everything in the existing physical universe into the digital world, and you can also build the energy in the virtual world and other various services, and even beyond the imaginations in the current physical world. (Zhang , 2022)

The concept of the metaverse is in a process of rapid growth and evolution. Different scholars have defined the metaverse from the perspectives of technology and philosophy, and there is no unified conclusion yet. The Shenyang team of Tsinghua University defines the metaverse as a new type of Internet application and social form that integrates a variety of new technologies. Zhang Xiaheng et al. believe that metaverse is an Internet field based on the interaction of virtual reality world constructed by information technology, Internet technology and digital technology. Liu Geping believes that the metaverse represents the latest stage of the development of visual immersion technology. Its essence is an online digital space parallel to the real world, and it is becoming a practical field for the innovation and development of human society. Some researchers believe that metaverse is based on technologies such as digital twins, artificial intelligence, human-computer interaction, Internet of Things, and high-speed communication. It is created to meet people’s needs for deep immersion, cross-domain social entertainment, and surreal creation. An ecological civilization space that is parallel to the real world and independent of the integration of the real world and society.

Regardless of the current interpretation of the perspective of the metaverse, that the metaverse is after the PC Internet and mobile internet after the new generation of the Internet has become a common understanding. The metaverse is an important part of the digital economy era and the next stage of the Internet. It consists of augmented reality (AR), virtual reality (VR), mixed reality (MR), immersive vision, blockchain, cloud computing, Digital Twins, artificial intelligence, big data, 3D and other technologies. (Li , 2022, pp. 41–54) I summarized the connotation of the metaverse with Fig. 2. Its core has two features. The first is that you can build a virtual digital world. In the virtual digital world, you can build any objects, services, desired processes, etc., and the interaction between them. This is the construction level of the virtual world and the core part of the metaverse. The second part is to establish a connection with the physical world. I think the current metaverse is nothing more than the core content of these two aspects. In the process of constructing these two core contents, the well-known Internet technologies, AR, VR, and MR technologies, which are technologies for augmented reality and virtual reality, can all be used. If you want to build a lot of metaverses and allow one person to move in multiple metaverses at the same time, there may be more

artificial intelligence robots in the future, so that artificial intelligence technology will also be used in this kind of virtual reality. In the construction of the avatar image in the world, a person can appear in multiple metaverses at the same time. (Zhang , 2022)

**Figure (1):Schematic diagram of metaverse interaction**



Source: (Zhang , 2022)

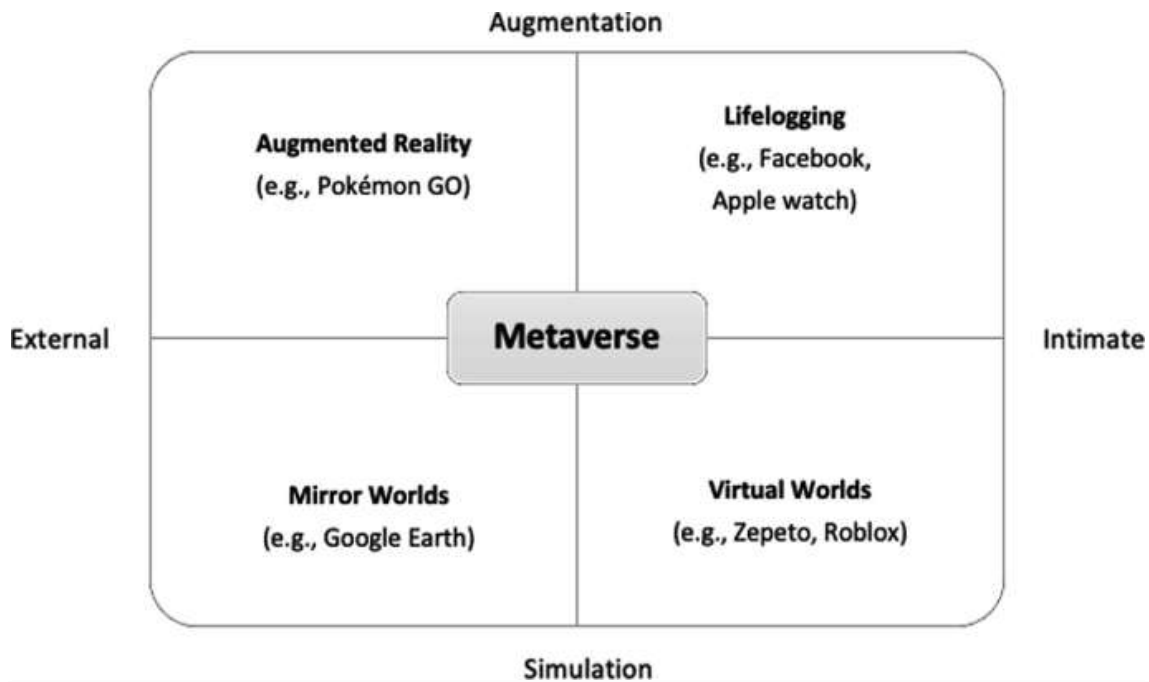
### 3. Metaverse services:

