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THE METAVERSE FRAMEWORK

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BACKGROUND AND MEANING OF METAVERSE

The metaverse is a network of realistic virtual worlds that are connected to one another and allow users to socialize, create and play games, work, and shop. The metaverse can be compared to sophisticated third-dimensional internet realm or cyberspace where signing in is not necessary. It might also incorporate elements of virtual and augmented reality. At this stage, the idea of a single, acknowledged metaverse is still speculative and fantastical. Despite this, certain giants of technology have persisted to develop metaverse-like experiences such as virtual fashion shows, live concerts, and workplaces.

The phrase METAVERSE is used to define a hypothetical synthetic environment that is related to the physical world. This term is derived from the combination of the prefix "meta," which signifies transcendence, and the word "universe."

Author and entrepreneur Matthew Ball provides the following thorough definition of the metaverse in his book The Metaverse: And How It Will Revolutionize Everything:

"A massively scaled and interoperable network of real-time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively infinite number of users with a continuity of identity, history, entitlements, objects, communications, and payments."

By adopting a more expansive and ambiguous interpretation of the Metaverse, it becomes possible to view social media networks like Facebook, Twitter, and Instagram as a simplified representation of the Metaverse. Social media platforms are digital environments where individuals engage, communicate, share information, and virtually exist. Even contemporary social media platforms might be considered a streamlined iteration of a Metaverse due to its

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perpetual presence, the fact that individuals reside within it (since they spend a significant amount of time in this virtual realm), and their ability to construct their own universe (with their feed, videos, images, etc.). The primary distinction is in the immersive nature of 3D environments compared to 2D screens capable of scrolling, as well as the constrained or subpar user experience resulting from playing on a diminutive 2D screen.[2]

History of Metaverse

The notion of "binocular vision" was first introduced by scientist Sir Charles Wheatstone in 1838. It involves the combination of two images, one for each eye, to create a unified 3D view. Stereoscopes, a technology that utilizes the illusion of depth to generate an image, were developed as a result of this principle. This approach is currently employed in contemporary virtual reality headsets.

In 1935, Stanley Weinbaum, an American science fiction writer, released the book Pygmalion's Spectacles. In this book, the protagonist ventures into a fictional realm by utilizing a set of goggles that provide visual, auditory, gustatory, olfactory, and tactile sensations.[3]

In 1956, Morton Heilig invented the inaugural virtual reality (VR) machine, known as the Sensorama Machine. The machine employed a combination of 3D video, audio, fragrances, and a vibrating chair to create an immersive experience for the spectator, simulating the sensation of riding a motorcycle in Brooklyn. In 1960, Heilig obtained a patent for the initial head-mounted display, which integrated stereoscopic three-dimensional visuals with stereo sound.

In Neal Stephenson's 1992 science-fiction book Snowcrash, which imagines a time when millions of individuals interact in a cyberspace realm using virtual avatars, the phrase "metaverse" first appears. Another sci-fi book, Earnest Cline's 2011 Ready Player One, which

[2] Benjamin Talin- History and evolution of the Metaverse Concept, Published on 8th Feb 2023, https://morethandigital.info/en/history-evolution-of-metaverse-concept/, last visited 21st March 2024.

[3] Bernard Marr- A short History of the Metaverse, Published on 21st March 2022, https://www.forbes.com/sites/bernardmarr/2022/03/21/a-short-history-of-the-metaverse/?sh=68b980759688, Last visited 21st March 2024.

features common people donning VR headgear and entering a virtual world to live out their imaginations, further popularized this idea.

Beyond literature, the metaverse also exists thanks to the 2003 release of Second Life by the business Linden Lab. Second Life is a virtual 3D world where users can do almost anything. It is regarded as one of the earliest real-life examples of a metaverse (or something similar to it). There are no points or overarching objectives in Second Life. They can take on new personas, pursue hobbies, manage enterprises, and form relationships with individuals from various parts of the world.

