APPLIED RESEARCH PROJECT REPORT- 2023

Commerce in the Metaverse:

Navigating the Metaverse's Influence on Trade, Investment, and Policy

Acknowledgement

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Executive Summary

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The report covers an overview of metaverse concepts and their application in various industries and discusses policy challenges such as competition law, data privacy, security, and intellectual property. To foster trust and innovation, comprehensive regulations targeting these areas are essential. Collaboration among governments, technology companies, and international organizations is crucial to bridge the digital divide and ensure equitable access. By addressing these challenges, we can unlock the metaverse's potential for self-expression and drive economic growth and societal advancement.

The metaverse will affect business execution in myriad ways. From manufacturing to marketing, metaverse and its enabling technologies will both shift value and allow for new value creation and cost reduction. From a general perspective, supply chain and operations and sales and marketing are two key areas which are likely to be largely and widely affected by the metaverse. Back-end management, supply chain management, and employee operations have already been impacted by businesses quickly adapting to the metaverse. Further, connecting to consumers in an environment that allows for co-creation presents unique opportunities and challenges. Beyond such general applications, certain industries are at the forefront of metaverse integration, demonstrating unique business applications in the metaverse. Gaming, automotive, and retail industries provide useful case studies to examine ways in which key players have innovated in different ways.

The metaverse's integration across industries necessitates trust, data privacy, and policies that strike a balance between businesses, creators, and consumers. A comprehensive regulatory framework focusing on competition law, data privacy, security, and intellectual property rights is essential to unlock the metaverse's full potential, enhance user experience, and foster innovation. Furthermore, active community monitoring, moderation, and involvement play a crucial role in cultivating the metaverse as a safe space for enriched social interaction.

Moreover, the metaverse's full potential requires a strategic combination of investment and regulatory measures. Investment is a crucial driver in unlocking the metaverse's potential, enabling the exploration of new opportunities and applications as it expands beyond current boundaries. Additionally, the increased interplay between the metaverse and emerging technologies underscores the need to stay aligned with other advancements as the multi-layered metaverse will promote and vice-versa gain from frontier technologies' development, highlighting its vast hidden potential. Proactive regulation is crucial to harness the full potential of emerging technologies. Comprehensive regulatory frameworks involving multiple stakeholders promote responsible usage, user protection, and innovation. Thus, collaboration among governments, technology companies, and international organizations is vital for bridging the digital divide and ensuring equitable access in the metaverse. Drawing from lessons learned during the internet revolution, finding the right regulatory balance is imperative for the metaverse's success.

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Glossary

5G/6G	5G/6G are both next generations of wireless technologies which will provide faster speeds, lower latency, and higher capacity to support the metaverse experiences.
ARTIFICIAL INTELLIGENCE	Artificial Intelligence can be used to create intelligent virtual assistants, advance automated processes, and provide personalized experiences tailored to users within the virtual environment.
BLOCKCHAIN	A decentralized digital ledger technology that enables secure and transparent transactions, accurate record-keeping, and seamless interactions within the virtual environment.
CLOUD/EDGE COMPUTING	Cloud computing is a centralized computing approach which utilizes the Internet to store, manage, process data, and run applications on remote servers. Instead, edge computing is a decentralized approach that optimizes data processing and computation by locating them closer to the points of data generation.
DEEP FAKE TECHNOLOGY	The use of artificial intelligence and machine learning to create manipulated multimedia content, such as videos or images, convincingly depict false or altered information, often leading to deceptive or misleading representations.
DECENTRALIZED AUTONOMOUS ORGANIZATION (DAO)	An organization that operates autonomously through smart contracts on a blockchain, governed by predefined rules and community voting, without the need for centralized control.
DIGITAL TWINS	Real-time virtual replicas of physical objects or processes which can be utilized to construct the metaverse. In other words, digital twins serve as a bridge between the physical and virtual worlds.
DMA	Digital Markets Act
DSA	Digital Services Act
EXTENDED REALITY	A combination of immersive technologies, which includes Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR).
HAPTIC TECHNOLOGY	A network of physical devices that enables seamless data exchange and collaboration between physical and virtual realms.
MICROSOFT MESH	A mixed reality platform by Microsoft
NON-FUNGIBLE TOKEN (NFT)	NFT stands for Non-Fungible Token. It is a unique digital asset that uses blockchain technology to represent ownership or authenticity of a specific item or content. Unlike cryptocurrencies, NFTs are indivisible and cannot be exchanged on a one-to-one basis.
INTELLECTUAL PROPERTY REGIME (IPR)	The legal framework governing the protection, enforcement, and management of intellectual property rights, including patents, trademarks, copyrights, and trade secrets.
WEB3	This evolution of the Internet incorporates decentralized technologies, blockchain, and cryptocurrencies to create a more open, user-centric, and interconnected virtual environment.

List of Figures and Tables

Summary & Research Methodology

With the recent advancement in technologies, the concept of the metaverse has gained traction as a potential commercial reality. Consequentially, there has been a surge of interest in the potential implications of the metaverse on society, culture, and the economy. World Economic Forum has emerged as a prominent influencer in metaverse-related discussions. The organization has actively engaged in dialogue and published insightful reports to assist stakeholders in comprehending the ethical and governance considerations associated with the metaverse (World Economic Forum, 2023)

In collaboration with the World Economic Forum, this project aims to investigate metaverse development's current and potential influence **on international trade and investment**. In this project, we discuss **the associated business opportunities and governance challenges** inherent in the metaverse and formulate **policy recommendations** to address the major policy issues stemming from this phenomenon.

The report covers the following four aspects:

- Provide an overview of the concepts associated with the metaverse, including its definitions, characteristics and value network
- Analyze how the metaverse has been or can be applied to general business functions and specific industries.
- Discuss four policy challenges resulting from metaverse development: Competition law, intellectual property laws, data privacy and security and macroeconomic risks.
- Propose a set of policy recommendations that can potentially mitigate the identified risks associated with metaverse development.

Summary & Research Methodology

To gather comprehensive insights into our research questions, we utilize a combination of several key methods:

Literature Review

Establish a solid foundation of knowledge

Case Studies

Exemplify opportunities and challenges brought by metaverse development

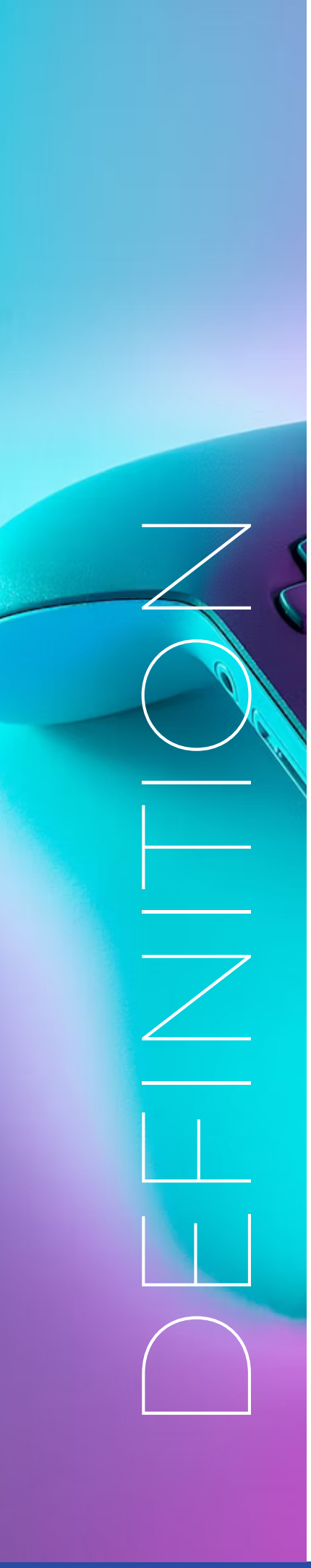
Interviews

Gain firsthand perspectives and insights associated with the metaverse application and governance topics

Survey (See Appendix*)

Collect quantitative data from practitioners whose organizations/companies can be influenced by the metaverse

The Metaverse: Definitions, Characteristics, and Value Network



DEFINITION

Although the metaverse has been a topic of interest for decades, there is still no widely accepted definition or consensus on its scope. Multiple stakeholders, including industry participants (e.g. companies), industry commentators (e.g. venture capitalists) and international organizations, have contributed their views on the definition of the metaverse.

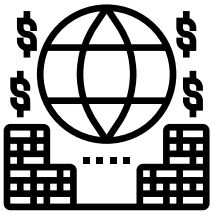
Based on the literature review, **Matthew Ball** (2022), a prominent venture capitalist and metaverse specialist, has provided the most commonly-used definition for the term. He defines it as "a massively scaled and interoperable network of real-time rendered 3D virtual worlds which can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence and with continuity of data, such as identity, history, entitlements, objects, communications and payments".

Meanwhile, the definition of **Meta**, the previous Facebook, should also be highlighted as the renaming of the technology giant reflects their ambition to spearhead the development of the metaverse. Meta officially defines the metaverse as "a set of virtual spaces where you can create and explore with other people who aren't in the same physical space as you. You'll be able to hang out with friends, work, play, learn, shop, create and more". Despite the differences in how they define it, Meta and Matthew Ball both agree that the metaverse is a "successor" of the Internet, moving beyond Web 2.0 and into the realm of Web 3.0.

While a fully-established and universally-recognized metaverse does not yet exist, drawing on prior research, an ideal metaverse is characterized by several characteristics that distinguish it from the real world and other digital platforms. We combine three versions of the metaverse's characteristics, respectively defined by Matthew Ball (2022), Deloitte (2022a) and Korea Development Institute (KDI) (2021), into six features mentioned below:

CHARACTERISTICS

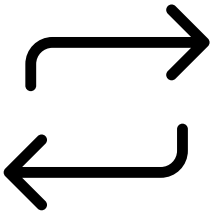
Economic



It has been mentioned by all three versions that the metaverse should boast a robust and functional economy, with its own currency and exchange systems enabling seamless economic transactions among users.

Interoperable

After reviewing the three versions, we realize that there are differences in the definitions and emphasis of 'interoperable' and other related concepts, such as 'persistent' and 'seamless'. Our 'interoperable' is a re-defined version, which includes the related requirements for an ideal metaverse and summarizes them into three points.

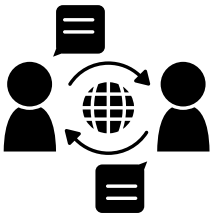


a.Over-time: Users' digital identities and assets should persist over time and continue indefinitely.

b.Within the metaverse: The metaverse will be composed of various virtual platforms and applications. Users should be allowed to move seamlessly between them with connected experiences and records.

c.Between the real world and the metaverse: The memories and information in the metaverse and the real world should be linked together, integrating the physical and digital worlds into one unified ecosystem.

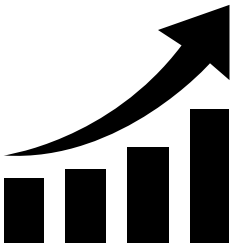
Synchronous



In the metaverse, people can have a wide range of social interactions with other users in real time. While Ball (2022) and Deloitte (2022a) refer to this characteristic exactly as 'synchronous', this feature corresponds to the 'Concurrence' identified by KDI, which also requires achieving real-time interactions in the metaverse.

CHARACTERISTICS

Scaleable

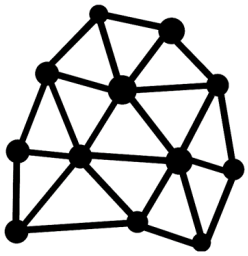


With reference to Ball (2022), an ideal metaverse should have the capabilities to support many simultaneous users while having a massively-scaled number of virtual platforms within. This concept is alike to the 'Ubiquitous' feature in KDI's version as they both emphasize the need for the metaverse to be large-scale and diverse.

Immersive

An ideal metaverse can provide users with highly realistic and immersive experiences indistinguishable from the physical world. Therefore, in the metaverse, users will experience a feeling of "social and spatial presence as the real world", as noted by KDI (2021) as the characteristic 'presence' (p. 6).

Decentralized



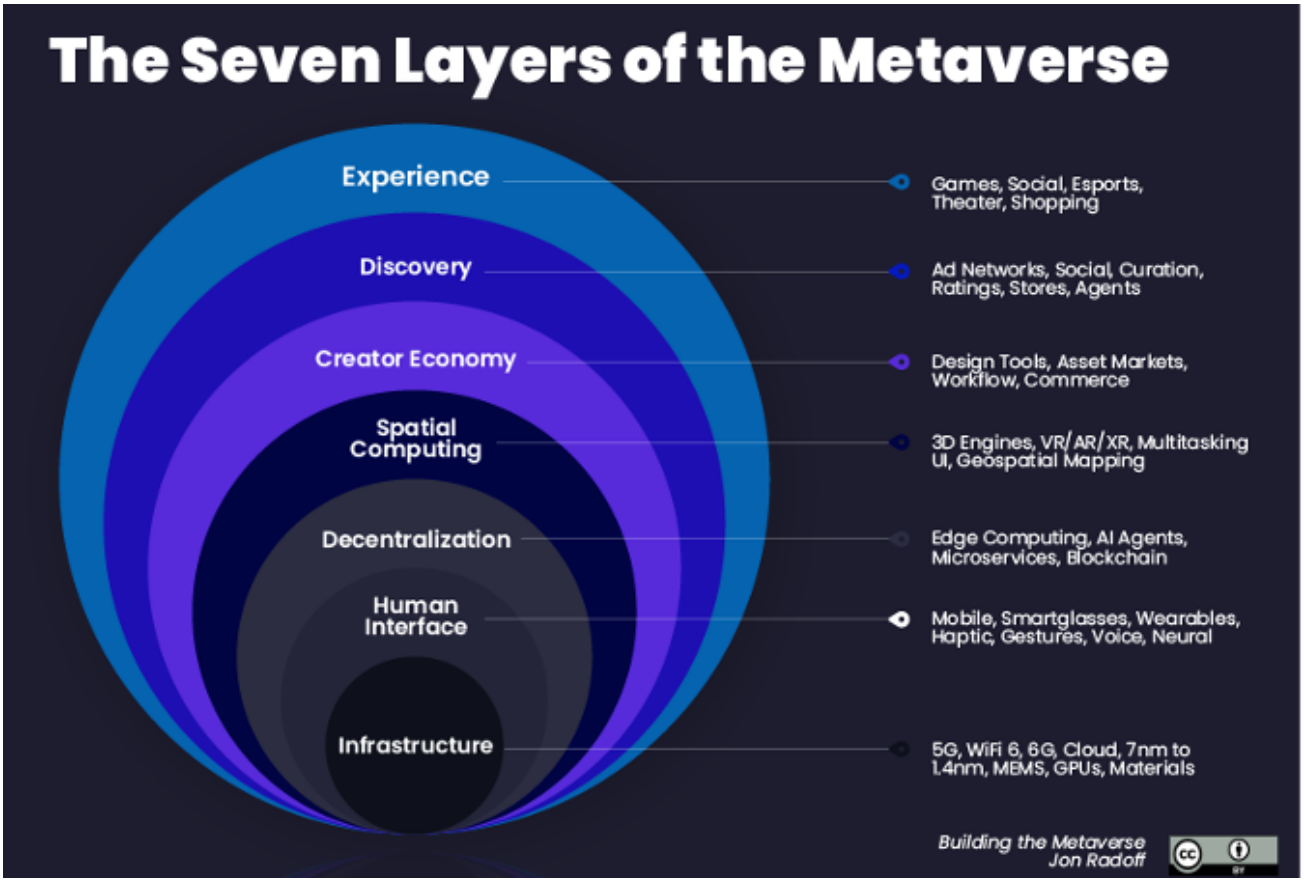
An ideal metaverse should empower the users to exercise sovereignty over their digital lives, especially in content creation and sharing, as well as their own data. Therefore, everyone's individual agency can be respected in this decentralized world. Data. Therefore, everyone's individual agency can be respected in this decentralized world.

Value Network

Similar to the definition and characteristics of the metaverse, there are varied views on its value network based on different themes. Value chain and ecosystem are two central angles from which the existing theories approached the problem of conceptualizing the value network of the future metaverse. Our discussion is confined to the four most-cited partial solutions to the value network puzzle, respectively developed by Jon Radoff (2021), Deloitte Canada (2022), McKinsey & Company (2022) and World Economic Forum (2023).

