

A COMPREHENSIVE SURVEY ON METAVERSE

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ABSTRACT

Digital transformation has been evolving drastically since the 1990s, with the birth of the internet. This digital transformation makes several fictions into reality. Social networking like Facebook, virtual 3d world like VR chat, and augmented reality applications such as Pokmen go are recent examples of transformation from digital to the real world. Metaverse is a complete conversion from the real world to the virtual world. Metaverse integrates different technologies and can be a new internet perspective. All tech joint are putting their effort into Metaverse development by feeling the potential economic and social power of Metaverse. This research will reveal the basic concepts of Metaverse and explore its potential research issue.

Keywords: Metaverse, Virtual Reality, Augmented Reality, Digital Second Life, Multi-Technology, Sociality, Hyper Spatiotemporality, Computational Issues, Ethical Issues, Privacy Issues, Cyber-Syndrome, Technology. Etc.

I. INTRODUCTION

The modern era is fortified with an enormous number of innovative technologies. Cloud computing, the Internet of Things, Artificial Intelligence/Machine Learning, quantum computing, Virtual Reality/Augmented Reality, digital twin and blockchain are modern technologies of the twentieth century[1]. Metaverse is an alum gum of many technologies. It can be thought of as a new form of the internet combined with various other technologies. Metaverse, in its concept, is still enhancing its canvas. Participants from all over the world are adding meaning to its definition.

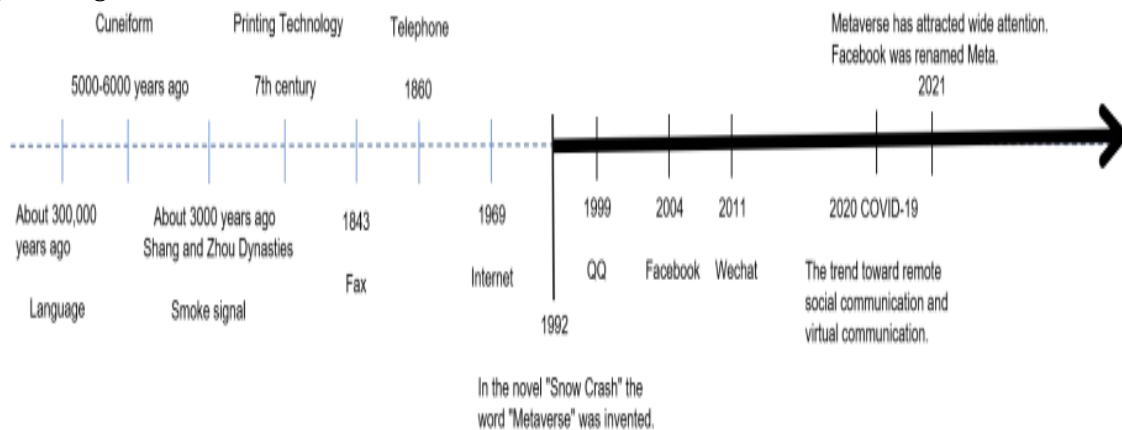


Fig 1: Timeline of communication method development

According to the technological perspective, humanity's communication has evolved and changed from the birth of humankind—the new technological revolution brought new communication channels such as social networking. Metaverse commercial aspects are also far-reaching since all the tech joints dedicate their potential and investment. From the user point of view, there is a considerable increase in demand for the virtual world; new methods of communication are ever-increasing.

In its meaning, the word Metaverse is a combination of two words prefix Meta (transcending) with the universe. This term was first coined by an author of fiction novel Neil Stephensen in its novel snow crash in 1992[2]. Current Metaverse can be thought of as social values of the z Generation[3]. The figure below shows the perspective of Metaverse as the integration of the physical world and digital twin.