When Second Life first launched, about a million people signed up, demonstrating its enormous popularity. It hosted concerts by Jay-Z and Harvard University classes, and Rolling Stone dubbed it "the future of the Net." However, interest in Second Life eventually dwindled, and the platform's growth stagnated. However, its cultural influence hinted at a metaverse.

How does the metaverse work?

Theoretically, the metaverse works by enabling an infinite number of people to simultaneously connect with one another in real-time within an active virtual environment that is immersive, three-dimensional, and seamlessly integrated to our physical reality. It's a tricky technological feat to pull off in real life. A large amount of computer processing power is required for such a task, in addition to advancements in mobile devices, gaming consoles, and VR and AR headset technologies.

Additionally, considerable coordination and cooperation between many businesses would be necessary for a unified, interoperable metaverse, one that would allow users to transport their identities and digital valuables across platforms held by different companies.

Companies in the past, and gaming firms in particular, have been reluctant to make their assets interoperable with a rival's environment. According to this argument, getting along with other platforms would need a certain amount of power to be relinquished. But such collaboration will be essential to the creation of a fully realized metaverse.[4]

[4] Hal Koss, what is the metaverse, really? published on October 6th 2022 https://builtin.com/media-gaming/what-is-metaverse, (last visited on 15th October 2023)

SCOPE OF METAVERSE

The metaverse encompasses a broad spectrum of virtual and digital experiences and is constantly expanding. The distinction between the real and virtual worlds is muddled by the complexity and interconnectedness of the metaverse. Here are some essential features of its range:

- The metaverse is made up of a variety of virtual environments and worlds, including online games, social media platforms, 3D simulations, and augmented or virtual reality experiences. Users can communicate with each other and with digital items in these spaces.
- Immersive Technologies: To produce immersive, sensory-rich experiences that mimic physical presence, it makes use of immersive technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR).
- Social Interaction: The metaverse is defined by social interaction, allowing users to interact with one another in virtual environments to communicate, work together, and have fun. Many metaverse experiences are fundamentally social in nature.
- Digital Economy: It features a digital market where users may purchase, sell, and exchange virtual products and services—often with the use of digital money or cryptocurrencies.
- Security and privacy issues are brought up by the metaverse because of the amount of personal information, digital identities, and interactions that take place there.
- New regulatory and governance frameworks may be needed for the metaverse in order to solve legal and moral challenges including digital security, jurisdiction, and intellectual property rights.