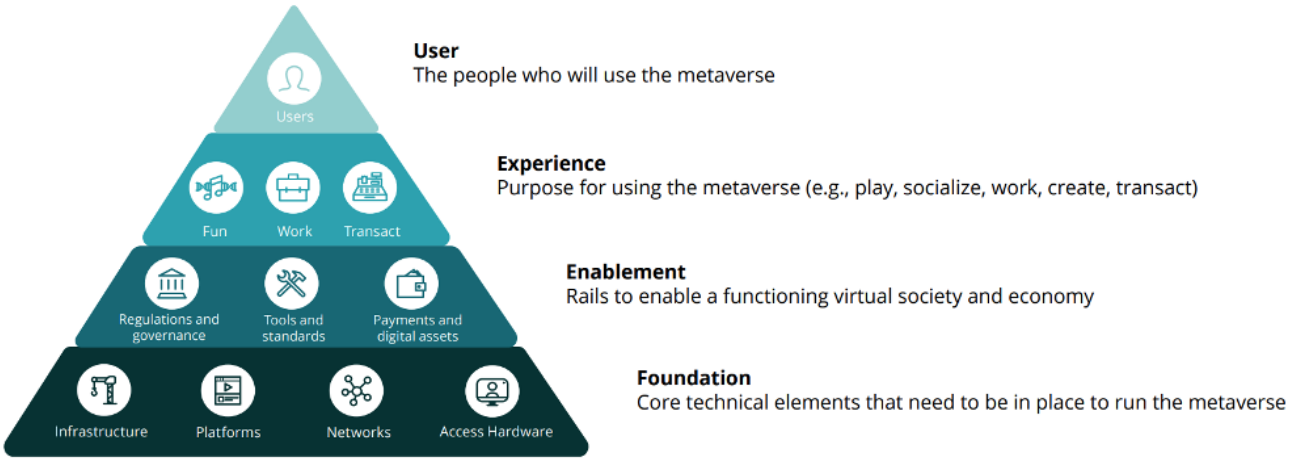
While Deloitte Canada (2022) envisions the ecosystem of a fully-functioning metaverse concerning Matthew Ball (2020) and Coinbase (2021), the rest three paradigms all focus on mapping the value chain in the metaverse. The value chain is primarily concerned with creating and delivering virtual experiences. In contrast, the ecosystem highlights the broader network of relationships and interdependencies that enable and support the value chain. However, the value chain and ecosystem are interdependent and complementary components of the value network, which can reflect both the creation-and-delivery process of virtual products and the stakeholder interaction in the metaverse.

Figure 1. The seven layers of the value chain in the metaverse
Source: Radoff, J. (2021, June 3). The Metaverse Value-Chain. Building the Metaverse.



The metaverse's value network is composed of two distinct realms: the virtual world and the physical world, which can overlap through mixed reality technologies rather than being separate entities. The two worlds possess unique characteristics and interactions; exclusive components exist in the virtual or physical world. Consequently, the newly-incorporated virtual world is not merely replicating the physical world. Additionally, the operations can be sustained independently with the virtual components, as the artificial intelligence assistants can potentially replace human interaction. The functioning of the metaverse requires the participation of various stakeholders and the necessary infrastructure and facilities to maintain the activities and connections between the physical and virtual worlds. The human layer of the metaverse can be categorized into eight groups of participants: developers, content creators, platform providers, technology companies, users, advertisers, investors and governors.

Figure 2. The expected ecosystem of a fully-functioned metaverse
Source: Deloitte Canada. (2022). Welcome to the metaverse. Deloitte Canada.



It is important to note that individuals can be involved in multiple groups simultaneously, and there is no restriction on belonging to only one group. Firstly, developers refer to the individuals or teams who are responsible for developing the foundational elements for the metaverse users, including infrastructure, platforms, applications and experiences. Meanwhile, platform providers contribute to the accessibility and reliability of the platforms within the metaverse. However, developers and providers actually take different roles in platform development and delivery. While the developers focus on building the technological foundation of platforms, providers are responsible for managing and operating the platforms as a service.

Technology companies engage in the metaverse ecosystem by offering a wide range of technological solutions to support the operations of the metaverse. While technology companies help construct the overall technological landscape, developers bring their specialized skills to software development and content creation within the metaverse. Relying on the tools, software, and platforms provided by developers, platform providers and technology companies, content creators produce and contribute digital content to the metaverse.

This group is crucial for the value network as its actions significantly enhance the diversity, engagement, and overall user experience of the metaverse. The metaverse also provides a new channel for companies to reach and engage with their clients in immersive and interactive ways. Advertisers refer to individuals or companies who leverage these new marketing opportunities to promote their products, services, or brands within the metaverse, mostly in the virtual realm. Given the profit potential in investing in the metaverse, investors, including individuals, venture capitalists, private equity firms and other entities, have provided financial resources to support the projects, companies and initiatives related to the development, growth and expansion of the metaverse.

Figure 3. The four categories and ten layers of the metaverse, according to the value-creation
Source: McKinsey. (2022). Value creation in the metaverse | McKinsey. Mckinsey & Company.

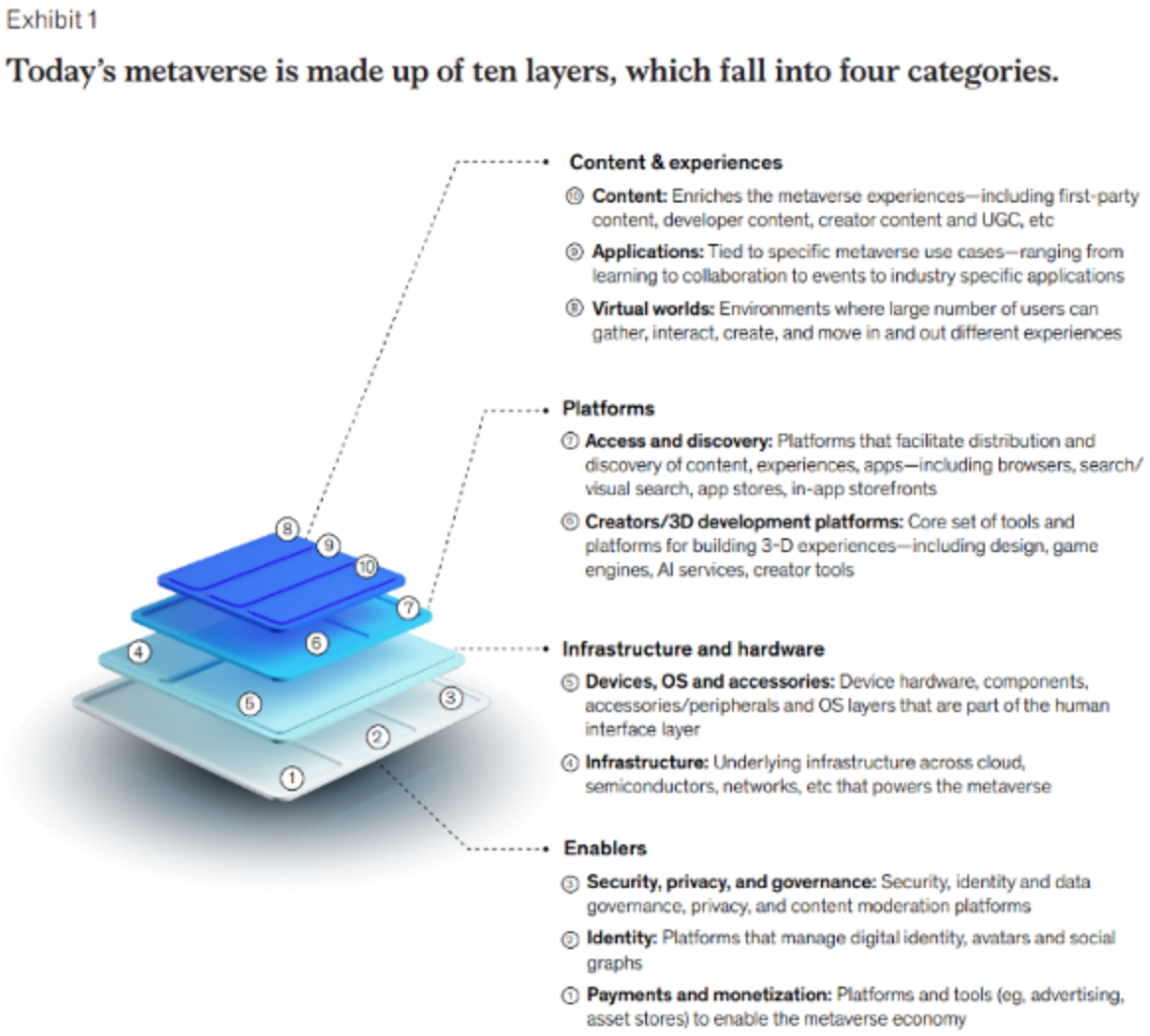
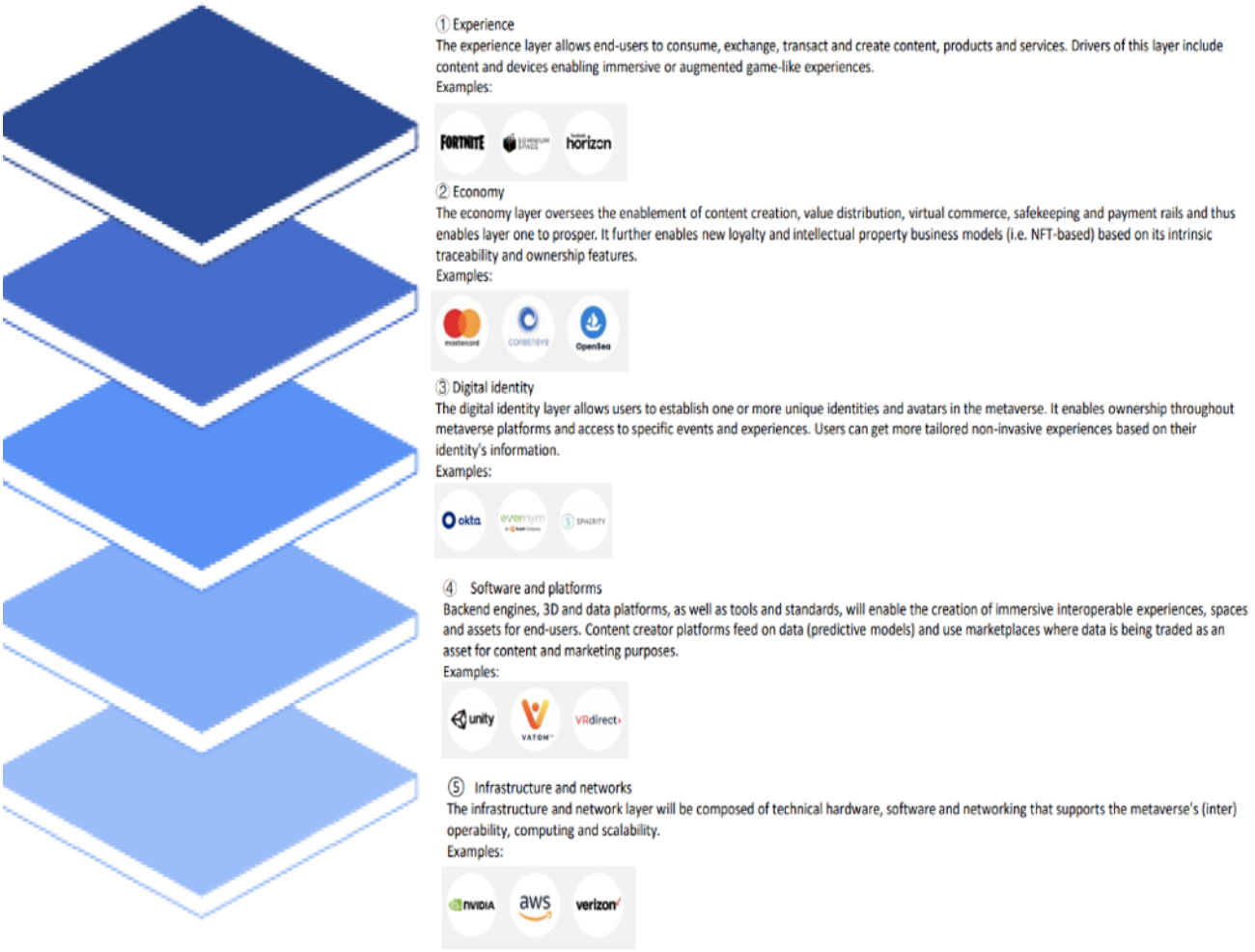


Figure 4. Five Layers of value creation in the metaverse
Source: World Economic Forum. (2023). Demystifying the Consumer Metaverse. World Economic



The governors are the most controversial component of the human layer, whose existence in the metaverse remains uncertain. Three potential scenarios exist for the governance status within the metaverse concerning both the physical and virtual worlds. Firstly, the existing governing bodies from the physical world may extend their regulatory reach into the metaverse and therefore establish consistent rules and principles for the newly-incorporated virtual world. Secondly, there is a possibility that the physical and virtual worlds are going to have separate governing bodies. Policymakers in the physical world may allow the virtual world to develop its own democratic mechanisms for participation.

To confirm the decentralized characteristic, the entire population can become the governing body of the virtual world, leading to a decentralized governance structure within the virtual realm. Thirdly, the virtual world may reversely influence the governance in the physical world, and traditional governments can gradually be marginalized. Decentralized democracy can be ultimately established across the entire metaverse.

Business Applications and Opportunities of the metaverse

Business Applications and Opportunities of the metaverse

As with the introduction and evolution of the internet, the metaverse could affect how business is executed in every industry. The extent to which these changes will revolutionize industries or simply further digital trends already at play is a topic of debate. The degree to which metaverse technologies enable value creation instead of value shift is also contested.

An example is useful to illustrate the implications of such questions. The entertainment industry offers a relevant case study from both an industry and a marketing and engagement perspective. Currently, the average American spends approximately 153 minutes per day consuming television. This number, however, is decreasing year-over-year while screen time overall remains relatively constant (Stoll, 2023). These numbers, when taken together, signal a shift in entertainment from traditional TV to other formats rather than new value creation.

There are ways that the metaverse allows for value creation, though, in the entertainment space. For example, hybrid concerts allow for increased ticket sales and price discrimination based on audience needs. Exploring the example further, various trends that have been observed for years are further enabled by metaverse technologies. For example, theme park rides previously enhanced with technology have been made more immersive through AR/VR integration. A more revolutionary change, however, is seen in Disney's intention to build its own theme park in the metaverse (Marr, 2022). This exploration reveals how the effects of the metaverse are and will be realized and the various business implications it holds for industries.

To understand the business implications of the metaverse, it is useful to explore general business applications applicable across industries as well as industry-specific applications seen in industries leading in metaverse investment and adoption.

General Business Applications

The metaverse enables various general business shifts applicable across industries. As the next section will exemplify, different industries may realize these opportunities in unique ways.

Applications can be broken down into two key areas: supply chain and operations and sales and marketing.

Supply Chain and Operations

In terms of back-end management, cost-cutting opportunities are varied. From factories to brick-and-mortar stores, virtual twins or replacements can allow for benefits such as cost-effective testing, process management, and ease of expansion. For example, the model for one virtual store can be easily translated globally while allowing for differences in currency and language (Obsessar, 2023).

Supply chain management executives are optimistic about the potential the metaverse brings. A 2022 Accenture study found that 64% feel metaverse integration will positively impact their organisations. Visibility and testing are key benefits, made possible by end-to-end supply chain mapping and the opportunity to test the effects of elements such as weather, transport delays, and more. These factors will allow companies to make strategic adjustments, creating more efficient systems. Further, the metaverse allows for actions related to sustainability, both for understanding carbon footprint and making impactful adjustments (Maersk, 2022). The metaverse will also allow for increased data collection and use accuracy, providing more effective and efficient supply and demand management. Improvements in this area will allow for cost-saving on inventory, delivery, data-related costs, and profit-generation activities such as price discrimination(Scaff, 2022).