Starting with Stephenson's description of metaverse (1995), Smart et al. (2007) proposed the definition of metaverse as a virtually-enhanced physical reality and a physically persistent virtual space. The researchers classify metaverse services into four representative types of technologies: (1) Augmented Reality, (2) Mirror Worlds, (3) Lifelogging, and (4) Virtual Worlds. Figure 1 shows this classification scheme using two axes which run from augmentation (adding new layers to the real world) to simulation (creating parallel realities), and from intimate (identity-focused) to external (world-focused): ( Lee & Wei , 2022)

1. Augmented Reality: These technologies add visual effects onto reality by using interactive effects, e.g., Pokémon GO.
2. Lifelogging: These technologies capture and save users' conditions, activities, and daily experiences, so that users can share and track them. Lifelogging technologies can be embedded in wearable devices, e.g., Apple Watch.
3. Mirror Worlds: This concept includes various informationally enhanced virtual services that show "reflections" of the real world, expanding real world information into the virtual world, e.g., Google Earth and Google Maps.
4. Virtual Worlds: These technologies provide a replication of the real world. The key component of a virtual world is the avatar, the user's personification. Avatars allow users to create new identities, and experience new social interaction with other users, e.g., Minecraft.

Smart et al. emphasize that these four technologies are not stand-alone but can be combined and used in collaborative ways. We adopt their classification scheme in this study.

Figure (2): The classification of metaverse by Smart et al.



The source: ( Lee & Wei , 2022)

#### 4. Types of metaverse platforms:

Ball defines the metaverse as the interconnection of different virtual worlds, including with data, information, and knowledge. Each of these platforms may offer different user experiences. We can distinguish roughly between two different types of metaverse platforms: for companies & education, and for private use, including leisure. Of course, like in the physical world, also in the metaverse both usages blur. (Henz , The psychological impact of the Metaverse, 2022)

##### 4.1. Private use (leisure):

An example for the second is to be expected to come from Facebook's mother company Meta Platforms. CEO Mark Zuckerberg refers to "Snow Crash" and "Ready Player One" when describing his vision. Both books describe a day-by-day usage of the metaverse, also as escapism from a dysfunctional world [8]. He explains the company's vision: "We hope to basically get to around a billion people in the metaverse doing hundreds of dollars of commerce, each buying digital goods, digital content, different things to express themselves, so whether that's clothing for their avatar or different digital goods for their virtual home or things to decorate their virtual conference room, utilities to be able to be more productive in virtual and augmented reality and across the metaverse overall" [7]. Based on this vision, the company's approach is in the tradition of Linden Lab's "Second Life", already established back in 2002.