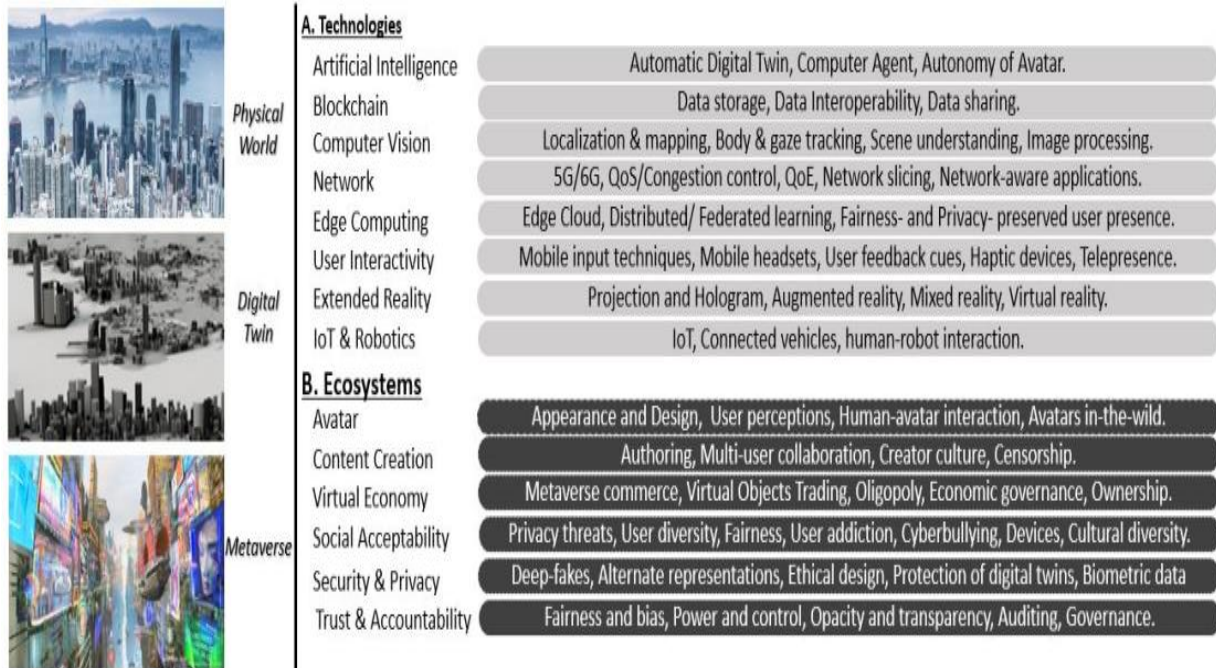


Fig 2: Metaverse as the integration of the physical world and digital twin

This research will reveal basic concepts of Metaverse along with its characteristics and open issues. The following section will discuss Metaverse characteristics, and in section III, open issues of Metaverse will be discussed.

II. METAVERSE CHARACTERISTICS

This section will discuss the essential characteristics of the Metaverse. As a new web application, Metaverse combines different technologies called multi-technologies. Since Metaverse is forming new social norms, its sociability characters need to be considered. Its closeness to the real world virtual has spatiotemporality characteristics.