Employee operations can also be improved through metaverse integration. For example, training and upskilling can be provided in an immersive learning environment that allows for virtual learning without sacrificing a hands-on experience. The immersive experience possible in the metaverse also enables a safer training and testing process. In terms of day-to-day operations and the shift to hybrid work models, the metaverse allows management to address issues that remote working has brought to light, including siloed work, communication issues, employee accountability, and lack of separation between work and home life, providing benefits for both businesses and employees (VRdirect, 2023).

Sales and Marketing

The metaverse allows for new ways of engaging with customers and the risk of brand fatigue if not executed correctly. The key to success is listening to consumers, especially as co-creation strategies grow in popularity. The internet created digital advertising space, which now represents a 500-billion-dollar industry worldwide (Stasita, 2021), and advertising real estate in the metaverse offers new space for advertisers to reach consumers. “Land” in the metaverse can be utilized for myriad advertising purposes, such as billboards or more engaging, experienced-focused marketing opportunities, such as casinos, to enable metaverse gameplay (Euronews, 2023). From a marketing perspective, understanding trends, navigating hype culture, and utilizing drops are just a few of the concepts present in marketing today that are even more important and relevant in the metaverse. Understanding consumer expectations and what is considered “cool” is essential at a time when brands are under pressure to maintain political correctness while being authentic.

Industry-Specific Analysis

Industry-Specific Analysis

Beyond general applications, in order to fully understand the potential of the metaverse, it is useful to analyze specific use cases from leading industries in the space. For this study, gaming, automotive, and retail are useful industries as they have quickly adapted to the metaverse in unique and varied ways.

Gaming

The gaming industry has been an early adopter of metaverse technologies, allowing for unique consumer interaction in gameplay, co-creation, and new monetization opportunities.

Use case: Non-Fungible Token (NFT) marketplace and game-making

While gaming in the metaverse can be seen as an evolution of open-source gaming, its fundamental difference is the engagement of consumers as co-creators and stakeholders able to easily profit from their contributions to the gaming environment and the game itself. Open-source gaming, wherein the source code is freely available for coders to edit, precedes metaverse gaming and shares similar interoperability and open internet values. Of course, as companies seek to stake out territory in the metaverse, interoperability is not inevitable. The promise of the metaverse, though, and its appeal to many, is that it represents a decentralized, democratic internet. Further, interoperability may be in the best interests of companies. A virtual identity is key to metaverse interactions, and gaming is the forerunner in this space. Customization, often through NFT avatars, is popular in the metaverse. In fact, default avatars are considered less experienced gamers or newcomers and are offered less respect. In an interoperable world, these visual avatars represent ad space for companies when users enter different worlds. Beyond the companies themselves, allowing users to operate on different platforms provides the original company with a better product to sell to advertisers. For example, Fortnite could offer Pepsi the opportunity to sell Dorito gun tags as NFTs. Allowing for those tags to be maintained for consumer use even when they leave Fortnite's owned platform extends the audiences who will see such advertising (Maymar,2022).

Metaverse technologies, predominantly blockchain and decentralized payment systems, are democratising the game-creation process. An example of a gaming company actively pursuing this approach to gaming is Pixowl Mobile Games Studio's "The Sandbox", which utilizes Polygon and its own SAND tokens as well as digital real-estate LAND tokens and ASSET NFTs to enable attribution and buying and selling. The Sandbox is a haven of interoperability. For example, users are able to use NFTs from various outside platforms in The Sandbox. The platform is a foundation for users to easily create and monetize their own games and other assets (Chen, 2022).

Automotive

In the automotive industry, early adopters have primarily benefited through sales and operations benefits. Virtual design practices and immersive showroom experiences are two examples of innovation in the industry. The concept of digital twins is relevant here. Models by McKinsey indicate the scope of potential gains through the adoption of digital twins: "Models suggest that digital twins can potentially improve output by about 10 to 25 percent while reducing unplanned maintenance by 80 percent and increasing quality by up to 25 percent" (Heineke, 2023).

Use case: Digital twins

Digital twins in the automotive industry are relevant throughout the entire lifecycle of a unit, from manufacturing to maintenance. For example, in the manufacturing stages, digital twins allow for operations and supply chains to be managed with ease globally. Further, testing on a virtual twin is much more cost-effective than on a physical model (Parvin, 2022). This concept also applies to sales, when test drives can be performed virtually. From the consumer perspective, a virtual twin of a physical car that can be operated in the metaverse provides added value to the purchase of a vehicle (Heineke, 2023).

Retail

The retail sector has also been quick to adapt to metaverse technologies due in part to the familiarity of the sector with metaverse trends such as drops, cyclicality, and innovative marketing. Primarily, this space's use cases have focused on the sales cycle and consumer engagement. In an industry reliant on touch and feel but having shifted dramatically online, the metaverse allows companies to capture the benefits of brick-and-mortar stores in a new way (Adcock, 2023). Further, as an industry focused on aspiration and emotion, companies are using new ways of buying enabled through the metaverse, such as with the innovative use of NFTs to create perceptions of value.

Use case: Marketing NFTs

Luxury fashion brands have been eager to test metaverse marketing. Gucci, for example, launched a unique marketing campaign in which it created a movie based on one of its clothing lines which was then sold through Christie's as an NFT. The film, a four-minute video clip developed by Gucci's creative director and award-winning photographer and director, Floria Sigismondi, positioned Gucci as both a creative and digital innovator. Further, this move allowed for unique value creation, turning a piece of marketing into a new revenue stream (Hypebeast, 2021). In this case, the auction closed at a final sale price of $25,000 USD (Brooks 2021), and Gucci donated the proceeds of the sale to UNICEF USA in an effort to make Covid-19 vaccines more accessible (Villa, 2021).

Trends and implications

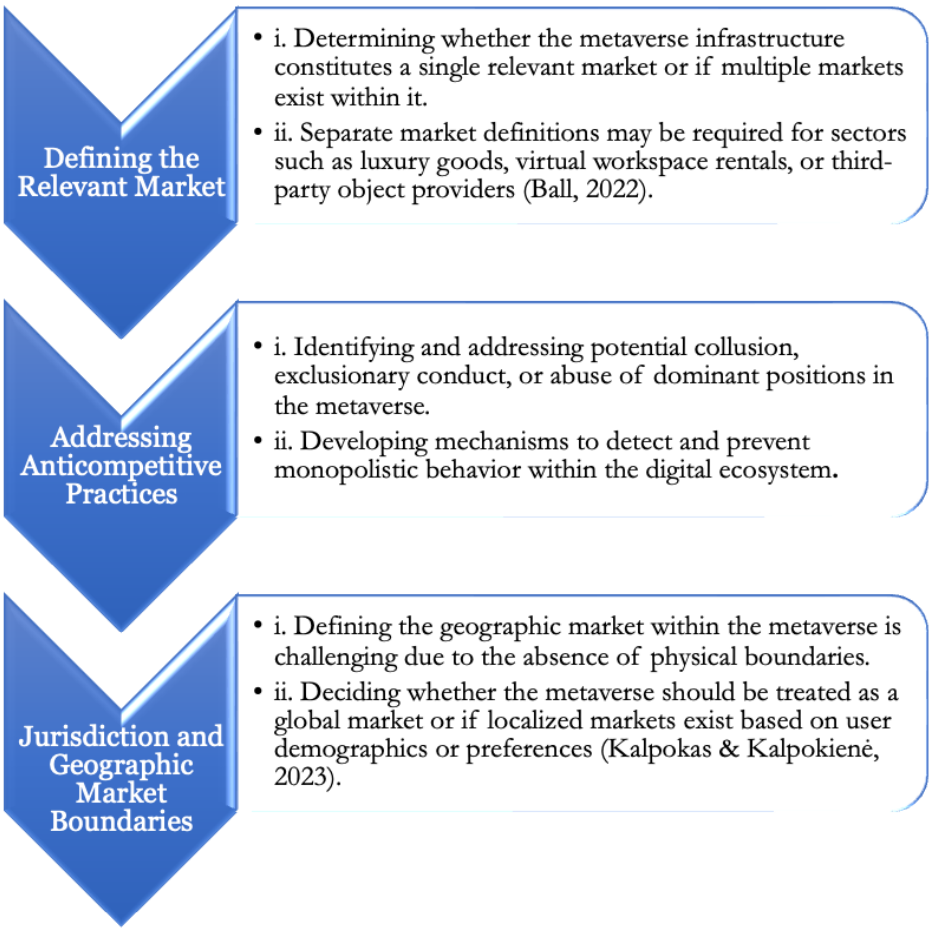
As discussed, implications of the metaverse are wide-ranging from general business applications to unique ways in which industries will be affected and can harness the power of the metaverse for success. With these changes come trends and implications that reflect the changing technological landscape and interactions between players. Primary to this discussion are issues of trust, data, and privacy.

Consumer concern over data and privacy is tied inherently to trust, and this tension will only grow in importance as the metaverse touches more industries and interactions between companies and consumers and, as well, blurs the line between company, creator, and consumer. Key to building trust in this shifting environment are policies that take into account the new realities of business in the metaverse (Soon, 2023).

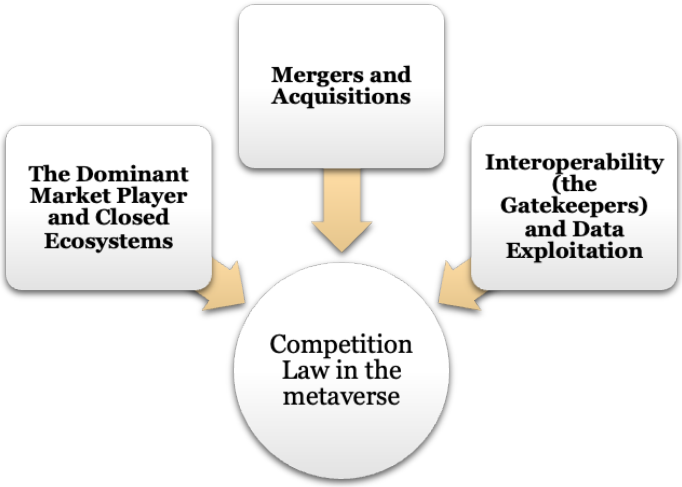
Policy Challenges in the metaverse

Competition Law

As the metaverse captures the collective imagination and grows into a vast digital landscape, competition law faces a pressing challenge in ensuring fairness and preventing monopolistic practices that can stifle innovation and harm consumers. The metaverse, with its limitless possibilities and immersive experiences, presents a unique set of complexities for enforcing competition laws (Singhi & Rajput, 2021). Comprehending and effectively addressing these obstacles is essential for cultivating a competitive atmosphere. The summarized box below outlines the challenges confronting the current competition law framework within the metaverse.



For the purpose of this report, three important challenges have been flagged:



The Dominant Market Player and Closed Ecosystems

One pressing issue that requires attention is the increasing dominance of certain market players within the metaverse ecosystem. The emergence of dominant players in the metaverse ecosystem can have significant consequences, including monopolistic control and the creation of barriers for new market entrants across various aspects of the metaverse (Megale, 2022). This dominance poses a significant challenge to the principles of fair competition, particularly in the metaverse, where the influence of dominant market players extends beyond traditional market boundaries. By controlling virtual real estate, digital assets, and the underlying infrastructure of the metaverse, a company can exert control, impose unfair conditions, and exclude competitors from accessing vital resources (Hutson et al., 2023). This situation undermines competition and hampers the growth of an open and inclusive metaverse ecosystem leading to the potential concern of closed ecosystems emerging within the metaverse.

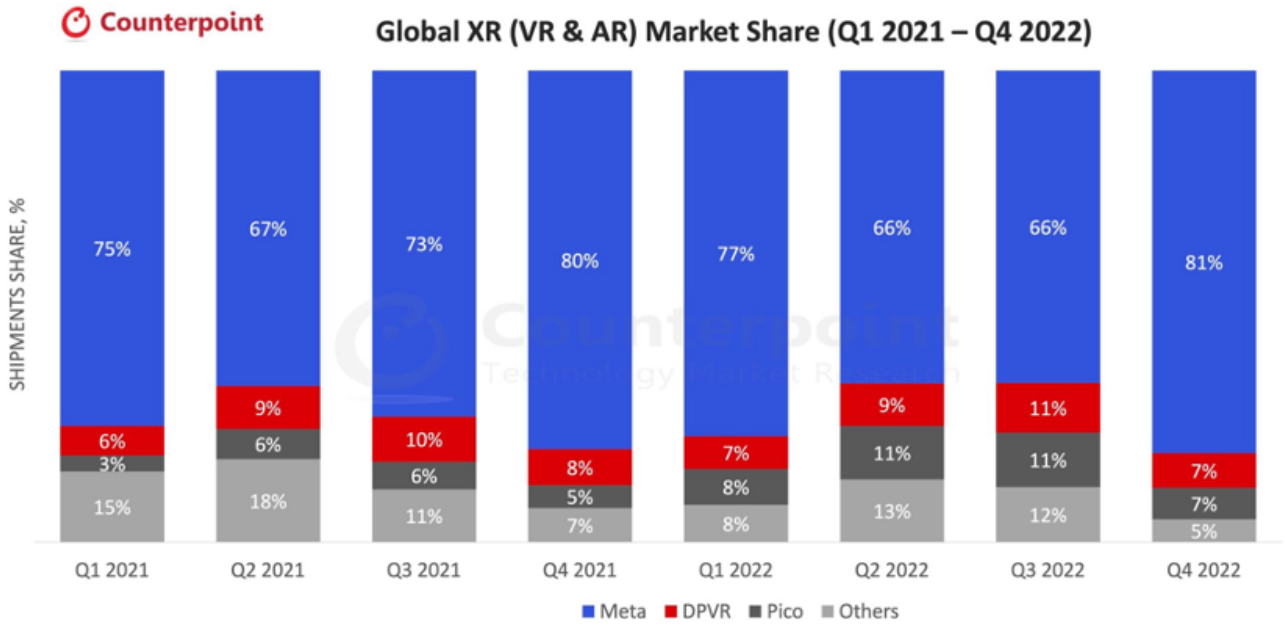
If one or more metaverse platforms become closed systems, users may face restrictions on freely navigating between different metaverse "worlds" and transferring virtual goods and services (Megale, 2022). This could result in establishing gatekeepers who control access to the metaverse, similar to what we have observed with core platform service providers like Google's Play Store and Apple's iOS. These gatekeepers would have the power to control their users, business partners, and competitors, influencing consumer choices, setting high access prices, entering exclusive agreements with third-party providers, and exploiting user data to strengthen their market dominance (Hunt, 2022). This is further elaborated from the below-mentioned case study of the dominant space in VR hardware occupied by Meta and the restrictions it can generate.

Case Study: Dominant position in Hardware industry

The global extended reality (XR) market, comprising augmented reality (AR), virtual reality (VR), and mixed reality (MR), witnessed substantial growth, reaching $29.26 billion in 2022 (Buhr et al., 2022). Projections indicate that the market will surpass $100 billion by 2026 (Phelan, 2022). Particularly, the global virtual reality headset market was valued at $7.81 billion in 2020 and is predicted to grow at a CAGR of 28.2% from 2021 to 2028 (Counterpoint, 2022).

Major vendors in this space include Oculus (Meta), Sony, HTC (for VR devices), and Microsoft, Magic Leap, Vuzix (for AR headsets and glasses). As per the data available, Meta holds a dominant market position in the AR/VR headset market, with nearly 80% market share in 2022 (Fernandez & Hui, 2022). ByteDance (Pico) follows with a 10% market share, positioning itself as a significant player in the industry. Whereas other companies such as DPVR, HTC, and iQIYI also hold notable positions within the top five, indicating a competitive landscape but with Meta as the clear leader (Jungherr & Schlarb, 2022).

Figure 5: Global XR Sales 2021-2022
Source: Counterpoint



The dominant market position of Meta highlights its significant influence and control over the AR/VR headset market. However, the presence of other players, including ByteDance and emerging competitors, suggests a potential for market dynamics to shift in the future (Kharpal, 2021). Observing how competition evolves as new entrants, technological advancements, and product innovations shape the market will be interesting.