##### 4.2. Companies:

Focusing on the professional sector, various companies are in the process to implement their virtual reality platforms. For example, Engage, which offers a learning and meeting platform. The big player to be expected here is Microsoft, as it can connect its platform with strong existing apps like MS Teams and Office. The including of Digital Twins into the virtual reality (VR) offers the ability for learners to experiment with a test version of the actual machinery, learn the handling and study the impact on potential changes. The physical and digital world bridge, as employees can remotely operate a machine inside the VR, while these changes also the performance of the physical twin. On the other hand, employees standing at the

physical machine can via Augmented Reality glasses, or directly the smartphone, access the metaverse to read manuals, write protocols, work with real-time data, and even interact with other avatars .

#### **4.3. Gamification (the transport of information via gaming)**

is another professional usage, already deployed for massive online games like “EVE Online”. This game simulates a virtual universe, where players can take on the role of a spaceship captain and discover the wonders of the galaxy. In collaboration with Geneva University, the game became reality, as the users, sitting before their computers, became citizen scientists acting inside a virtual space. The software asked the virtual captains to evaluate exoplanets using data from the university’s database. If a sufficient number of users evaluated the planet information, the game sent the information back to the university. With their work, the users not only supported science, but also gained perks for the game.

#### **4.4. Education:**

Similar to roleplay games, for educational purpose, historic scenes could be recreated to let the students experience them inside the virtual reality, which could be like a 3D movie (for example “Gladiators at the Colosseum”) or also include interaction.

### **III. Metaverse and communication:**

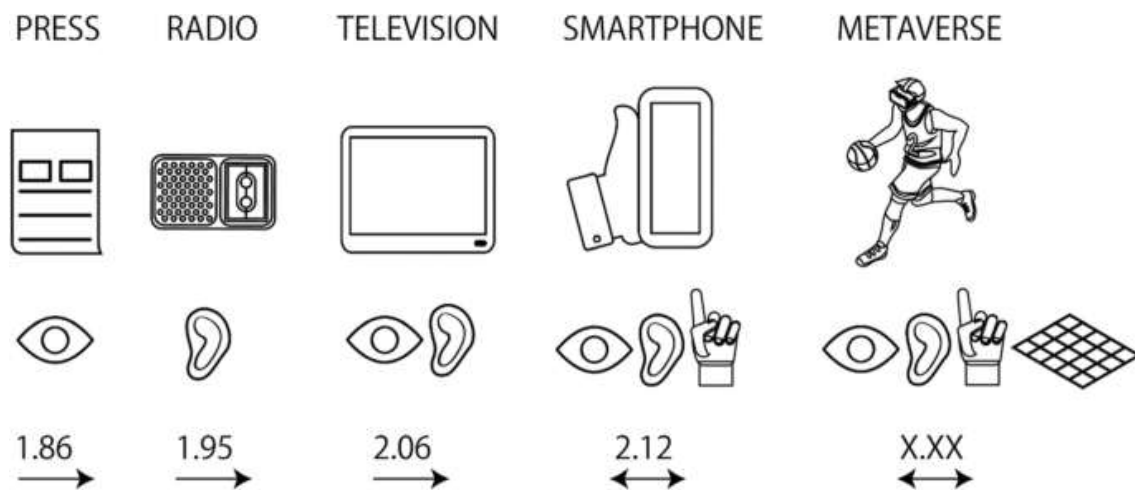
#### **1. changing nature of media to metaverse:**

Based on previous theoretical considerations, the metaverse will be placed in chronological order with its predecessors (smartphones, television, radio, and print) to compare the changing nature of media and how they provide more or less realistic experiences to their users. In that context, the following is examined: (1) senses engaged in media use, (2) virtual reality as an escape, (3) possible attractiveness of the metaverse, (4) envisioned digital twins, and (5) the impact of metaverse design on its users’ psychology.

The metaverse will be based on the convergence of technologies that allow multisensory interactions with VR [48]. Of course, it would not be only about sensors that send inputs for further processing in the metaverse but also about vibrations and other stimuli that come from the VR equipment. Two-way communication, or the interaction of man with the machine, will be the dominant characteristic of the metaverse, as it is the case with the mainstream Internet.