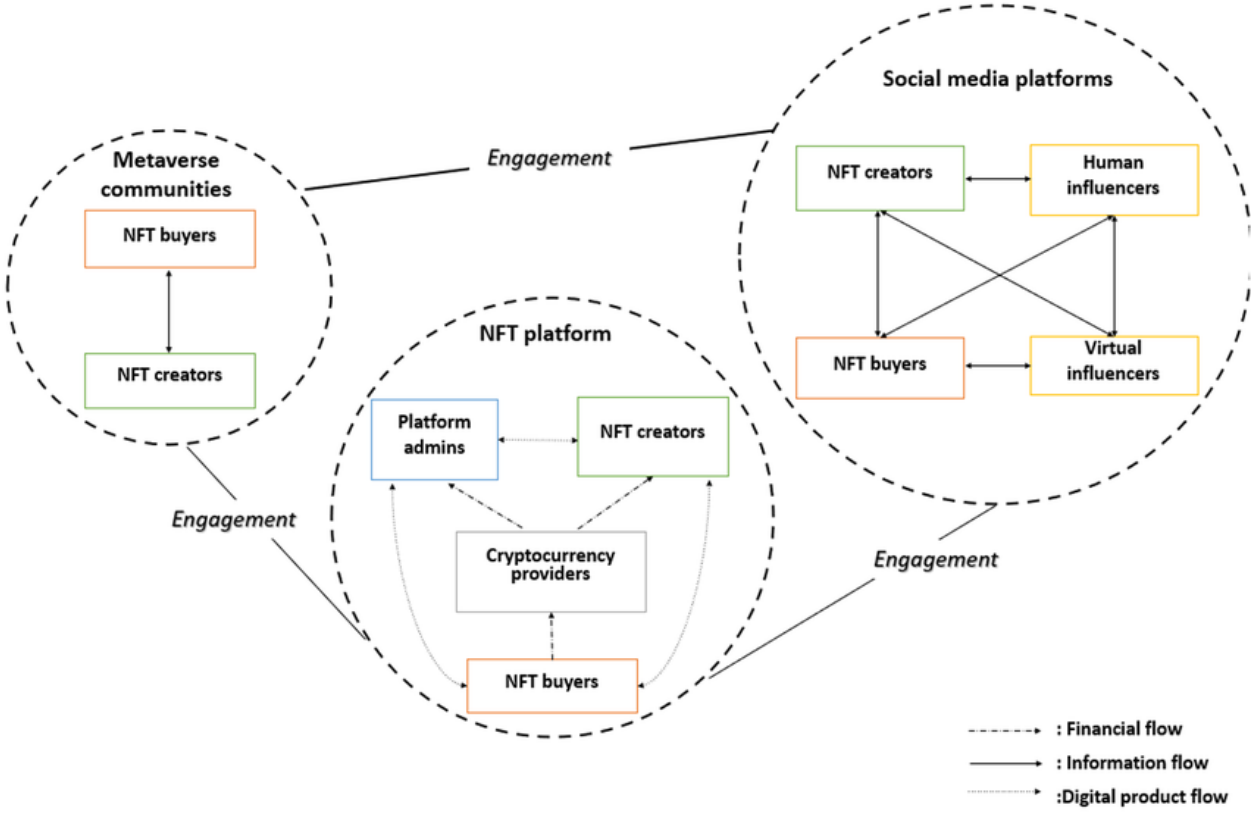
The metaverse realm presents a compilation of significant endeavours that have the potential to yield intriguing prospects for business ventures. These devices are equipped with state-of-the-art technologies and exhibit a remarkable degree of authenticity across various domains.

- Engaging in retail activities in shopping malls and online platforms
- Utilising digital classrooms to facilitate virtual learning for students.
- Purchasing avatar accessories and garments
- Engaging in the purchase and sale of digital assets such as NFTs and artworks.
- Enhancing business expansion through effective communication

- Discusses the services available to clients via the internet.
- Establishing virtual environments such as educational institutions and conference spaces
- Engaging in direct communication with fellow digital entities within the metaverse real estate activity platform.

KEY STAKEHOLDERS AND CONTRIBUTORS TO THE METAVERSE ECOSYSTEM

The metaverse landscape is experiencing significant growth, as numerous organizations from various industries compete to gain a portion by offering inventive experiences through multiple exploring advancements. Nevertheless, it is currently in its early stages, and the establishment of clearly defined economies will occur gradually as the diverse strategies of different parties begin to converge. However, the present advancements in both the business and technology domains provide us with insight into the future trajectory.[5]



[5] Shashank Mathur, Kate Bevan, Jitesth Gera- Demistifying the Metaverse, Published on 26th April 2022, https://www.infosys.com/iki/perspectives/demystifying-metaverse.html, Last visited 21st march 2024.

*This study examines the phenomenon of hybrid interaction among stakeholders in the metaverse market, with a specific focus on NFT products. Non-fungible tokens (NFTs). The anticipated expansion will be driven by the utilization of workforce collaboration, product design and development, production, logistics, sales and marketing, and retail applications. We anticipate that governments will utilize the metaverse to establish methods for providing social services. South Korea is currently engaged in efforts to facilitate virtual tourism, civil complaint filing, and other services inside the metaverse environment.