However, the entry of Sony's PSVR2, Apple's venture into the market, and the upcoming devices from Meta and Pico are anticipated to significantly impact the VR industry in terms of both adoption and momentum in the upcoming years (Leswing, 2023). The recent introduction of Apple's Vision Pro VR headset is expected to disrupt the market further (Bulst & Vinck, 2022) and potentially alter market share dominance, fostering competition among these key stakeholders (Khang et al., 2023). However, it is worth noting that these advancements are still predominantly driven by major players in the technology and digital industry, which may limit the inclusion of smaller stakeholders and developers.

Mergers and Acquisitions

In the fast-changing digital world, competition authorities recognize the importance of proactive measures to prevent harm to competition. As the metaverse evolves, regulators must prioritize merger control to address market concentration and avoid dominant ecosystems that hinder competition (Yu & Yu, 2023). A specific concern is "killer acquisitions," (Dargan, 2023), where incumbents purchase innovative firms at high prices to eliminate potential competition, jeopardizing promising innovations. To counter this risk, competition authorities are expected to strengthen pre-merger screenings, discouraging such acquisitions and enforcing regulations to protect competition (Boreham, 2023). Our analysis reveals that strategic transactions in this space can lead to dominant market positions, controlling virtual assets and infrastructure. Furthermore, acquisitions or mergers with key technology producers and content creators can create closed ecosystems, limiting access and impeding an open metaverse.

Analysis indicates that major players in the technology industry are making significant investments in acquiring or merging with companies that operate at the forefront of various aspects of the metaverse, such as hardware, platforms, avatar creation, and 3D engines (Drapkin, 2023). A closer examination of the provided table demonstrates that the primary focus of these big tech companies is to acquire or merge with companies that specialize in metaverse technologies (Jung et al., 2023). This observation is further supported by a case study involving prominent players in the metaverse. For instance, Facebook's Meta is a noteworthy example, as the company actively acquires technologies and platforms related to the metaverse (Jung et al., 2023), solidifying its position as a key player in this emerging field.

Table 1: Top Tech Companies and their investments in the metaverse
Source: Authors Analysis (Arya Yash, 2023)
(* Figures in billions; Approximate for data available till June 2023)

Company Name	Company Valuation	Investment in the metaverse*
MICROSOFT	2580	70
GOOGLE	1580	40
NVIDIA Corporation	1050	20
META Platforms Inc	720	10
TENCENT	444	5
BYTEDANCE	300	1.5
EPIC GAMES Inc	32	2
UNITY Software Inc.	16	1.5

Thus, larger software and technology players' acquisition or merger of smaller tech start-ups can positively and negatively affect metaverse innovation. On one hand, it brings valuable resources, expertise, and technological advancements to the metaverse. However, it also raises concerns about consolidation and reduced competition, potentially limiting the entry of new and innovative start-ups. It is essential to strike a balance between promoting innovation and maintaining a diverse and competitive metaverse environment. Policymakers and governments have a crucial role to play in competition law governance, monitoring these deals in both the virtual and real world and anticipating their long-term implications and conditions. Their vigilance and foresight are necessary to ensure a thriving, innovative metaverse ecosystem.

Case Study: Acquisition and Mergers in the Software and Technology industry (See Appendix*)

Tencent: As a dominant player in China's gaming market, Tencent aims to elevate its gaming business in the metaverse. With a 43% market share, Tencent seeks to enhance game interactivity and quality by acquiring smaller gaming developers and graphic designers. Tencent's interest in consumer-facing hardware for virtual reality (VR) and augmented reality (AR) is evident, with the recent acquisition of Black Shark Gaming indicating a potential focus on VR headsets. By integrating social elements into its gaming offerings and investing in hardware, Tencent aims to solidify its position in China's metaverse play. Despite having a cash balance of $44.6 billion, Tencent plans to exercise caution in their metaverse investments, likely pursuing smaller deals valued between $100 million to $200 million.

Figure 6: Acquisitions by Tencent Gamings

Data compiled March 14, 2022.
Analysis includes acquisitions announced or completed by Tencent and its current subsidiaries in China since Jan. 1, 2015, where the target is in home entertainment software industry.
Source: S&P Global Market Intelligence

These examples (See Appendix*) demonstrate the strategic efforts of major companies such as Microsoft, Unity, Nvidia, and Meta etc. to establish their presence in the metaverse (Ball, 2022). Through strategic acquisitions, these companies are obtaining valuable assets, technologies, and capabilities that will shape the future of virtual experiences. By collectively driving innovation and transforming the virtual landscape, they are laying the foundation for immersive experiences in the metaverse (Ball, 2022). However, a question arises regarding whether these large-scale acquisitions will create a level playing field for small developers and foster healthy competition in the market.

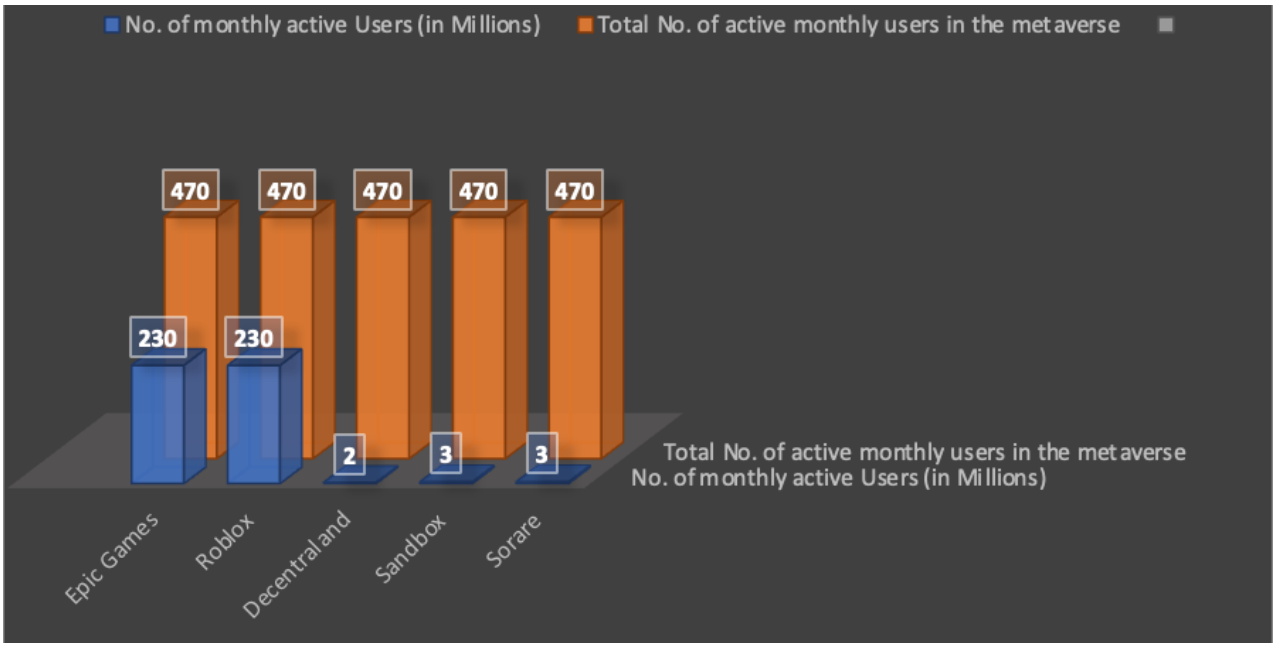
Interoperability (The Gatekeepers) and Data Exploitation

Metaverse markets may experience strong network effects and "tipping" dynamics, where the presence of a critical mass of users on a particular platform becomes advantageous. This conduct of dominant companies controlling access to their metaverse could harm consumer choice and competition (Bulst & Vinck, 2022). Another notable challenge to the metaverse is the application of the essential facilities doctrine. Applying the essential facilities doctrine can prevent dominant companies from restricting access to essential metaverse infrastructure, creating a level playing field for established players and emerging start-ups. Advocacy for regulating big data as a public utility has gained traction in various domains, and it can be extended to the metaverse space. By treating metaverse data as a public utility, governments can establish regulations that ensure fair access, protect consumer rights, and promote competition within the metaverse ecosystem. (Ghlionn & Hamilton, 2022).

The involvement of major players in providing metaverse infrastructure raises concerns regarding potential anticompetitive behaviour. The refusal to supply specific goods or services and its impact on competition requires careful consideration (Kalpokas & Kalpokienė, 2023). Factors like the powerful network effects and high user, capital and business market concentration within the metaverse ecosystem can create significant barriers, dissuading users from switching to competing platforms (Huynh, 2023). This poses a substantial challenge to competition law enforcement in ensuring a level playing field. Moreover, denying competitors access to the metaverse infrastructure can have far-reaching implications for secondary markets within the metaverse (Phasel, 2023). The actions of the infrastructure provider, such as imposing unreasonable terms or engaging in exclusive agreements, can directly affect various secondary markets (Jungherr & Schlarb, 2022). Notable examples, such as Google Maps' control over reviews or Apple's dominance in-app distribution, demonstrate the potential influence on competition within the metaverse (McDonald, 2021).

The preliminary analysis of the table reveals a concentration of active users in the metaverse, with a significant portion gravitating towards Roblox and EPIC Games (Fortnite titles). This dominance by these platforms signifies their influence in terms of user volume and data generation resulting in potential future gatekeepers, tipping effect and data cartelization (Schonbaum, 2022). This importance is further emphasized by the increasing huddle among luxury brands and artists trying to make their presence known and capture the audience in the metaverse (See Appendix*). For instance, the metaverse real estate market is projected to reach $5.37 billion by 2026, fuelled by the participation of major brands (Howard, 2023).

Figure 7: Comparison of Major metaverse platforms and the number of monthly active users.
Source: Author's Analysis: (Arya Yash, 2023)



This intense competition among major platform providers to capture a large user base and access vast amounts of data raises concerns about the potential for collusion within the metaverse. This race for dominance can lead to companies involved in its development sharing sensitive information or forming agreements on pricing, similar to previous cases involving Big Tech companies (Brown, 2023). Such actions can create a virtual monopoly and hinder fair competition. The risk of tacit collusion, where participants achieve anticompetitive outcomes without explicit communication, is a significant concern, as it relies on their collective market power (Choi & Gierhart, 2023).

Furthermore, the role of algorithms in facilitating collusion is also emphasized, as they can autonomously set prices or respond to competitors' pricing, potentially contributing to collusion (Choi & Gierhart, 2023). It is important not to underestimate the potential for algorithmic collusion and collusion facilitated by blockchain technology. Scenarios where algorithms compete against each other, or agreements are made on a unified algorithm for price setting are considered to be potential risks that need to be addressed (Choi & Gierhart, 2023).

Data security and privacy concerns in the metaverse

Within the vast expanse of the metaverse, a realm brimming with infinite possibilities, a pressing challenge emerges - the imperative to address security and privacy concerns. As users immerse themselves in this interconnected virtual world, they face potential risks: unauthorized access, data breaches, and compromised personal information (Canbay et al., 2022).

The decentralized nature of the metaverse further exacerbates these concerns, necessitating a proactive approach to safeguarding user privacy and ensuring data protection (Dreyer, 2022). In this part, we delve into the complexities of security and privacy in the metaverse, exploring viable strategies and recommendations to mitigate risks and create a trusted and secure environment for all users.

For this purpose, we will distil three significant areas of concern.

Privacy and user control over data:

The development of the metaverse raises significant questions regarding privacy and the ethical use of personal data. As the metaverse relies on virtual and augmented reality, AI, and blockchain-based applications, it has the potential to generate massive amounts of highly personal data (Wu et al., 2022). This expansion of data collection and usage possibilities presents challenges similar to those we face in today's Web 2.0 environment but on a much larger scale.

Extensive and invasive data collection is expected in the metaverse, with companies leveraging personal data to gather insights on user preferences and behaviour for targeted advertising and marketing. The frontier technologies used in the metaverse could create millions of additional data points, further expanding data collection opportunities (Jung et al., 2023). For example, VR/AR headsets with wearable technologies could capture physiological parameters such as heartbeats, breathing rates, and eye movements, providing deep insights into users' behaviour and potentially revealing sensitive personal information (Kasnevich & Daniel, 2022).

For example, collecting eye movement data in the metaverse can reveal more than just where a person is looking. It can provide insights into interests, emotions, hunger, and sexual desires. Therefore, users must understand and agree to use their eye movement data, especially if it goes beyond the immediate interaction (Khang et al., 2023). Moreover, integrated sensors used to make VR more immersive can capture and analyse a user's every movement, raising questions about the classification of facial expressions, gestures, and body language as data and their compatibility with privacy regulations like the GDPR (Hsiao, 2022). This level of data collection raises significant privacy concerns and the potential for abuse or unauthorized access to personal information.

However, under the GDPR's (Art. 4 No. 1 GDPR) definition, personal data includes information related to an identified or identifiable individual. Factors such as facial expressions, gestures, and body language, specific to a person's physical identity, can be associated with an individual, thus falling under personal data. Consequently, this data would be subject to the provisions and protections outlined in the GDPR (Dreyer, 2022).

Nevertheless, beyond these legal considerations, there are ethical concerns surrounding the use of facial expressions to infer a user's personality traits, motivations, or honesty can be used by advertising and marketing companies for a better-targeted audience capturing by processing this data (Fernandez & Hui, 2022). For example, an Avatar roaming in the virtual world showing interest in particular billboards and advertisements or products can be better ascertained and captured through facial expressions. Conducting such analyses could deeply infringe upon users' rights (Wu et al., 2022). Regardless of any potential legal justifications for lawful processing, it is worth questioning the permissibility of such practices. Although facial expression data may be classified as particularly sensitive under Article 9 of the GDPR, it still allows processing under strict conditions (Gratton, 2021).

Another immediate concern is that combining data gathered from users' interactions and AI algorithms could be used to create sophisticated and deceptive experiences. The devices used to access the metaverse, such as VR headsets, pose a risk of data breaches and manipulation (Khang et al., 2023). As mentioned, these devices may collect sensitive data, such as voice control or facial movement, which hackers could reproduce. If unauthorized individuals access such devices, they could compromise users' personal information and manipulate their sensory experiences within the metaverse (Ma & Huang, 2022). This data can be used in "Deep Fake technology" and could be employed in this scenario to create convincing simulations of individuals within the metaverse, including their appearance, voice, and behaviour (Ma & Huang, 2022). Thus, it raises concerns regarding identity theft and more (See Appendix* for more details on Deep Fake"

Promoting a Safe and Inclusive Environment

As the metaverse becomes a platform for social interactions, it must prioritize policies that foster a safe and inclusive environment for all users. Discrimination and harassment, including hate speech and cyberbullying, are critical concerns in the metaverse (Pietro & Cresci, 2021). Incidents of sexual harassment and assault in the metaverse have been extensively documented, revealing an uncomfortable reality. According to a report by MIT Technology Review (Basu, 2022), Victims of harassment in virtual spaces often face dismissive and abusive responses, which exacerbate the hostile environment. The anonymity factor of online platforms contributes to the ease with which people engage in bullying and harassment. Additionally, jurisdictional and privacy challenges make pursuing and holding perpetrators accountable difficult. These factors combined create a disconnected and challenging landscape for addressing and preventing online harassment.

The scope of the problem is not limited to isolated incidents. A Pew Research study indicates that most American adults recognize online harassment as a prevalent issue (Vogels, 2021). Shockingly, 41% of respondents reported first-hand experiences of harassment in digital spaces (Singhi & Rajput, 2021). While AI-driven content filtering can help detect and prevent harmful content, it has limitations. Therefore, it is essential to spread awareness among users about which laws and regulations govern their actions in the metaverse. However, enforcing regulations becomes significantly challenging due to the metaverse's open nature and lack of geographical constraints.