The cognitive stimuli that can be experienced through the metaverse will largely depend on the equipment that is used. Through the process of technological evolution, VR headsets, add-ons, and gadgets will be updated and changed. So far, the senses that are stimulated by VR devices include auditory, visual, haptic (touch) feedback, and a 3D feeling of space. Related to that, the progression of media through their changing nature is depicted in Fig. 4. The new media have additional features that replicate direct communication (physical world) better than the older ones. Metaverse will be the most realistic media so far ,as it would include a sense of space as addition to sight, hearing, touch, and interactivity. (Bojic, 2022, pp. 1-24)

Figure (3): media development



The source: (Bojic, 2022)

Different media are explained with icons representing the senses that these media engage, the level of media addiction (intensity) that they provoke, (Bojić & Marie, 2017, p. 42) and one or two ways of communication that they enable, which is illustrated with one- or two-way arrows below each media. Additionally, there is an icon symbolizing a 3D sense of space, as a characteristic of the metaverse.

## 2. Fusion of the metaverse and Communication

### 1.1. The metaverse is a vehicle that integrates people and media

In the academic field of journalism and communication, many scholars have conducted theoretical research on the original works from the perspective of the media. Scholars believe that the metaverse is the latest wave of the Internet technology, communication revolution, and it is also the third wave. It is a fusion of the present and the expected or the future. The ultimate communication medium for all inclusive technologies. The original universe builds a larger universe that integrates the natural universe and the real universe through diverse and inclusive digital technologies and various aspects of content. It is an advanced form of cyberspace (version 2.0) with characteristics such as high fidelity, virtual-real interaction and embodied immersion history, free participation, integration and civilization history. It is the final state of the evolution of network virtual space. A symbiotic carrier that integrates real people, thinking and communication media. Everything in the metaverse is derived from the carrier of the metaverse itself, especially every element in the metaverse can spread to the universe. Every corner finally achieves the purpose of spreading.

### 1.2. Fusion of metaverse and media format

metaverse technologies such as virtual reality, augmented reality, digital enjoyment and NFT are reshaping the form of news media from the perspective of the production form, presentation method and a user's concept of time and space of information content. First, by borrowing metaverse technologies such as virtual reality and augmented reality, leading news media organizations will have stronger visual content production capabilities and can produce high-definition news content with a richer and more powerful user experience. Secondly, applications such as NFT and smart contracts that use blockchain technology as the underlying technical logic may rewrite the circulation mechanism and rules of content works in the news media industry due to their unchangeable and transparent technical characteristics, allowing more individual users to participate. Rights to Content Production and Editing. For example, a content sharing platform called "Mirror" (DAO, Decentralized Autonomous Organization) uses "writing tokens". Third, a series of metaverse technology applications endow the "virtual and real integration", which will generate high-fidelity "immersive experience" and user-interactive,



participatory communication content, downplay the fact of the communication content, and highlight the user's immersive experience and participatory interaction, change the user's concept of time and space, or completely rewrite the traditional concept of media. In this scenario, "the medium becomes the user's on-the-spot perception of reconstructed facts" and becomes a virtual interaction and immersive experience.

### **1.3. Communication Scene Fusion**

The fusion of reality and reality and the reconstruction of time and space are the core propositions in the concept of the metaverse. The fusion of reality and reality is the external presentation of the metaverse, while the reconstruction of time and space is an implicit feature. The connection between time and space is broken, thus presenting a rich and diverse scene. On the two levels of time and space, multiple superimposed scenes can be presented, such as scenes from the past are presented in the future, and scenes from other places are presented here. Entering the initial stage of development, this scenario is actually more about somatosensory and communication, which provides a practical place for the user's body to enter the communication field in the post-human era. As an all-real shared space that provides users with an immersive interactive experience, the metaverse is precisely creating a social scene of "coexistence" that meets the needs of both parties, placing interpersonal and human-computer interaction at the core of the scene, and is short-term. Video media communication provides the necessary basic environment and scenes.

