


## Dispute Resolutions for Digital Assets in a Decentralized Virtual World

### *La risoluzione delle controversie per i beni digitali in un mondo virtuale decentralizzato*

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#### Abstract

Digital assets and the Metaverse have transformed our interactions and business practices. This dynamic environment, comprising virtual worlds and online communities, facilitates the creation, sharing, and consumption of digital information. As the Metaverse grows, disputes over digital assets pose challenges for traditional dispute resolution. Thus, this study explores the need for effective dispute resolution, focusing on digital assets, decentralization, digital evidence, and proposing a structure for decentralized resolution.

*Gli asset digitali e il Metaverso hanno trasformato le nostre interazioni e le pratiche commerciali. Con la crescita di questo ambiente dinamico, composto da mondi virtuali e comunità online, le controversie sugli asset digitali pongono sfide per la risoluzione tradizionale delle dispute. Pertanto, questo studio esplora la necessità di una risoluzione efficace delle controversie, concentrandosi sugli asset digitali, la decentralizzazione, le prove digitali e proponendo una struttura per la risoluzione decentralizzata.*



**Keywords:** Digital assets, Metaverse, Blockchain technology, Decentralization, Dispute resolution.

**Summary:** [1. The Role of Digital Assets within virtual realms.](#) - [2. Understanding Digital Assets in virtual realms.](#) - [3. Legal Frameworks for Digital Assets in the Metaverse.](#) - [3.1 Challenges in Resolving Disputes on digital assets in virtual realms.](#) - [3.2 LegalTech Challenges in the Metaverse.](#) - [4. The future of digital assets in the Metaverse.](#) – [4.1. Key Findings.](#) – [4.1. Future Research Directions.](#)

## 1. The Role of Digital Assets within virtual realms.

Computer science innovations significantly impact daily life by improving and transforming social interactions, communication, and human contact. Three significant waves of technical progress have been identified from the perspective of end users, and they are based on the arrival of desktop computers, the Internet, and mobile devices, in that order. Immersive technologies like augmented reality (AR) and virtual reality (VR) are at the centre of the fourth wave of computer innovation. This wave is expected to create the next paradigm in ubiquitous computing, potentially revolutionizing remote labour, business, education, and entertainment - especially for online learners. This new paradigm is called the Metaverse. The closed compound word metaverse comprises the Greek prefix meta, which means beyond, or after, and universe. Stated in various ways, the Metaverse is an everlasting, multiuser post-reality setting that blends virtual and physical reality. The fundamental flaws of web-based 2D e-learning tools can be addressed by metaverse in the context of distance learning through the internet.

Metaverse is a multiuser and post-reality environment that combines both physical reality and digital virtuality and is based on the convergence of Augmented and Virtual Reality that allows multimodal interaction with digital data, individuals and virtual environment. As a result, Metaverse refers to a multiuser platform connected to another network of social engagement settings to facilitate dynamic interaction with smooth embodied user communication and digital objects in real-time. It comprises an immersive and social VR system that engages and works with open game worlds, AR spaces and parallel computing networks.<sup>1</sup> There is fierce competition to develop the standards, protocols and infrastructure for the Metaverse. Big companies are putting a lot of effort into developing their closed, proprietary hardware and software ecosystems in an effort to entice customers and position themselves as the de facto Metaverse destination.

The scientific community has recently given the metaverse a great deal of attention, and much research was previously done on this technology's principles, architecture, and uses. Since this technology is still in its infancy, we must manage any potential issues that may arise from the qualities of the metaverse, such as virtual worlds, scaling, perseverance, synchronization, financial flexibility, decentralization, privacy, and interoperability.

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<sup>1</sup> Y Aouidef, F Ast, B Deffains, 'Decentralized justice: A comparative analysis of blockchain online dispute resolution projects' (2021) 4 *Frontiers in Blockchain*, 3.

Neal Stephenson coined the term 'metaverse' 1992 while writing 'Snow Crash', a science fiction novel. According to Stephenson,<sup>2</sup> the prefix 'meta' denotes 'far off', and the suffix 'verse' denotes 'universe'. The founder of Facebook, Mark Zuckerberg, later validated this by declaring in October 2021 that his digital platform would now be referred to as 'meta'. The term 'metaverse' refers, in general, to a fifth-generation of technology and everything that exists outside of the Internet, where individuals can utilize software and avatars to portray themselves as members in an interactive three-dimensional world<sup>3</sup>. However, because many scholars have defined the phrase differently, there isn't a single, widely acknowledged definition. Some academics describe it as an immersive three-dimensional collaborative setting where users can engage in cultural, social, and economic activities while communicating via avatar<sup>4</sup>. The main objective asserts that the Metaverse is seen as a thriving component of the next-generation internet, having emerged with the emergence of the web and mobile internet.<sup>5</sup>