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Illustrations:

If Avatar "A" harasses Avatar "B" in the metaverse "XYZ," whom can the victim complain to and which laws will be applicable? Complaining to national authorities may be an option, but enforcing actions becomes difficult when "A" and "B" are citizens of different countries, raising the issue of cross-border jurisdiction. Similarly, suppose they are citizens of different countries but operate their avatars in the virtual world of "XYZ" from their current residence. In that case, the question arises: Does that jurisdiction of their residence have the power to intervene? Alternatively, one could approach platform operators like "XYZ" to take action. However, if the dedicated metaverse space operates on a decentralized concept, with DAOs comprising users and developers making decisions based on votes. Additionally, If "A" Uses platform "P" and "B" using platform "M" with their respective metaverse ecosystems, determining which platform has the authority to enforce action (XYZ, P or M) becomes challenging.

Thus, as the metaverse is likely to become more interoperable, allowing people to move freely between different platforms, determining the reliable platform for a specific incident becomes even more complex.

Applying regulations and strategies similar to that used by other online platforms, such as YouTube, involving banning participants may seem like a solution. However, this approach falls short, as people can easily register again under new disguises, emails, or different platforms (Huynh, 2023).

Furthermore, accessibility should be at the forefront of metaverse policies. Virtual spaces must be designed to accommodate users with disabilities, ensuring equal opportunities for participation and engagement (Qin et al., 2022). This includes providing alternative means of interaction, captioning or audio descriptions for multimedia content, and incorporating assistive technologies to enhance accessibility (Jain, 2022). For instance, policies can mandate that metaverse platforms provide customizable user interfaces, support for screen readers, and options for users with mobility impairments to navigate virtual environments effectively. By prioritizing accessibility and inclusivity, policies can promote a metaverse that embraces diversity and equal participation, enhancing the overall user experience (Canbay et al., 2022).

Case Study: Incidents of Abuse in the metaverse

One notable example involves the app "Population One," owned by Meta. Chanelle Siggens (Diaz, 2022), reported being approached by another player who engaged in simulated groping and explicit actions towards her avatar. Similarly, Mari DeGrazia witnessed frequent instances of harassment while in the app, and she experienced abuse when another player groped her avatar's chest. Another incident occurred within the app "Lone Echo VR," also owned by Meta Smith, 2022). Sydney Smith encountered lewd and sexist remarks from another player who claimed to have recorded her voice for explicit purposes (Smith, 2022). Another gamer, Jordan Belamire, also shared her disturbing experience of being sexually harassed in the game Quivr, where another player virtually groped her chest and engaged in explicit gestures (Basu, 2022).

In the metaverse, when a user is touched by another, the hand controllers vibrate, resulting in a disorienting and disturbing physical experience during a virtual assault. As haptic technology advances and virtual immersion increases, the line between reality and the virtual world becomes blurred (Diaz, 2022). It is crucial to acknowledge that harassment and abuse encompass physical components and impact an individual's mental state. This raises significant concerns about the potential for more realistic and distressing experiences in the future (Fernandez & Hui, 2022).

Here it is recommended that the platform providers can adopt an age-based access restriction approach in the metaverse to enhance safety and promote a secure environment. By implementing age verification processes during registration, platforms can limit access to certain virtual places and interactions based on the user's age. This measure aims to protect vulnerable populations, such as children, from inappropriate content or potential exploitation. While requesting proof of date of birth can strengthen this approach, platforms must also prioritize protecting sensitive data and ensure it is not accessible to marketing or associated industries. Striking a balance is crucial to maintain privacy while creating a safe space in the metaverse that instils trust and inclusivity for users of all ages, genders, and identities.

Ensuring Security and Financial Integrity

Security and financial integrity are paramount concerns in the metaverse, given the potential for cyber threats and the growth of virtual economies. As the metaverse gains prominence in both consumer and industrial realms, it becomes crucial to address jurisdictional and liability issues to combat hacking, scams, data breaches, taxation concerns, and identity theft (Goodman, 2014). To protect users' personal information, it is imperative to establish a comprehensive policy framework that integrates the needs of all stakeholders. This framework should focus on implementing robust security standards to create a secure environment within the metaverse.

Virtual economies within the metaverse introduce the need for policies regulating financial transactions, especially regarding virtual currency systems and consumer protection (Karapatakis, 2019). For example, procedures can require metaverse platforms to implement secure transaction mechanisms, such as encryption and multi-factor authentication, to protect users' financial information in and outside the metaverse, whether using blockchain and crypto for financial transactions or not (Cotter, 2022). The metaverse can provide opportunities for cybercriminals, organized criminals, terrorist groups, and sex offenders to hide behind encryption, untraceable NFTs, and other means (Odedra, 2022). Identifying and pursuing legal recourse against perpetrators may be challenging due to the metaverse's multi-layered structure and decentralized nature.

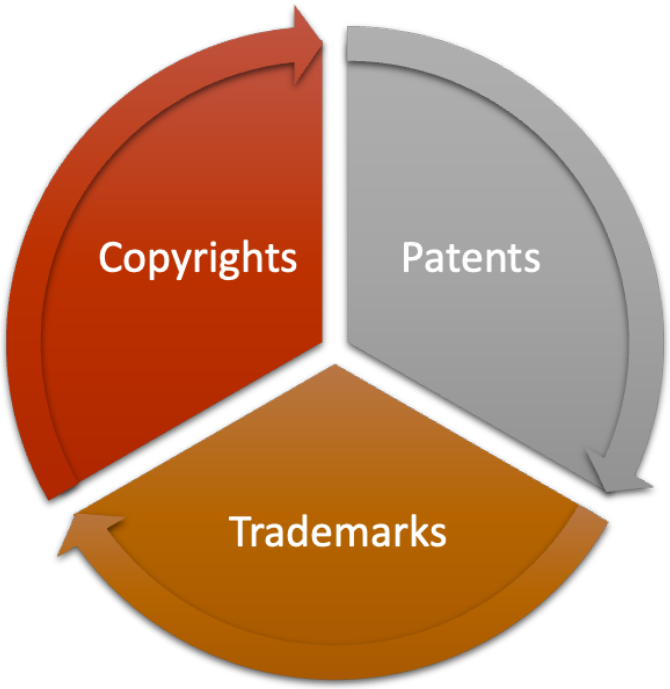
Another major problem is the vulnerability of metaverse platforms to breaches, leading to virtual asset theft and unauthorized transfers. The internet has already proved to be an active marketplace of illegal monetary activities, which has been illustrated by a case study of "Second life" in Appendix*. Similarly, there lies the grave threat of exploitation of virtual assets by organized criminals to facilitate transactions in underground marketplaces operating in the dark web, such as the “Silk Road” and also lead to exploitation of vulnerable groups by criminals (Adler, 2018) see Appendix*.

Intellectual property rights (IPR)

The metaverse presents distinct areas requiring intellectual property (IP) rights consideration. While some areas can be managed within existing laws and regulations, others need clear rules, particularly those involving blockchain, AI, and NFTs. In VR and AR technologies, patent regulations protect software and hardware inventions (Singh, 2022). However, user-generated content poses challenges and requires effective IP enforcement strategies.

Platforms like YouTube provide models for content takedown requests and IP infringement safeguards. Implementing similar approaches in the metaverse, such as clear procedures, reporting channels, and content filtering mechanisms, can proactively address copyright and trademark violations (Hsiao, 2022). Rather than creating new regulations, a proactive enforcement policy and collaboration among stakeholders would be beneficial (Chio & Gierhart, 2023).

Thus, this analysis will confine itself to three major IPR areas: patents, trademarks, and copyrights, where enforcing existing regulations pose a challenge (Phelan, 2022).



Patents

The metaverse presents thought-provoking patent-related challenges that demand careful analysis. In the physical world, patents protect human inventions (Ireland & Lohr, 2020). However, with the metaverse heavily relying on AI technologies to enhance user experiences, a crucial question emerges: Should AI-generated inventions be eligible for patents? Let us explore a scenario to illustrate this issue further. Imagine developing a ground-breaking innovation in the metaverse with the assistance of AI, potentially revolutionizing the digital twin industry or offering medical applications. Through extensive trials, one can ascertain the real-world utility of their invention beyond the virtual realm, prompting the desire to seek patent protection. However, a hurdle arises when identifying the inventor (Singh, 2022).

Similarly, AI algorithms autonomously generate remarkable digital assets in the metaverse's expanding creative landscape, such as virtual dresses and breathtaking landscapes (Nanobashvili, 2022). This generation by an AI leads to a critical question: Who should hold copyright ownership over AI-generated creations? Copyright laws traditionally protect human creators and their original works, but when AI actively participates in the creative process, the distinction between human and machine authorship becomes blurred (Khang et al., 2023). Establishing clear ownership and rights for AI-generated creative works within the metaverse is imperative to ensure fairness and foster innovation.

Case Study: DABUS

In 2018, DABUS, an autonomous AI system, generated two patentable inventions: a neural flame and a fractal container. Stephen Thaler, the creator of DABUS, claimed that AI combines simple concepts to form complex ideas and projects their potential outcomes. Thaler filed patent applications for these inventions, listing DABUS as the inventor (Hidaka, 2021). However, patent offices worldwide, including the USPTO, UKIPO, and EPO, rejected Thaler's applications, asserting that only humans can be recognized as inventors under existing patent laws (Kim, 2022). The USPTO, guided by the statutory language and relevant precedents, emphasized that conception, an essential aspect of inventorship, must be performed by a natural person. Thaler's appeals to various patent offices yielded mixed results, highlighting the ongoing debate regarding AI inventorship (Newman, 2021).

The DABUS case underscores the general requirement in most jurisdictions that inventors must be human beings. Despite the undeniable capability of today's AI to autonomously generate novel and useful inventions, the legal framework still upholds the human-centric approach to inventorship (Mcdermott, 2021). However, the Australian Federal Court's and South African patent office and the court ruling notably recognized the possibility of AI inventorship, representing a noteworthy departure from the traditional perspective (Ireland & Lohr, 2020).

Copyrights

Copyright infringement in the metaverse, specifically involving NFTs, poses substantial challenges to enforcing intellectual property rights. The metaverse represents digital assets as Non-Fungible Tokens (NFTs), encompassing artworks, music, videos, and virtual land. Consider an artist who creates a unique digital artwork and sells it as an NFT on a decentralized metaverse platform. The artist holds the copyright, granting exclusive reproduction, distribution, and public display rights. However, unauthorized copying and replicating digital artworks are prevalent concerns within the metaverse. An infringer might reproduce and sell the artist's work without permission, profiting from copyright infringement (Schonbaum, 2022).

Enforcing copyright in the metaverse, particularly on decentralized platforms, is challenging due to the decentralized nature of these platforms and the involvement of decentralized autonomous organizations (DAOs) in governance. DAOs operate on blockchain technology and make decisions through community consensus, playing a role in governing and enforcing metaverse rules (MRICS & Plebani, 2022). To address copyright infringement, metaverse platforms must rely on the governance and enforcement mechanisms established by DAOs. These mechanisms may include reporting procedures for copyright violations, community-driven dispute resolution processes, and the involvement of intellectual property experts or mediators. Such measures are vital for resolving complex cases and safeguarding the rights of copyright holders.

Furthermore, the issue of virtual land in the metaverse raises copyright concerns when users create replicas of famous architecture or landmarks without proper authorization (Kalpokas & Kalpokienė, 2022). Unauthorized replication and distribution of copyrighted architectural designs infringe upon the rights of the original creators. Additionally, virtual land parcels in the metaverse are associated with NFTs, which emulate real property characteristics and possess unique spatial coordinates: the decentralized nature and distinct identification of metaverse property present challenges in applying existing dispute resolution policies effectively (Frank, 2022).

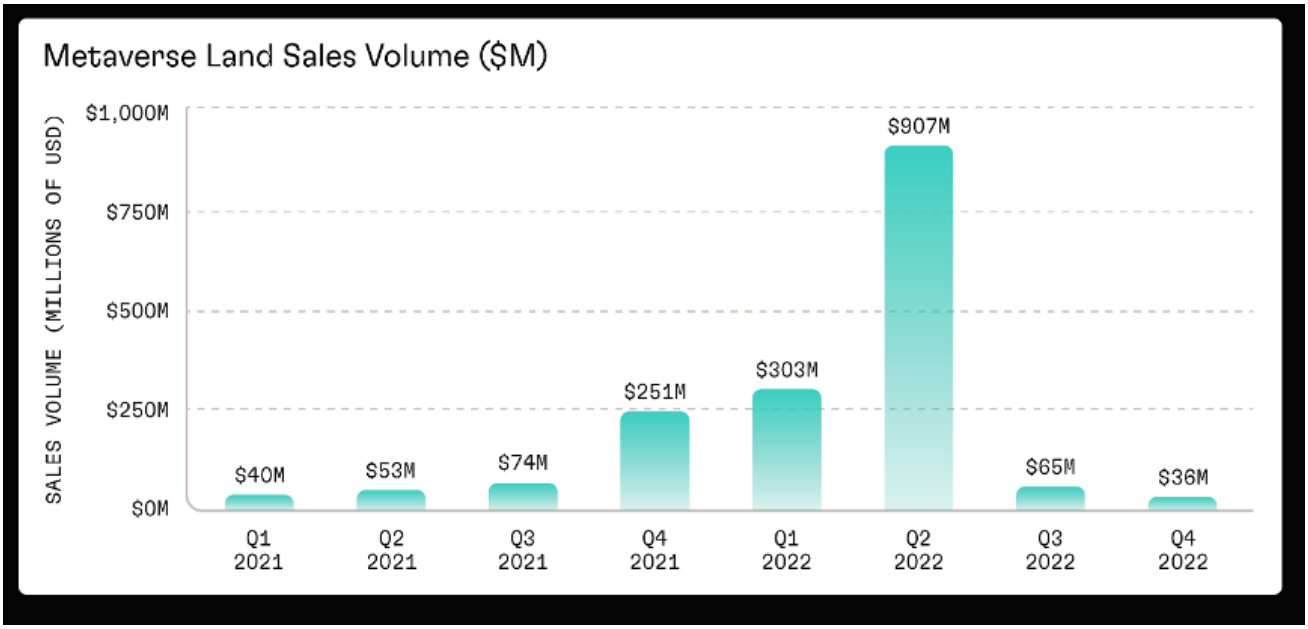
Although the data highlights the significant activity and fluctuations in the virtual real estate market within the metaverse, experts have suggested an increase in the virtual demand as more virtual worlds will start the sale of virtual lands. Despite declining average land prices and trading volume from February to June 2022 (Pritchard, 2022), the overall value of land sales across the top ten virtual world platforms reached approximately $1.9 billion (Frank, 2022). This indicates sustained interest and investment in virtual land ownership. Furthermore, the surge in NFT sales within the virtual real estate market in 2022 is noteworthy (MRICS & Plebani, 2022). With sales exceeding $1.4 billion (Pritchard, 2022), representing a substantial 180% year-on-year increase compared to 2021 (Frank, 2022), virtual real estate NFTs have emerged as a valuable asset class. The Otherside virtual world land dominated the market, accounting for 75% of total sales, emphasizing its popularity and desirability among buyers (Pritchard, 2022).

Figure 8: Metaverse and Total Sales Volume of Virtual Lands till 2022
Source: Metaverse Real Estate Statistics (2023)- Tony Mariotti

Metaverse	Sales Volume
Otherside	$815,204,820
Decentraland	$444,540,170
The Sandbox	$344,317,044
NFT Worlds	$90,836,020
Metroverse Genesis	$44,579,775
Worldwide Webb	$39,693,477
Voxels	$33,767,981
Arcade Land	$30,416,840
Treeverse	$24,672,677
Somnium Space	$22,158,169
TOP 10 TOTAL	$1,890,186,973

Looking ahead, the digital real estate market is projected to experience substantial growth, with an estimated increase of $5.37 billion from 2022 to 2026 (Pritchard, 2022), representing a compound annual growth rate (CAGR) of 61.74% (Mariotti, 2023). While recent trends indicate a cooling-off period, it is essential to adjust expectations accordingly. Nonetheless, the virtual real estate market remains an attractive and promising sector within the evolving metaverse, offering lucrative opportunities for investors and enthusiasts as the metaverse continues to gain traction and expand.