### **1.4. Fusion of Communication Perception**

Metaverse, as a new application form of the organic integration of various Internet elements, will promote the deep involvement of the human body and mind in communication, while embodied communication emphasizes the interaction of mind, body and environment. Peters said, "The body is not a carrier that can be discarded. In a sense, the body is the homeland we are returning to." In recent years, emerging technologies such as VR/AR/MR, interactive technology, artificial intelligence, cloud computing, and Internet of Things technology to develop rapidly. Their application in the field of information dissemination constantly drives humans to simulate, simulate and even recreate the daily interaction between their minds, bodies and the environment, bringing human voice, touch, limbs and other organs into the communication process, making immersive communication from Imagination moves towards reality, further highlighting the importance of the body in the communication process. Interaction technologies such as VR/AR/MR realize the embedded interaction between the user's virtual body, cognitive system and virtual scene. Sensors placed on the body can transmit the brain's instructions to the body, combining the real body with the virtual body, which can be "get" or "see, hear, touch". (Jiang & Xu , 2022, pp. 18–28)

Figure (4): Metaverse + Communication integration diagram



The source : (Jiang & Xu , 2022)

### 3. Outlook in the futur of communication with metaverse:

With the rising popularity of metaverse technology, communication of the future looks incredibly different. Virtual reality and augmented reality technologies are already being used to connect people in ways that were impossible before. It will soon become the norm for people to communicate through virtual avatars, allowing for a more interactive, engaging, and lifelike experience. On top of that, the actual physical distance between people can be virtually eliminated, allowing for real-time collaborations and conversations across the globe.

In the 21st century, the emergence of the metaverse has drastically changed the way we communicate. With augmented reality and virtual reality, we can now bridge the gap between the

physical and digital realms, allowing us to communicate with one another in ways that were never before possible. By breaking down boundaries between these two realms, we can express ourselves more fully, experience more immersive interactions, and explore new ideas and opportunities. With the potential for deeper connections and a more meaningful exchange of ideas, the metaverse has opened up a world of possibilities for communication in the future.

In addition to changing the level of communication media in individuals so that the sense of space increases the elements of the communication process. In other words, changing concepts and changing the process of communication as a whole, We need a new theorem, new studies and new theories that address potential communication phenomena in a virtual 3D environment. To show semiological analyses of virtual environments, that is, there will be a change in the level of the environment that we will study from the real world to the virtual world until the characters change by the Avatar, so that the phenomenon becomes more of a communication context. And so metaverse has imposed several spatial and temporal contexts on us simultaneously for one person, that is, the communication phenomenon has changed at all levels in 3D environment.

At the sender and receiver, both skills will change through avatars. An avatar (which will have more capabilities than an average user) may be able to speak in any language and by any means by using a direct translator or can make modifications to the level of the senses, and he has superior abilities that enable him to use more than one sense at a time. The sender or future may disappear in the communication process, for example in the event of an Internet outage. This is an element of technical noise in the communication process, with several other elements through the new virtual world. This individual can also communicate with more than one person simultaneously and in multiple contexts through virtual attendance and hologram. Even time can change, and we can go from one chapter to another in the blink of eyes we can attend events by default.

#### **IV. Conclusion:**

Talking about metaverse is a long explanation, so in this scientific paper we tried to explain the knowledge transition in the media and communication, "As the media is an integral part of society, they have been on a date with the continuous development of the creation of new forms of media different from their predecessors in every era of mankind's development, they allow humans to enter even the world of work through virtual forums. Connecting to its new form in the metaverse world reflects a paradigm shift that constitutes an infrastructure for future human society. This cognitive shift promotes daily life at material, spiritual and communicative levels, providing a new potential for human society, work and life in the future. Exceeds and penetrates the constraints of the previous generation of the Internet. The transformation of information and communication sciences into another bank; On the other hand, metaverse has introduced new terms and varied knowledge that have changed the field of research in information and communication sciences.