The gaming sector has historically spearheaded progress in virtual environments, and the metaverse represents the most recent allure within this business. The projected growth rate for the worldwide video game market, encompassing consumer expenditures on both physical and digital video games across various devices, as well as online gaming subscriptions, is anticipated to be 6.7% per annum. This growth is projected to result in a market value of $218.8 billion by 2024, up from $180.3 billion in 2021. Gamers are currently utilizing 3D avatars, engaging in digital asset trade, making monetary transactions at virtual casinos, participating in community streaming, and attending virtual concerts within the game. In April 2020, rapper Travis Scott conducted a concert in Fortnite, an immersive gaming environment, which attracted a viewership of up to 12 million individuals.[6]

A heightened focus on fostering communities inside these virtual environments and addressing tangible issues, wherein gamers receive compensation for their achievements in the form of non-fungible tokens (NFTs). Currently, immersive gaming is primarily contained within separate virtual environments. However, the increasing decentralization of gaming could potentially compel these environments to become more open and interoperable.

Given the enduring changes brought about by the pandemic, it is anticipated that workplace collaboration will emerge as a significant domain for innovation. Microsoft is introducing Mesh for Microsoft Teams, a feature that enables individuals to engage in collaborative activities by utilizing personalized avatars (or their digital replicas) within a mixed reality environment. Additionally, it enables enterprises to construct their own virtual environments.

[6]The Games Market and Beyond in 2021: The Year in Numbers, Tom Wijman, Dec. 22, 2021, newzoo.

Mesh offers a range of potential applications, including the facilitation of onboarding processes for newly hired employees, the implementation of mixed reality town halls, and the utilization of virtual whiteboards and displays to enhance productivity in remote work settings.

BMW has utilized NVIDIA's Omniverse, a collection of technologies for constructing 3D virtual environments, to develop a digital replica of one of its German manufacturing facilities. The organization has the capability to facilitate global collaboration among individuals to collaboratively develop and strategize the factory in real-time.[7] Additionally, it employs avatars and robotics to replicate manufacturing floor processes in order to evaluate novel workflows and pinpoint opportunities for enhancing productivity, quality assurance, and input costs. We anticipate that digital replicas of factories will serve as experimental environments for innovation, expediting the processes of product design, development, and market entry.

Prominent retail corporations like as Nike, Adidas, and Walmart have initiated the introduction of digital merchandise within the metaverse by use of non-fungible tokens (NFTs). In December 2021, Adidas generated an estimated sum of $22 million within a single day through the introduction of non-fungible tokens (NFTs) for commercial purposes.[8] These NFTs encompassed digital characters, such as the "Bored Ape" collection, and granted users access to hoodies and shoes. Walmart is apparently investigating the metaverse and contemplating the introduction of its own cryptocurrency and non-fungible tokens (NFTs). The consumer-oriented sectors will also observe the development of virtual 3D environments for many fundamental activities, like trying on wearable devices, exploring vacation destinations, and conducting tours of real estate properties.

SIGNIFICANCE OF AUGMENTED REALITY (AR) AND VIRTUAL REALITY (VR) IN SHAPING THE METAVERSE

[7] BMW uses Nvidia's Omniverse to build state-of-the-art factories, Louis Columbus, Nov. 16, 2021, VentureBeat.

[8] Adidas sold more than $22 million in NFTs, but it hit a few snags along the way, Jay Peters, Dec. 17, 2021, The Verge.

The concept of the metaverse is strongly linked to technologies such as artificial intelligence (AI), augmented reality (AR), and virtual reality (VR). Augmented reality facilitates the seamless incorporation of virtual things within the physical environment, whereas virtual reality (VR) focuses on the utilization of three-dimensional computer modelling to construct immersive virtual environments. While the metaverse does not mandate the use of VR headsets or similar devices, it is anticipated by experts that virtual reality technology will have a significant impact on the development of this nascent digital realm.