Figure 9: Metaverse land sale volumes from 2021 to 2022
Source: 2022 Annual Metaverse Virtual Real Estate Report- Parcel.so



Trademarks

Trademark infringement in the metaverse presents a complex and pressing issue that necessitates advanced strategies for effective resolution. As virtual worlds and platforms establish distinct brand identities, the unauthorized use of trademarks introduces confusion and dilution, posing significant risks to brand reputation and consumer perception (Irwin, 2022). To mitigate these risks, deploying sophisticated mechanisms within the metaverse is imperative to swiftly detect and address trademark infringement instances.

A proactive approach is critical to combatting trademark infringement in the metaverse. Brand monitoring tools equipped with advanced technologies can play a pivotal role in identifying unauthorized usage of trademarks, enabling prompt action to protect brand owners' rights and interests (Singh, 2022). Streamlined content takedown procedures, backed by efficient reporting and enforcement mechanisms, are vital in swiftly removing infringing content and preserving brand integrity (Chen et al., 2022).

Case Study: Hermès and the Fight Against Virtual Trademark Infringement

Hermès, the luxury brand, faced a metaverse trademark infringement case involving virtual handbags called "Meta-Birkins." These digital creations were sold as non-fungible tokens (NFTs) without authorization. Hermès successfully argued that using their trademarked name, "Birkin," for these virtual handbags constituted infringement. On 23rd June 2023, a Manhattan federal judge recently granted Hermès' request to permanently halt the sales of the infringing NFTs, securing a significant victory for the brand's integrity and trademark protection in the virtual realm.

Another question concerning trademarks is whether the evidence of distinctiveness for real-world goods/services can be applied to virtual worlds. Unlike in the physical world, where consumer perception determines the distinctiveness of descriptive or non-traditional signs, the virtual world introduces additional complexities (Park, 2022). This poses significant considerations for businesses operating exclusively in the metaverse. When seeking trademark registration in the real world, assessing how the audience will perceive the trademarks in the virtual world and how IP authorities will evaluate their value and enforce infringements in the real world ((Bondre, 2022). To effectively implement and protect trademarks across both the metaverse and the real world, a comprehensive approach must carefully consider the unique dynamics of each realm.

The challenges of trademark infringement in the metaverse are multifaceted and demand tailored solutions. Brand owners must employ robust brand protection strategies encompassing proactive monitoring, timely enforcement, and ongoing vigilance. The notable case of Hermès illustrates the significance of diligent enforcement efforts to safeguard trademarks and prevent unauthorized use within virtual environments (Abutouq, 2022). When seeking trademark registrations, brand owners must assess how their trademarks will be perceived by audiences in both realms (Park, 2022) and ensure that intellectual property offices and authorities recognize the value and enforceability of these trademarks.

Macroeconomic Risks

Exchange rate

In the virtual layer of the metaverse, metaverse token currencies, also known as digital currencies, could be adopted to facilitate seamless economic transactions within the virtual world and enable exchange between the virtual world and the physical world. The fluctuations in the exchange rate of these metaverse currencies can potentially have spillover effects on the real economy. Central banks often aim to ensure the stability of their currencies' exchange rates. However, central banks must monitor additional exchange rates after introducing multiple metaverse token currencies into the financial system. Although the currently small-scale use of metaverse token currencies has had a limited impact on the real economy, as the metaverse develops, it may gradually acquire the capabilities to affect the value of real-world currencies. For example, if many metaverse users decide to convert their digital currencies into a specific traditional currency, the supply of that currency on the market will increase, which will consequentially impact the exchange rate and value of the traditional (i.e. real-world) currency. It is worth noting that existing metaverse currencies are not typically issued or regulated by political entities but rather by metaverse developers (Ashmore, 2023). This lack of oversight may bring challenges in establishing trust in the perceived value and stability of these digital currencies.

Financial stability

In recent years, the metaverse has emerged as one of the most trending concepts in the technology investment sphere. Fueled by the fear of missing out, many speculative investors have entered the metaverse arena. Tendencies for speculative investment may emerge within the metaverse realm, similar to the tendencies observed in previous technology-driven bubbles, such as the dot-com bubble in the late 1990s (Mills, 2001). Additionally, the rapidly evolving nature of the metaverse and the absence of established valuation models can also bring difficulties for investors to price the associated risks. The uncertainty in the value of metaverse assets or projects can lead to market violability and inflated valuations under the allure of potential exponential growth and novel investment opportunities. Nowadays, the markets show a higher degree of optimism regarding the future of the metaverse. However, the realization of the anticipated metaverse requires substantial financial investment and overcoming various technical challenges. There are no guarantees that the projected scenarios can indeed be achieved, and if progress stalls, it could lead to a bursting of the metaverse bubble at certain stages. It will be important for policymakers – especially the banking and financial regulators – to take stock of these developments to enact appropriate safeguards and thereby minimize the risks of financial spillovers from metaverse developments onto the real world.

We acknowledge that the metaverse is still an emerging concept, and its spillover impact on the real-world economy will depend on its adaptation, scale and integration with the existing systems, which is currently minimal. However, as the metaverse continues to expand, there can be growing macroeconomic risks brought by the metaverse development to real-world economies, which should be noticed by policymakers.

Policy Recommendations

As governments navigate the complex landscape of the metaverse, a strategic approach to governance becomes imperative to ensure responsible and inclusive development. Therefore, the report elaborates on the essential elements of a robust strategy for effective metaverse governance. This multifaceted approach aims to balance innovation and individual rights while equipping citizens with the necessary skills and protection to thrive in this evolving digital landscape.

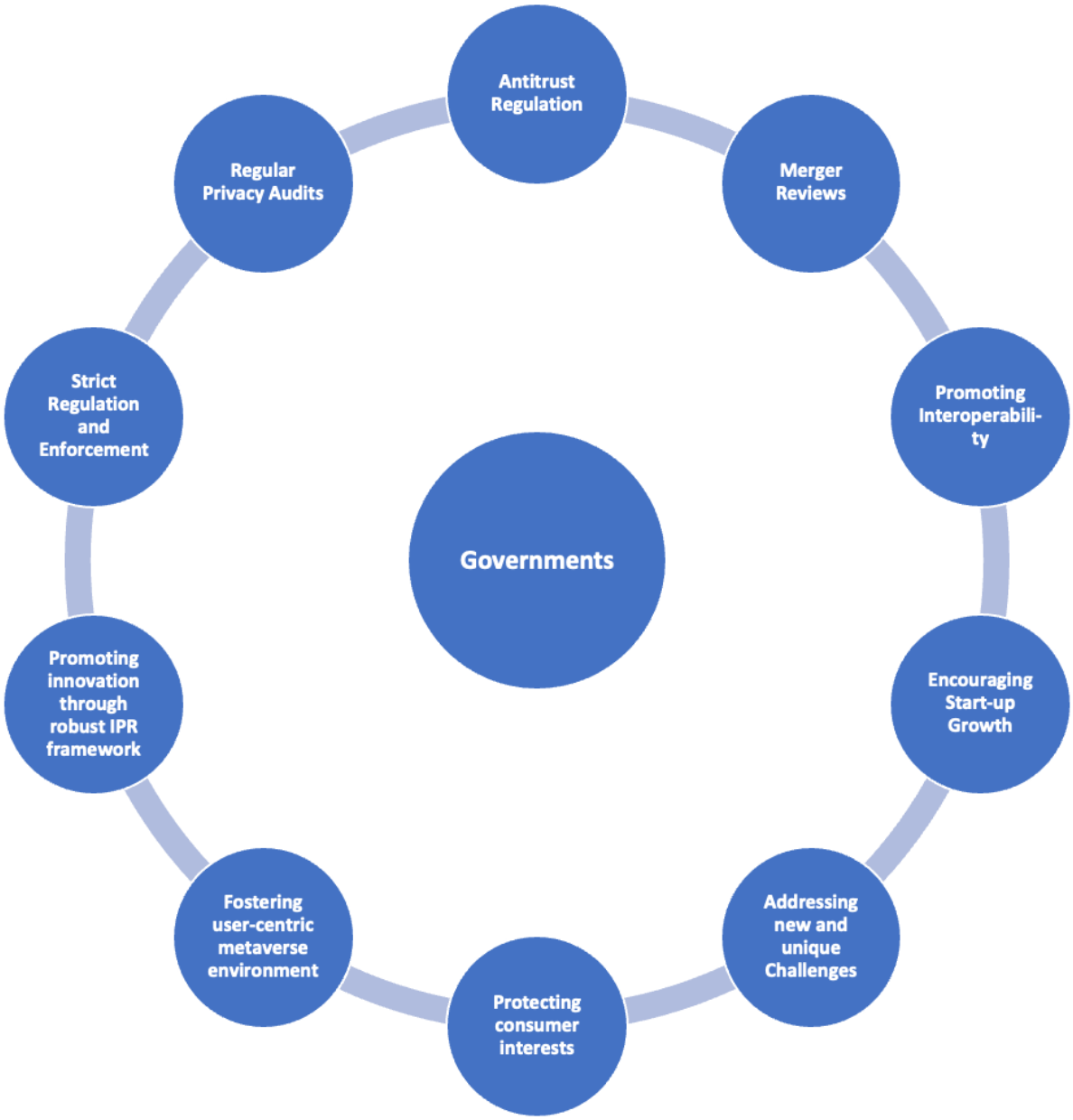


Figure 10: 10-Pronged Strategy for effective governance in the metaverse
(**Source:** Author's Analysis: Arya Yash, 2023)

Antitrust Regulation and Merger Reviews: Policymakers must ensure fair competition by diligently enforcing antitrust regulations and scrutinizing significant acquisitions by tech giants to prevent undue market dominance. Additionally, thorough reviews of metaverse mergers and acquisitions, analyzing their impact on competition, innovation, and consumer welfare, are crucial. Approvals should prioritize maintaining a level playing field for established players and emerging start-ups.

Promoting Interoperability and Start-ups: Driving innovation and fair competition by supporting start-ups through funding, incentives, and favourable regulatory frameworks and facilitating their entry into the metaverse market should be given priority by governments and regulators. Additionally, advocating for open standards and interoperability among metaverse platforms fosters seamless integration, collaboration, and a competitive environment.

Fostering a dynamic and user-centric metaverse environment: The metaverse should be an active and user-centric space responsive to evolving user needs and preferences. Addressing anti-competitive practices that impede innovation and limit user choices should be tackled. By fostering an environment where individual creators, programmers, and market players are incentivized to excel and cater to user demands, we can create an engaging metaverse experience that evolves with the changing needs of its users and addresses consumer concerns by ensuring fair access and open standards for all.

Promoting innovation through a robust IPR regime: Striking the right balance between protecting and fostering innovation is vital. By establishing new legal rules governing the digital space and using the existing framework fostering respect for intellectual property, we can inspire confidence among content creators and technology developers, encouraging them to push boundaries and drive continuous innovation in the metaverse ecosystem.

Strict regulation, enforcement and regular privacy audits: Governments and regulatory bodies must establish clear laws and rules that hold users, platforms, hardware providers and DAOs accountable for enforcement and actions. Additionally, regulatory bodies or government agencies with jurisdiction over digital media and virtual environments should be responsible for conducting metaverse audits and mandating them. They can require audits to ensure compliance with legal and regulatory requirements, assess data privacy and security practices, evaluate the impact on competition, and monitor overall compliance with established standards.

Addressing New and Unique Challenges: Governments must recognize the need to update existing laws and court interpretations to keep pace with the dynamic virtual world, and redefining conventional terms becomes imperative. From determining the applicability of sexual harassment to metaverse acts to promulgating neuro rights and safeguarding data privacy, the metaverse demands a precise understanding of emerging challenges.

Private Sector & International Organisations

The metaverse offers endless possibilities for collaboration and progress, allowing private companies and international organizations to work together and achieve mutual benefits. To fully unlock the potential of the metaverse, we have identified seven crucial areas where private entities and IOs can collaborate and innovate for development.

Figure 11: 7- domains of cooperation and development for private players and IOs in the metaverse (**Source:** Author's Analysis: Arya Yash, 2023)

Collaboration with Industry Stakeholders: Tech giants, metaverse platform developers, and virtual world operators must collaborate to combat trademark infringement and protect intellectual property rights. They should implement policies and guidelines to safeguard users, service providers and AI-generated IP and data within their ecosystems.

User-centric Privacy Settings: Design user interfaces that prioritize privacy, allowing individuals to customize their settings. Grant users granular control over data sharing, specifying what information is shared, with whom, and for what purposes.

Transparent Data Usage Policies: Develop clear and concise policies explaining how user data is collected, stored, and used in the metaverse. Transparent policies build trust, providing users a comprehensive understanding of how their information is handled.

Regular Privacy Audits: Conduct regular privacy audits by independent third-party organizations specializing in cybersecurity. These audits ensure compliance, identify risks and strengthen user confidence. Hackathons can also enhance user awareness and address vulnerabilities.

Improving virtual experience through safeguards: To ensure a safe and satisfactory user experience, it is essential for platform and hardware providers to implement innovative approaches that safeguard personal data. Service providers should also take responsibility for monitoring the proper use of user data and providing clear information and resources to users for recourse and remedial measures if necessary. It is essential to promote user awareness and ensure transparency in data usage practices. For instance, Meta has introduced its "4-foot" boundary to prevent users from interacting with or closing into other avatars.

Community moderation and reporting mechanisms: Leverage the community's strength by assigning dedicated individuals and moderators to monitor and enforce guidelines actively. Furthermore, using advanced AI avatars or chatbots can also provide additional assistance, helping community enforcers to analyze and identify potentially harmful content.

Enhance International Cooperation: To establish consistent standards and policies, it's essential to collaborate with global organizations such as WIPO (World Intellectual Property Organization), ITU (International Telecommunication Union), INTA (International Trademark Association), and ICANN (Internet Corporation for Assigned Names and Numbers), as well as private policy groups and NGOs/NPOs.

Conclusion

The metaverse is still experimental, with ongoing research and investment needed to unlock its full potential. As we delve deeper into this virtual realm, it is crucial to address the digital divide, ensuring that all individuals have equitable access and opportunities within the metaverse. Bridging this gap requires collaboration and concerted efforts from various stakeholders, including governments, technology companies, and international organizations.

A key aspect of building a thriving metaverse is establishing user trust. People must feel confident that their personal information is secure, their privacy is protected, and ethical practices are upheld within the metaverse platforms. Striking the right balance between innovation and regulation is essential. While concerns about stifling innovation often arise in the technology industry, history has demonstrated that appropriate regulations can foster fair competition, safeguard user rights, and promote a healthy ecosystem. International organizations are pivotal in bridging the digital divide and promoting equal access to the metaverse.

By collaborating with governments and technology companies, these organizations can facilitate the development of necessary infrastructure, provide resources, and implement digital literacy programs. Their expertise and global perspective can help address challenges and create pathways for marginalized communities to participate in the metaverse. Drawing from the lessons learned during the internet revolution, finding the right
balance in regulating the metaverse is imperative. Effective regulation should protect user interests, ensure data privacy, and foster responsible practices, while still preserving the principles of free expression and open access that have been vital to the success of the Internet.

In conclusion, the metaverse holds immense potential for self-expression and novel experiences in the digital realm. However, realizing this potential requires continued research, investment, and collaboration. By bridging the digital divide, establishing trust, and striking a balance in regulation, we can create an inclusive and vibrant metaverse that benefits individuals from all walks of life.

Appendix*

Acquisition and Mergers in Software and Technology Industry

Unity Software Inc.: Unity's strategic moves position them as a major player in the metaverse. Their $4.4 billion merger with IronSource enables simplified crypto wallet integration into games, positioning them as a potential leader in crypto gaming. Additionally, the $1.6 billion acquisition of Weta Digital equips Unity with the capability to create hyper-realistic virtual environments using real-time 3D (RT3D) technology.

Microsoft: Microsoft's 2017 acquisition of AltspaceVR revealed their ambitions in the metaverse, providing a glimpse of the future. However, recently, Microsoft announced the closure of AltspaceVR on March 10, 2023, redirecting efforts toward advancing Microsoft Mesh and integrating it with Microsoft Teams as a key aspect of their metaverse strategy for enhancing online workplace experiences. This shutdown eliminates one of the earliest pioneering social virtual platforms, potentially limiting new experiences and innovation in the metaverse space offered by the platform. Furthermore, Microsoft's recent $68.7 billion acquisition of Activision further solidifies their position in the metaverse, allowing them to tap into Activision's extensive gaming portfolio and expand its metaverse offerings.