## References:

- Henningson, J. (2022, 10 17). *The History of Minecraft*. Retrieved 01 02, 2023, from redbull: <https://www.redbull.com/se-en/history-of-minecraft>
- Henz , P. (2022). The societal impact of the metaverse. *Discover Artificial Intelligence volume 2, 19*.
- Lee, K. S., & Wei , H. (2022). Designing Metaverse Platforms for Participatory Culture: What We Can Learn from BTS in Metaverse and K-pop Fandom. *Congress of the International Association of Societies of Design Research IASDR 2021: [ ] With Design: Reinventing Design Modes* (pp. 654–661). Singapore: Springer.
- Peukert, C., Weinhardt, C., Hinz , O., & van der Aalst, W. (2022). Metaverse: How to Approach Its Challenges from a BISE Perspective. *Business & Information Systems Engineering volume, 4*(<https://doi.org/10.1007/s12599-022-00765-9> ), 401–406.
- Zhang, L. J., Chung, J. Y., Liu, L. K., Lipscomb, J. S., & Zhou, Q. (2002). An integrated live interactive content insertion system for digital TV commerce,". *Fourth International Symposium on Multimedia Software Engineering, 2002*. (pp. 286-293). Proceedings.
- Active Worlds. (n.d.). Retrieved 01 2023, from Vinesauce Wiki: [https://vinesauce.fandom.com/wiki/Active\\_Worlds#Videos](https://vinesauce.fandom.com/wiki/Active_Worlds#Videos)
- AlArabiya. (2021, 11 05). *At 60 hours only the second person after Mark Zuckerberg entered the world of MetaVers. See the imagination*. Retrieved 1 12, 2023, from youtube: <https://www.youtube.com/watch?v=myqw4yV5Co4>
- alienworlds. (n.d.). *alienworlds*. Retrieved 2023, from alienworlds: <https://alienworlds.io/>
- Bojić, L., & Marie, J. L. (2017). ADDICTION TO OLD VERSUS NEW MEDIA. *Srpska politička misao, 2*, 33-48.
- Bojic, L. (2022). Metaverse through the prism of power and addiction: what will happen when the virtual world becomes more attractive than reality? *European Journal of Futures Research volume 10, 22* , 1-24.
- cryptokitties. (n.d.). *cryptokitties*. Retrieved 2023, from cryptokitties: <https://www.cryptokitties.co/>
- Henz , P. (2022). The psychological impact of the Metaverse. *Discov Psychol 2, 47*, 1-8.
- Inceoglu , M. M., & Cilogluligil , B. (2022). Use of Metaverse in Education. *International Conference on Computational Science and Its Applications ICCSA 2022: Computational Science and Its Applications – ICCSA 2022 Workshops. 13377*, pp. 171–184. Cham: Springer.
- Jiang , C., & Xu , J. (2022). Exploration of Short Video Media Communication Based in the Metaverse. *METAVVERSE 2022. Lecture Notes in Computer Science. 13737*, pp. 18–28. Cham: Springer.
- Li , X. (2022). Research on the Application and Risk Prevention of Metaverse in Vocational Education. *METAVVERSE 2022. METAVVERSE 2022. Lecture Notes in Computer Science. 13737*, pp. 41–54. Cham: Springer.
- Moro-Visconti , R. (2022). The Valuation of Newspaper Headings, Digital Media, and Copyright. *In The Valuation of Digital Intangibles*. Switzerland AG: Palgrave Macmillan,Cham.
- pokemon. (n.d.). *pokemon*. Retrieved from pokemon: <https://www.pokemon.com/fr>
- Schumacher , P. (2022). The metaverse as opportunity for architecture and society: design drivers, core competencies. *Architectural Intelligence 1*, 1-20.
- supermario. (n.d.). *supermariorun*. Retrieved 2023, from supermariorun: <https://supermariorun.com/fr/>
- vinesauce. (2016, 03 26). Retrieved 01 02, 2023, from Youtube: <https://www.youtube.com/watch?v=PRgATG6PUA0>
- vrchat. (2017). *vrchat*. Retrieved from vrchat: <https://hello.vrchat.com/>
- Zhang , L. J. (2022). MRA: Metaverse Reference Architecture. *Internet of Things – ICIOT 2021. ICIOT 2021. Lecture Notes in Computer Science. 12993*, pp. 102–120. Cham: Springer.