One illustrative instance involves the accessibility of the Facebook metaverse via augmented reality glasses, virtual reality headsets, and, to a restricted degree, desktop and mobile applications. The development of a very advanced virtual and augmented reality headset, referred to as "Project Cambria," has been unveiled by Meta. According to Meta, this device is designed to facilitate mixed reality experiences and incorporate cutting-edge sensors that enable virtual avatars to sustain eye contact and accurately mimic the facial expressions of actual individuals. The utilization of advanced technology has the potential to augment the expressions of avatars, enabling them to effectively communicate human emotions and employ body language, so fostering a heightened sense of realism in virtual worlds. Based on data from Statista, Morgan Stanley has projected that the aggregate market for augmented reality (AR) and virtual reality (VR) is anticipated to attain a value of $300 billion by the year 2024.[9]

Within the metaverse, a customary workday could entail donning a virtual reality headset and accessing a simulated workspace. The digital workspace possesses the capacity for complete customization, mimicking a tangible office, a tranquil beach, or a creative realm—in essence, contingent upon individual inclinations or organizational decisions.

Colleagues have the ability to engage in real-time collaboration within virtual settings, irrespective of their geographical location. Incorporating elements such as 3D presentations and interactive brainstorming sessions, the metaverse presents the possibility of virtual meetings that beyond conventional video conferences. Designers and engineers have the

[9] Role of AR and VR in Metaverse, Published on 18th Dec 2023, https://zebpay.com/au/blog/role-of-ar-and-vr-in-metaverse, last visited 25th March 2024.

ability to engage in collaborative efforts to construct and alter three-dimensional models in real-time, with team members actively observing and offering prompt feedback.

The potential of the metaverse to transform training and professional growth is significant. Employees have the opportunity to engage in interactive training programs that are focused on scenarios, thereby enhancing their abilities in a more engaging and practical manner when compared to conventional online courses.

Augmented reality (AR) and virtual reality (VR) play a crucial role in defining the Metaverse by enabling the creation of immersive digital experiences and interactions in virtual shared places. The following are few crucial elements that underscore their importance:

1. The integration of augmented reality (AR) and virtual reality (VR) technology provides users with heightened immersive experiences through the fusion of digital material and the physical world (AR), or the creation of wholly virtual settings (VR). Immersive experiences play a crucial role in establishing the requisite sensation of presence and engagement within the Metaverse.

2. Spatial computing is facilitated by augmented reality (AR) and virtual reality (VR), enabling users to engage with digital objects and settings within a three-dimensional spatial context. The capacity to create virtual shared places within the Metaverse is essential for enabling users to collaborate, communicate, and interact with content in a spatial manner.

3. AR and VR technologies facilitate the development of immersive interactive environments, allowing users to control digital objects, navigate virtual worlds, and participate in diverse activities. The Metaverse relies on these dynamic settings as its fundamental components, enabling social interactions, entertainment, education, and business.

4. Augmented Reality (AR) and Virtual Reality (VR) technologies facilitate multi-modal interaction by enabling many forms of user participation, such as gestures, voice commands, and gaze tracking. This integration enhances user immersion and

engagement. These technologies enhance the user experience within the Metaverse by offering natural and intuitive methods of engaging with digital material.

5. Enhanced Cross-Platform Accessibility: The accessibility of augmented reality (AR) and virtual reality (VR) technologies is progressively expanding to encompass a diverse array of devices, such as smartphones, tablets, VR headsets, and AR glasses. This level of accessibility guarantees wider acceptance and engagement in the Metaverse, allowing users to conveniently access virtual communal areas from any location and using any device.

6. Collaborative Spaces: Augmented Reality (AR) and Virtual Reality (VR) facilitate the establishment of collaborative environments where individuals can engage in real-time work, learning, play, and social interaction. These cooperative environments promote the development of a community, the exchange of knowledge, and the collective expression of creativity inside the Metaverse.

7. Advancements in Applications: Augmented reality (AR) and virtual reality (VR) technology persistently stimulate innovation in diverse industries such as gaming, entertainment, education, healthcare, and enterprise. The utilization of their capabilities within the Metaverse presents novel prospects for content creators, developers, enterprises, and organizations to investigate innovative applications and encounters.