Acquisition in the Hardware industry

Meta (Jungherr & Schlarb, 2022): (Formerly Facebook) Meta’s acquisition of Oculus, a prominent VR hardware company, was a notable milestone in its metaverse ambitions. In 2014, Facebook acquired Oculus for approximately $2 billion, with a combination of cash and stock (Singh, 2022). This acquisition signalled Facebook's strategic entry into the VR market and its commitment to shaping the future of immersive experiences. Since then, Oculus has continued to develop and release VR headsets, gaining recognition as a leading player in the industry (Hunt, 2022). The deal between Facebook and Oculus has significantly impacted the evolution of VR technology and the advancement of the metaverse.

ByteDance (Kharpal, 2021): ByteDance's strategic acquisition of Pico, the world's second-largest VR headset maker, for 9 billion yuan ($1.3 billion) in August 2021. The acquisition positioned ByteDance for intense competition with Meta's Oculus in the VR market. By leveraging Pico's dominant market share in China and its technological expertise, ByteDance aimed to capitalize on the rising interest in the Metaverse (Yu & Yu, 2023). Despite financial constraints and competition concerns, the acquisition provided ByteDance with a significant advantage and the potential to reshape the VR industry landscape.

Appendix*

The Silk Road: was a notorious platform for trading illegal goods and services using cryptocurrencies like Bitcoin. This exemplifies how criminal organizations leverage virtual assets and the pseudonymous nature of transactions to engage in money laundering, drug trafficking, and arms trading (Biase, 2022). Since the metaverse allows individuals to offer services virtually, this can lead to associated crimes (Javers et al., 2022). For instance, the rise of virtual escort services or adult content in the metaverse can lead to exploitation and human and child trafficking (Javers et al., 2022; Hinduja, 2022). Criminals can exploit the pseudonymous nature of transactions and the difficulty in verifying identities to engage in these illegal activities under the guise of virtual services.

Second Life: In 2014, the virtual world "Second Life" experienced a security breach where hackers accessed user accounts and stole millions of virtual currency units (Saarinen, 2019). This incident highlights the need for robust security measures within metaverse platforms to safeguard virtual asset ownership and prevent unauthorized access.

Deep Fake technology: could be employed in this scenario to create convincing simulations of individuals within the metaverse, including their appearance, voice, and behaviour (Ma & Huang, 2022). Thus, it raises concerns regarding identity theft, invasion of privacy, and the potential for malicious actors to engage in deceptive practices. For instance, using user data and AI algorithms, hackers could generate virtual avatars that resemble real people, mimicking their gestures, expressions, and voices. Invasion of privacy and the potential for malicious actors to engage in deceptive practices. For instance, using user data and AI algorithms, hackers could generate virtual avatars that resemble real people, mimicking their gestures, expressions, and voices. This could lead to impersonation and social engineering attacks, where users are tricked into revealing sensitive information or engaging in fraudulent activities (Ma & Huang, 2022). Furthermore, manipulating sensory experiences within the metaverse could have profound psychological and emotional effects on users (Jain, 2022). Deep Fake content could be designed to evoke specific reactions or manipulate users' perceptions, potentially leading to exploitation or harm.

Global Brands in the metaverse: Global companies like Adidas, Atari, and Warner Music Group have recognized the metaverse as a platform to engage with consumers and drive sales, purchasing virtual plots within it (Chen et al., 2022). Fashion brands, including Gucci, Burberry, Prada, and Balenciaga, are also exploring the metaverse to attract younger consumers, leveraging augmented reality for virtual try-ons and offering customized jewellery to NFT owners (Mancino et al., 2022). In addition, the establishment of the Mall of the Metaverse by Majid al Futtaim highlights the rising significance of metaverse-based commerce, providing enhanced digital experiences across retail, entertainment, and leisure offerings (Hollensen et al., 2022). However, as brands collect and analyse data on consumer behaviour in the metaverse, transparent and responsible data governance standards become crucial to build consumer trust.

Appendix*

Commerce in Metaverse – Applied Research Project Supervised by World Economic Forum

Thank you for participating in our survey on the influence of the metaverse on trade and investment. We are master's students from the Geneva Graduate Institute, doing our Applied Research Project under the supervision of the World Economic Forum. Your responses will be kept confidential, and the survey should take approximately 10-15 minutes to complete. Please note that if you have any confusion or questions regarding the concept of the metaverse discussed in this survey, you can refer to the forum's publication Demystifying the Consumer Metaverse for a detailed definition and further clarification.

1. Do you currently work for a firm, company or organization?
▫ Yes
▫ No
2. What's your role within the business?
▫ CEO/Founder/Owner
▫ Senior Management (e.g., CTO, CFO, CMO)
▫ Manager/Supervisor
▫ Employee/Staff
▫ Other:
3. In which country is your business located?
4. What is the primary industry of your business?
▫ Technology/Software
▫ Finance/Insurance
▫ Retail/E-commerce
▫ Manufacturing
▫ Healthcare
▫ Entertainment/Media
▫ Consulting
▫ Education
▫ Non-profit
▫ Other:
5. What is the approximate number of employees at your business?
▫ Less than 20
▫ 20-100
▫ 101-500
▫ 501-1,000
▫ More than 1,000

Appendix*

6. Are you familiar with the concept of the metaverse?
▫ I have not heard of the concept
▫ I have heard of the concept but am not very familiar
▫ I am familiar with the concept
▫ I am very familiar with the concept
▫ I am very familiar with the concept, and my work is directly tied to the metaverse
7. Has your business developed a strategy or plan for incorporating the metaverse into its operations?
▫ Yes
▫ No
8. If yes, which of the following metaverse strategies has your company implemented or plans to implement? (Select all that apply)
▫ Creating a virtual presence for our products/services in the metaverse
▫ Developing virtual experiences or environments for our customers/clients
▫ Exploring partnerships or collaborations within the metaverse ecosystem
▫ Utilizing virtual currencies or blockchain technology within the metaverse
▫ Not applicable
▫ Other:
9. If no, what are the primary reasons for not considering or implementing a metaverse strategy? (Select all that apply)
▫ Lack of awareness or understanding of the metaverse
▫ Uncertainty about the potential benefits
▫ Lack of resources or expertise
▫ Concerns about security or privacy
▫ Does not align with current business strategy
▫ Not applicable
▫ Other:
10. In your opinion, how do you think the metaverse will influence global business and economic activities, including international trade and commerce?
▫ Significantly positive
▫ Somewhat positive
▫ No impact
▫ Somewhat negative
▫ Significantly negative

Appendix*

11. In your opinion, how do you think the metaverse will influence investment strategies and opportunities and other aspects of financial decision-making?
▫ Significantly positive
▫ Somewhat positive
▫ No impact
▫ Somewhat negative
▫ Significantly negative
12. If you expect the metaverse to have an impact on trade and investment, how soon do you expect that to be felt?
▫ Within the next year
▫ 1-3 years
▫ 3-5 years
▫ More than 5 years
▫ Not sure
▫ No significant impact
13. If you expect the metaverse can provide opportunities for your business, what might those be? (Select all that apply)
▫ Enhanced virtual customer experiences and interactions
▫ Increased market reach and global presence
▫ New revenue streams through virtual products/services
▫ Improved collaboration and communication within the company
▫ Enhanced product/service innovation and development
▫ No opportunities
▫ Other:
14. In which investment opportunities or sectors within the metaverse do you see your business actively participating or exploring? (Select all that apply)
▫ Virtual real estate and property development
▫ Virtual goods and asset trading
▫ Virtual gaming and entertainment
▫ Virtual advertising and marketing
▫ Virtual events and conferences
▫ Virtual education and training
▫ Virtual healthcare and telemedicine
▫ Virtual finance and banking
▫ Integrating virtual goods and services with the real-world economy
▫ Other:

Appendix*

15. What specific challenges do you anticipate your business may face in adapting to the influence of the metaverse? (Select all that apply)
▫ Technical infrastructure and integration requirements
▫ Data privacy and security concerns
▫ Skills and expertise gaps in metaverse technologies
▫ Regulatory and legal complexities
▫ User adoption and behavior change
▫ Competitive pressures from other companies
▫ Identifying viable business models and monetization strategies
▫ Addressing the ethical considerations within the metaverse
▫ Navigating the complexities of interoperability between different platforms, technologies and metaverse ecosystem
▫ Other:
16. What actions has your business taken or will take to address these challenges, if any? (Select all that apply)
▫ Investing in technological infrastructure and integration solutions
▫ Implementing robust measures to ensuring data privacy, data security and ownership protection in the metaverse marketplace
▫ Training and upskilling employees in metaverse technologies
▫ Seeking legal and regulatory guidance for metaverse operations
▫ Conducting user research and implementing strategies for user adoption
▫ Monitoring and responding to competitive pressures in the metaverse
▫ Exploring diverse business models and monetization strategies
▫ Engage in industry collaborations to establish shared protocols and standards
▫ Develop and communicate clear ethical guidelines to users
▫ Investing in future technologies related to the metaverse
▫ No action
▫ Other:
17. What specific concerns or risks do you believe the government should address regarding the metaverse? Please select all that apply.
▫ Data privacy and security risks
▫ Regulatory framework and oversight
▫ Intellectual property rights protection
▫ Ethical considerations in metaverse development and use
▫ Cybersecurity threats and vulnerabilities
▫ Fair competition and antitrust regulations
▫ Accessibility and inclusivity for all users
▫ Other:

Appendix*

18. Do you think there is a need for international collaboration in the regulation of the metaverse?
▫ Yes
▫ No
19. If yes, please specify the areas you believe require collaboration
▫ Technical interoperability and compatibility across metaverse platforms
▫ Data privacy and security standards for cross-border metaverse activities
▫ Intellectual property rights protection and enforcement across jurisdictions
▫ Ethical considerations and guidelines for metaverse development and use
▫ International trade and investment policies related to the metaverse
▫ Harmonizing regulatory frameworks and guidelines for metaverse operations
▫ Not applicable
▫ Other:

Thank you for your participation in this questionnaire. Your responses have provided us with valuable insights and will contribute to our Applied Research Project. We appreciate your time and effort in providing thoughtful answers.

REFERENCES

Adcock Solutions. (2023). The Metaverse: Changing Retail Experiences. Www.adcocksolutions.com. https://www.adcocksolutions.com/post/how-the-metaverse-will-change-retail-experiences

Abutouq, Y., Marsh, M. M., Williams, J., Jasnow, D., & Yusef, S. P. (2022). Non-Fungible Trademark Infringement or Nominative Fair Use Token? Nike -v- StockX Duel Is on Pace To Shape the Future of the Metaverse. JD Supra. https://www.jdsupra.com/legalnews/non-fungible-trademark-infringement-or-1008603/

Adler, D. (2018, February 21). Silk Road: The Dark Side of Cryptocurrency. Fordham.edu. https://news.law.fordham.edu/jcfl/2018/02/21/silk-road-the-dark-side-of-cryptocurrency/

Ball, M. (2022). Metaverse : and how it will revolutionize everything. Liveright Publishing Corp.

Basu, T. (2021, December 16). The metaverse has a groping problem already. MIT Technology Review. https://www.technologyreview.com/2021/12/16/1042516/the-metaverse-has-a-groping-problem/

Boghani, P. (2022). Tencent poised to lead China's charge into the metaverse. SP Global. https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/tencent-poised-to-lead-china-s-charge-into-the-metaverse-69311462#:~:text=Tencent%20is%20expected%20to%20be

Bondre, A. (2022, July 19). All About Trademarks in Metaverse: IP in the Virtual World. Sagacious IP. https://sagaciousresearch.com/blog/all-about-trademarks-in-metaverse-ip-in-the-virtual-world/

Boreham, J. (2022, August 8). 7 of the World's Top Metaverse Companies [2022 List]. The Metaverse Insider. https://metaverseinsider.tech/2022/08/08/7-of-the-worlds-top-metaverse-companies-in-2022/

Bradford, N., & McKenzie, B. (2021). Solving the DABUS problem: Bradford Newman asks what protections need to be put in place now that a machine can create IP. Intellectual Property Magazine. https://tind.wipo.int/record/44157

Brown, S. (2022). What Second Life and Roblox can teach us about the metaverse. MIT Sloan. https://mitsloan.mit.edu/ideas-made-to-matter/what-second-life-and-roblox-can-teach-us-about-metaverse

Buhr, M., Pfeiffer, T., Reiners, D., Cruz-Neira, C., & Jung, B. (2022). Real-Time Aspects of VR Systems. Virtual and Augmented Reality (VR/AR), 245–289. https://doi.org/10.1007/978-3-030-79062-2_7

Camila, B. (2021). Gucci Closes First NFT Sale Via Christie's Auction. Ocean DriveMagazine. https://oceandrive.com/gucci-nft-aria-christies-auction

Canbay, Y., Utku, A., & Canbay, P. (2022, October 1). Privacy Concerns and Measures in Metaverse: A Review. IEEE Xplore. https://doi.org/10.1109/ISCTURKEY56345.2022.9931866

Chen, D., Jiang, T., Li, X., & Zhang, Y. (2022). Luxury and the Metaverse. BCP Business & Management, 34, 533–539. https://doi.org/10.54691/bcpbm.v34i.3061

REFERENCES

Chen, H. (2022). The Sandbox: A New Way To Work And Play With Virtual Reality. Www.eventx.io. https://www.eventx.io/blog/the-sandbox-a-new-way-to-work-and-play-with-virtual-reality

Cheung, J. (2022, September 27). 4 Ways Virtual Stores Can Reduce Costs. Obsess. https://obsessar.com/cut-costs-with-virtual-stores/

Choi , A., & Gierhart, C. (2022a). Intellectual Property Enforcement in the Metaverse, Part 1 | Insights . Holland & Knight. https://www.hklaw.com/en/insights/publications/2022/10/intellectual-property-enforcement-in-the-metaverse-part-1

Choi, A., & Gierhart, C. (2022b). In Part 2, we focus in on the implications for IP enforcement of certain metaverse properties linked to the blockchain. Holland & Knight. https://www.hklaw.com/en/insights/publications/2022/10/intellectual-property-enforcement-in-the-metaverse-part-2

Cotter, E. (2022). Money laundering through video games. Napier. https://www.napier.ai/post/money-laundering-gaming-industry

Counterpoint. (2022, April 19). Global XR (AR & VR Headsets) Market Share: By Quarter. Counterpoint Research. https://www.counterpointresearch.com/global-xr-ar-vr-headsets-market-share/

Crime and Policing in Virtual Worlds. (2014, January 16). F3magazine.unicri.it. https://f3magazine.unicri.it/?p=360

Dargan, J. (2022, June 28). 7 Biggest Companies Investing In The Metaverse [2023]. The Metaverse Insider. https://metaverseinsider.tech/2022/06/28/companies-investing-in-metaverse/

Deloitte Canada. (2022). Welcome to the metaverse. Deloitte Canada. https://www2.deloitte.com/ca/en/pages/technology-media-and-telecommunications/articles/welcome-to-the-metaverse-deloitte.html

Deloitte China. (2022). Metaverse report—Future is here: Global XR industry insight | Deloitte China | TMT Industry. Deloitte China. https://www2.deloitte.com/cn/en/pages/technology-media-and-telecommunications/articles/metaverse-whitepaper.html

Di Pietro, R., & Cresci, S. (2021). Metaverse: Security and Privacy Issues. 2021 Third IEEE International Conference on Trust, Privacy and Security in Intelligent Systems and Applications (TPS-ISA). https://doi.org/10.1109/tpsisa52974.2021.00032

Diaz, A. (2022, May 27). Disturbing reports of sexual assaults in the metaverse: “It’s a free show.” New York Post. https://nypost.com/2022/05/27/women-are-being-sexually-assaulted-in-the-metaverse/

Drapkin, A. (2022, October 25). Metaverse Companies: Who’s Involved and Who’s Investing in 2022. Tech.co. https://tech.co/news/metaverse-companies-whos-involved-whos-investing