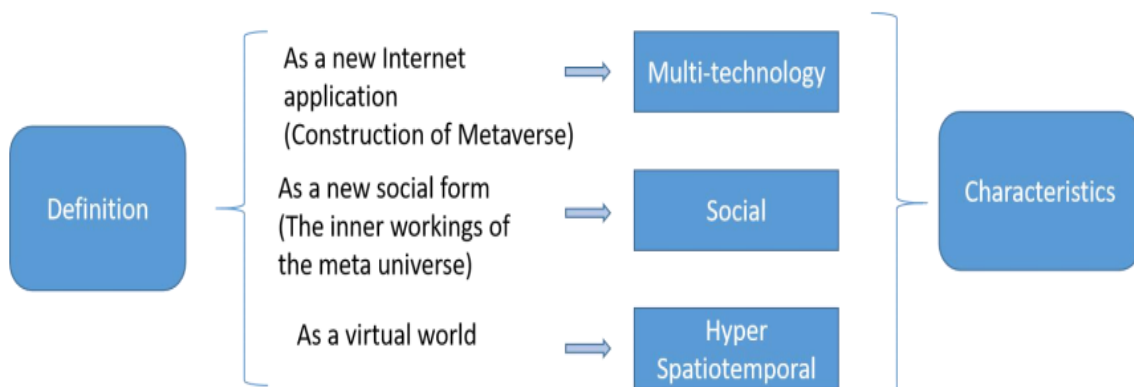


Fig 3: Metaverse characteristics

The figure above shows a basic construction of the Metaverse definition according to its characteristics. Below all the essential characteristics will be discussed with the prospective of Metaverse definition.

Multi-Technology:

Metaverse combines multiple technologies such as augmented reality, digital twin and blockchain. Augmented reality is the essential development technology of Metaverse since it uses development concepts of gaming engines and other AR-related tools and techniques for its development. The digital twin is the concept of mirroring some things as the Metaverse mirrored the real world into the virtual world, so use concepts of digital twin technology. Blockchain is in the economics system basis of Metaverse.

Sociality:

According to the definition of Metaverse describe, it is a new form of social values. Metaverse has its legal system, economic structure, and culture, which are very close but not equal to the real world.

Hyper Spatiotemporality:

Hyper Spatiotemporality is a term used for existence in both space and time. In other words, Metaverse is a virtual world counterpart of the natural world, breaking the barrier of space and time of the real world. In its core concept, Metaverse is a virtual world similar to the accurate word but with its spatiotemporal values.

III. OPEN ISSUE

This section will discuss the potential research challenges and issues of Metaverse technology in detail.

Interaction Issues:

Since Metaverse works a middle layer between the real world and virtual world, it needs to have the following characteristics:

- The tool used for implementing Metaverse world should be light-weighted, easy to access and transportable.
- The implementation system of Metaverse medium should be as transparent as the user should not need to have the technological knowledge

Currently, standard interactive technologies of Metaverse are following:

Somatosensory technology is commonly used in home entertainment and medical health care. It helps users interact with digital devices using hand gestures [4].

XR Technology: XR is a combination of VR(Virtual Reality), AR (Augmented Reality), and MR (Mixed reality) is, also called extended reality. Overall, XR is a computer-based wearable technology form of human-computer interaction[5].

Currently, both of the above technologies have the cost and transparency of devices. There is an open issue to working on interaction devices to make them easily affordable and transparent.

Computational Issues:

Computational power is the ability of the computer to process data. It has the following parameters to judge its performance: data manipulation, transmission, and storage. A very stable network is mandatory to support many concurrent users. Furthermore, as a new Metaverse technological host, cloud computing needs increased computing power. Besides the server side, user devices need to be more computationally intelligent and efficient for a high-quality Metaverse experience.

Ethical Issues:

Metaverse provides a new virtual culture to its users with norms and social relationships. New cultural norms and social interaction ethics are needed for this newly developed virtual social culture of Metaverse. This problem of ethical and social norms arises because of the absence of social and ethical norms of Metaverse society.

Privacy Issues:

In Metaverse, each identity is close to an actual world existence, so there must be a strict privacy check for Metaverse identities. Data privacy needs to be ensured in the Metaverse world.

Cyber-Syndrome:

Cyber syndrome is a phenomenon that refers to social, physical and mental disorders because of massive internet use[6]. Massive interaction with Metaverse devices can cause to increase in cyber syndrome.

IV. CONCLUSION

Technology joints are paying full attention to Metaverse to make it materialize. With the help of advancement in computing technology, Metaverse will change the virtual world and make it more interactive and embodied before Metaverse controlled the whole economy and technology. There must be attention to some open issues such as ethical norms, privacy, and other issues. This paper reveals basic concepts of Metaverse along with its open issue.

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