Dreyer, S. R. (2022, June 15). The metaverse: Data protection in a new virtual world | SRD. Schürmann Rosenthal Dreyer Lawyers. https://www.srd-rechtsanwaelte.de/en/blog/metaverse-data-protection/

REFERENCES

DUBAI. (2022, November 9). Why metaverse real estate is selling for millions. Euronews. https://www.euronews.com/next/2022/11/09/why-metaverse-real-estate-is-selling-for-millions

EACCNY. (2022, October 18). DG COMP | Understanding the metaverse – a competition perspective | European American Chamber of Commerce New York [EACCNY] | Your Partner for Transatlantic Business Resources. European American Chamber of Commerce. https://eaccny.com/news/chapternews/dg-comp-understanding-the-metaverse-a-competition-perspective/

Fernandez, C. B., & Hui, P. (2022). Life, the Metaverse and Everything: An Overview of Privacy, Ethics, and Governance in Metaverse. 2022 IEEE 42nd International Conference on Distributed Computing Systems Workshops (ICDCSW). https://doi.org/10.1109/icdcsw56584.2022.00058

Frank, R. (2022, February 1). Metaverse real estate sales top $500 million, and are projected to double this year. CNBC. https://www.cnbc.com/2022/02/01/metaverse-real-estate-sales-top-500-million-metametric-solutions-says.html

Ghlionn, J. M., & Hamilton, B. (2022, January 8). Metaverse clothing, travel, plastic surgery: Experts predict life in 2030. New York Post. https://nypost.com/2022/01/08/experts-predict-living-in-the-metaverse-by-2030/

Hidaka, S. (2021). UPDATED: Court of Appeal - AI generated inventions denied UK Patent in DABUS case. Gowling WLG. https://gowlingwlg.com/en/insights-resources/articles/2021/updated-ai-invention-denied-patent-in-dabus-case/

Hollensen, S., Kotler, P., & Opresnik, M. O. (2022). Metaverse – the new marketing universe. Journal of Business Strategy, 44(3). https://doi.org/10.1108/jbs-01-2022-0014

Howard, D., Mehdi, N., & Mykhnenko, V. (2023). Protiviti-Oxford survey: Global leaders place bets on the metaverse, North America goes all in. Vision by Protiviti. https://vision.protiviti.com/insight/protiviti-oxford-survey-global-leaders-place-bets-metaverse-north-america-goes-all#:~:text=Protiviti%2DOxford%20survey%3A%20Global%20leaders%20place%20bets%20on%20the%20metaverse

Hsiao, A. (2022, August 26). Metaverse Trademark Filings in China: Protecting Brands While the Law Catches Up. IPWatchdog.com | Patents & Intellectual Property Law. https://ipwatchdog.com/2022/08/26/metaverse-trademark-filings-china-protecting-brands-law-catches/id=151075/

Hunt, B. L.-M. (2022, October 13). Competition/antitrust in the metaverse. Lexology. https://www.lexology.com/library/detail.aspx?g=1fef6574-9ba4-4f3e-8682-ce78154524c2

Hutson, J., Banerjee, G., Kshetri, N., Odenwald, K., & Ratican, J. (2023). Architecting the Metaverse: Blockchain and the Financial and Legal Regulatory Challenges of Virtual Real Estate. Journal of Intelligent Learning Systems and Applications, 15(01), 1–23. https://doi.org/10.4236/jilsa.2023.151001

Huynh-The, T., Pham, Q.-V., Pham, X.-Q., Nguyen, T. T., Han, Z., & Kim, D.-S. (2023). Artificial intelligence for the metaverse: A survey. Engineering Applications of Artificial Intelligence, 117, 105581. https://doi.org/10.1016/j.engappai.2022.105581

REFERENCES

Ireland, I., & Lohr, J. (2020, September 9). “DABUS”: the AI topic that patent lawyers should be monitoring. MIP. https://www.managingip.com/article/2a5cxcoydfoc5lghlhrsw/dabus-the-ai-topic-that-patent-lawyers-should-be-monitoring

Irwin, K. (2022, August 31). What Is Virtual Land? How NFTs Are Shaping the Metaverse. Decrypt. https://decrypt.co/resources/what-is-virtual-land-how-nfts-are-shaping-the-metaverse

Jain, C. (2022). Virtual Fitting Rooms: A Review of Underlying Artificial Intelligence Technologies, Current Developments, and the Biometric Privacy Laws in the US, EU and India. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4120946

Jung, T., Claudia, & Maria, S. (2023). Extended Reality and Metaverse. Springer Nature.

Jungherr, A., & Schlarb, D. B. (2022). The Extended Reach of Game Engine Companies: How Companies Like Epic Games and Unity Technologies Provide Platforms for Extended Reality Applications and the Metaverse. Social Media + Society, 8(2), 205630512211076. https://doi.org/10.1177/20563051221107641

Kalpokas, I., & Kalpokienė, J. (2023). Regulating the Metaverse. Taylor & Francis.

Karapatakis, A. (2019). Virtual worlds and money laundering under EU law: The inadequacy of the existing legal framework and the challenges of regulation. New Journal of European Criminal Law, 10(2), 128–150. https://doi.org/10.1177/2032284419841711

Khang, A., Shah, V., & Rani, S. (2023). Handbook of Research on AI-Based Technologies and Applications in the Era of the Metaverse.

Kharpal, A. (2021, August 30). TikTok owner ByteDance takes first step into virtual reality with latest acquisition. CNBC. https://www.cnbc.com/2021/08/30/tiktok-owner-bytedance-acquires-pico-and-takes-first-step-into-virtual-reality.html

Kim, D. (2022). The Paradox of the “DABUS” Judgment of the German Federal Patent Court. GRUR International, 71(12), 1162–1166. https://doi.org/10.1093/grurint/ikac125

Knibbeler, D., Mohrmann , M., & Zadeh, S. (2022, August 3). EU: Privacy and security concerns in the metaverse. DataGuidance. https://www.dataguidance.com/opinion/eu-privacy-and-security-concerns-metaverse

Koo, J., Lee, C., Park, J., Park, S., Lee, G., Lee, H., & Yoon, M. (2021). Understanding of theMetaverse Industry and Policy Challenges. Korean Development Institute.

Lee, D. I. (2022). A Study on the Countermeasures of Avatar Sex Crime. Forum of Public Safety and Culture, 19, 155–170. https://doi.org/10.52902/kjsc.2022.19.155

Leswing, K. (2023, June 9). Apple Vision Pro: Impressive specs, new way of interacting could help it break the VR curse. CNBC. https://www.cnbc.com/2023/06/09/apple-vision-pro-vr-can-succeed-where-other-vr-headsets-have-failed.html

Levan, N. (2022). If the Metaverse is Built, Will Copyright Challenges Come?, 21 UIC Rev. Intell. Prop. L. 215 (2022). John Marshal Review of Intellectual Property Law. https://tind.wipo.int/record/46880

REFERENCES

Li, J. (2021, May 27). Gucci Launches First NFT, a Film Inspired by Recent Aria Collection. HYPEBEAST. https://hypebeast.com/2021/5/gucci-nft-debut-film-aria-collection-inspired-announcement

Ma, W., & Huang, K. (2022). Blockchain and Web3. John Wiley & Sons.
Maersk. (2022). 3 ways the metaverse will transform your supply chain. Maersk. https://www.maersk.com/insights/digitalisation/how-the-metaverse-will-transform-supply-chain-management

Maharishi, E. J. Z. T. (2022, May 26). Cybercriminals target metaverse investors with phishing scams. CNBC. https://www.cnbc.com/2022/05/26/cybercriminals-target-metaverse-investors-with-phishing-scams.html

Mariotti, T. (2022, August 5). Metaverse Real Estate Statistics (2023). RubyHome. https://www.rubyhome.com/blog/metaverse-real-estate-stats/#:~:text=Sources%3A%20TheSun%2C%20SwitchHere-

Marr, B. (2022). The World Of Metaverse Entertainment: Concerts, Theme Parks, And Movies. Forbes. https://www.forbes.com/sites/bernardmarr/2022/07/27/the-world-of-metaverse-entertainment-concerts-theme-parks-and-movies/?sh=115587856531

McDermott, E. (2021, August 2). DABUS Scores Again with Win on AI Inventorship Question in Australia Court. IPWatchdog.com | Patents & Intellectual Property Law. https://ipwatchdog.com/2021/08/02/dabus-scores-win-ai-inventorship-question-australia-court/id=136304/

McDonald, J. (2021). Roblox's metaverse is already here, and it's wildly popular. Emerging Tech Brew. https://www.emergingtechbrew.com/stories/2021/12/10/roblox-s-metaverse-is-already-here-and-it-s-wildly-popular

McKinsey. (2022). Value creation in the metaverse | McKinsey. Mckinsey & Company. https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/value-creation-in-the-metaverse

McKinsey & Company. (2023). The metaverse and proto-metaverse in automotive | McKinsey. Www.mckinsey.com. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-metaverse-driving-value-in-the-mobility-sector

Megale, L. (2022). (Meta)verse as the nextescaper from competition public enforcement. Market and CompetitionLaw Review, 6(2), 15-50, https://doi.org/10.34632/MCLAWREVIEW.2022.11715.

Microsoft News Center. (2022, January 18). Microsoft to acquire Activision Blizzard to bring the joy and community of gaming to everyone, across every device. Microsoft. https://news.microsoft.com/2022/01/18/microsoft-to-acquire-activision-blizzard-to-bring-the-joy-and-community-of-gaming-to-everyone-across-every-device/

MRICS , N. M., & Plebani, T. (2022, July 12). Metaverse Real Estate Industry: New World, New Rules. Wüest Partner. https://www.wuestpartner.com/ch-en/2022/07/12/metaverse-real-estate/

Odedra, D. (2022). Virtually a Reality: Financial Crime in the Metaverse. RiskScreen. https://riskscreen.com/blog/virtually-a-reality-financial-crime-in-the-metaverse/

REFERENCES

Oremus, W. (2022, February 7). Kids are flocking to Facebook's "metaverse." Experts worry predators will follow. Washington Post. https://www.washingtonpost.com/technology/2022/02/07/facebook-metaverse-horizon-worlds-kids-safety/

Parcel team. (2023). 2022 Annual Metaverse Virtual Real Estate Report. Parcel Learn. https://parcel.so/learn/2022-annual-metaverse-virtual-real-estate-report

Park, K. (2022). Trademarks in the Metaverse. WIPO. https://www.wipo.int/wipo_magazine/en/2022/01/article_0006.html

Phasel, J. (2023, April 1). Metaverse Users Worldwide - Metaverse Statistics to Prepare for the Future. Metaverse of Things. https://metaverseofthing.com/metaverse/metaverse-users-worldwide/

Phelan, R. N. (2022, September 28). Patenting Virtual Reality (VR) Inventions in the Age of the Metaverse. PatentNext. https://www.patentnext.com/2022/09/patenting-virtual-reality-vr-inventions-in-the-age-of-the-metaverse/

Pritchard, C. (2022). Top 10 Companies Investing In The Metaverse. Parcl. https://www.parcl.co/blog/top-10-companies-investing-in-the-metaverse

Qin, H. X., Wang, Y., & Hui, P. (2022). Identity, Crimes, and Law Enforcement in the Metaverse. https://doi.org/10.48550/arxiv.2210.06134

Radoff, J. (2021, June 3). The Metaverse Value-Chain. Building the Metaverse. https://medium.com/building-the-metaverse/the-metaverse-value-chain-afcf9e09e3a7

Ramos, A. (2022). The metaverse, NFTs and IP rights: to regulate or not to regulate? WIPO. https://www.wipo.int/wipo_magazine/en/2022/02/article_0002.html

Saarinen, J. (2019). Virtual world Second Life to enforce anti-money laundering regs. ITnews. https://www.itnews.com.au/news/virtual-world-second-life-to-enforce-anti-money-laundering-regs-527558

Samaniego, W. (2023, February 16). Top Metaverse business applications in 2023. VRdirect. https://www.vrdirect.com/blog/vr-news/top-metaverse-business-applications-in-2023/

Scaff, R. (2022). The metaverse will transform future supply chains . Accenture. https://www.accenture.com/us-en/blogs/business-functions-blog/metaverse-supply-chain-networks

Schonbaum, R. (2022). Decentraland NFT (LAND) Market Efficiency & Responsiveness to Events. https://dx.doi.org/10.7302/4830

Schultz, A. D. K., Daniel A. (2022, March 16). IP in the Metaverse: An Overview for Retailers in a New Landscape. Hunton Retail Law Resource. https://www.huntonretailindustryblog.com/2022/03/articles/ip/ip-in-the-metaverse-an-overview-for-retailers-in-a-new-landscape/

Singh, M. (2022). Standard-Setting Organisations' IPR Policies. Springer Nature Singapore. https://doi.org/10.1007/978-981-19-2623-5

REFERENCES

Singh, P., & Rajput, D. K. (2021). Metaverse: Surging Need for Competent Laws with Increasing Metaverse Crimes. International Journal of Law Management and Humanities, 5(5), 712–724. https://doij.org/10.10000/IJLMH.113621

Smith, A. (2022, May 30). Woman claims she was virtually “raped” in the metaverse. The Independent. https://www.independent.co.uk/tech/rape-metaverse-woman-oculus-facebook-b2090491.html

Soon, L. (2023). Value creation in the metaverse: something that must be built on Trust. LinkedIn. https://www.linkedin.com/pulse/value-creation-metaverse-something-must-built-trust-luke-soon/

Statista. (2021). Global digital advertising market 2024. Statista. https://www.statista.com/statistics/237974/online-advertising-spending-worldwide/#:~:text=Digital%20advertising%20spending%20worldwide%20%E2%80%93%20which

Steve, P. (2022). Embracing digital twin technology for engineering assets [White Paper]. AVEVA.

Stoll, J. (2014). U.S. media usage - time spent watching television 2021 | Statista. Statista; Statista. https://www.statista.com/statistics/186833/average-television-use-per-person-in-the-us-since-2002/

The Glimpse Group. (2022). The Metaverse Needs Communal Gardens, Not Walled Gardens. LinkedIn. https://www.linkedin.com/pulse/metaverse-needs-communal-gardens-walled-the-glimpse-group/

U.S. Attorney's Office, Southern District of New York. (2022, November 7). U.S. Attorney Announces Historic $3.36 Billion Cryptocurrency Seizure And Conviction In Connection With Silk Road Dark Web Fraud. U.S. Attorney’s Office, Southern District of New York. https://www.justice.gov/usao-sdny/pr/us-attorney-announces-historic-336-billion-cryptocurrency-seizure-and-conviction

Vidra, E. (2022, August 2). The top 10 companies investing billions in the Metaverse. VC Cafe. https://www.vccafe.com/2022/08/02/the-top-10-companies-investing-billions-in-the-metaverse/

Villa, A. (2021, June 2). Gucci Sells NFT Inspired by Latest Collection at Christie’s. ARTnews.com. https://www.artnews.com/art-news/market/gucci-nft-auction-christies-1234594632/

Wallace, R. M., & Zeloof, M. (2022). Unity Announces Merger Agreement with ironSource. Utility. https://investors.unity.com/news/news-details/2022/Unity-Announces-Merger-Agreement-with-ironSource/default.aspx

World Economic Forum. (2023). Demystifying the Consumer Metaverse. World Economic Forum. https://www.weforum.org/reports/demystifying-the-consumer-metaverse/?DAG=3&gclid=CjwKCAjwhdWkBhBZEiwA1ibLmG6xFaJK9uiDUeLBX6RxWhPuo3nK3jOFnfJUa7wbz1Qe4yDilla93RoCuWkQAvD_BwE

Wu, J., Lin, K., Lin, D., Zheng, Z., Huang, H., & Zheng, Z. (2022). Financial Crimes in Web3-empowered Metaverse: Taxonomy, Countermeasures, and Opportunities. https://doi.org/10.48550/arxiv.2212.13452

Yu, F. R., & Yu, A. W. (2023). A Brief History of Intelligence. Springer International Publishing. https://doi.org/10.1007/978-3-031-15951-0

Thank you!

Thank you for taking the time to read this report. If you have any questions or would like to discuss our findings further, please don't hesitate to reach out to us.

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