Several significant IT giants have declared participation in the Metaverse, including Microsoft, Facebook, Tencent, NVIDIA, Unity, and Bytedance. Facebook has gone even so far as to adopt the moniker "meta" for itself. Microsoft purchased Activision Blizzard for an astounding \$68.7 billion to increase its presence in the Metaverse gaming industry. This represents a significant investment in the Metaverse for the firm. These technology industry titans are keen to lead this new and exciting frontier because they believe the Metaverse can completely transform the digital world m.<sup>6</sup> Metaverse Seoul is building a virtual ecosystem to facilitate communication amongst several municipal administrative domains, such as culture, tourism, commerce, education, and public service. These developments offer a glimpse into the expanding Metaverse universe that draws the attention of various social network platforms, online gaming giants, financial and business companies, and more. It can also expand to other aspects of human life, such as healthcare, education, simulation, and transportation.<sup>7</sup>

Thus, the main objective of this article is to examine and emphasize the critical need for effective dispute resolution processes in the rapidly expanding Metaverse, with a specific focus on challenges related to digital assets. The article aims to address the unique complexities arising from the advent of digital assets, including virtual products, currencies, NFTs, and cryptocurrencies, within the immersive and decentralized environment of the Metaverse. It seeks to explore the impact of decentralization and blockchain

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<sup>2</sup>JG Allen, 'Wrapped and stacked: smart contracts' and the interaction of natural and formal language', (2018) 14(4) *European Review of Contract Law*, 307-343.

<sup>3</sup>J Allen, P Hunn. (Eds.), *Smart Legal Contracts: Computable Law in Theory and Practice* (Oxford University Press 2022).

<sup>4</sup>E Androulaki, A Barger, V Bortnikov, C Cachin, K Christidis, A De Caro, J Yellick, 'Hyperledger fabric: a distributed operating system for permissioned blockchains, (2018, April) In Proceedings of the thirteenth EuroSys conference, pp. 1-15)

<sup>5</sup>P Bacaksiz, 'Criminal Law against Metaverse and Virtual Reality Environments', (2023) 14 *Inonu UL Rev.*, 289.

<sup>6</sup>R Belk, M Humayun, M Brouard, 'Money, possessions, and ownership in the Metaverse: NFTs, cryptocurrencies, Web3 and Wild Markets', (2022) 153 *Journal of Business Research*, 198-205.

<sup>7</sup>G Benton, 'Cost Is the Top Tech Litigation Problem, Survey Shows', (2017) 2 *Silicon Valley Arbitration, Mediation Center*, available at <https://svamc.org/wp-content/uploads/SVAMC-2017-Survey-Report.pdf>

technology on conflict resolution, analyze the intricate nature of digital assets, and propose a structured approach for decentralized dispute resolution.

Digital assets are distributed ledger or blockchain-based assets that may be issued and transferred. Several names, such as cryptocurrency, digital tokens, and crypto assets, refer to them. Digital assets include commodities, real estate, securities, and money. One of the main issues with the Metaverse is how personal information is handled. The requirement to protect user information is reflected in the laws that apply to the Metaverse, such as the EU's General Data Protection Regulation (GDPR).<sup>8</sup> The Metaverse's immersive quality makes it possible to gather previously unheard-of volumes of data, such as biometric psychography, which discloses users' mental, emotional, and physical conditions. In decentralized Metaverse systems, disagreements may emerge about data protection principles, the appropriate use of such data, and who is ultimately responsible.

Identity theft must be avoided by making sure people in the Metaverse are who they say they are: existing criminal laws will probably be referenced in legal responses to identity theft in the Metaverse. Still, there are also practical issues to be resolved, such as tracking down offenders across countries. Resolving disputes in the Metaverse entails manoeuvring through intricate matters about jurisdiction, choice of law, and the characteristics of non-formal dispute resolution procedures. Although an intra-metaverse conflict resolution mechanism might develop, it is challenging to implement such decisions in the actual world. A possible answer is arbitration, as a hybrid method of resolving conflicts while maintaining anonymity.

## 2. Understanding Digital Assets in virtual realms

For decades, people have debated and conjectured about the idea of a Metaverse: a shared virtual world where people can communicate with one another in a computer-generated setting. But it wasn't until recently that technological advances have enabled the development of a Metaverse a plausible prospect.<sup>9</sup>

The concept of a virtual world was first proposed by scientists and futurists in the 1960s when they imagined a society where people might interact in a computer-generated environment. Ivan Sutherland, a computer scientist, invented the Sword of Damocles, the first head-mounted display (HMD), in the late 1960s. He named it "the ultimate display," allowing individuals to surround themselves with a virtual world.<sup>10</sup>

As virtual reality developed in the 1980s and 1990s, the idea of a Metaverse gathered increasing traction. Science fiction author Neal Stephenson defined a Metaverse as an online setting created by computers where individuals might

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<sup>8</sup> P Bhattacharya, MS Obaidat, D Savaliya, S Sanghavi, S Tanwar, B Sadaun, 'Metaverse assisted telesurgery in healthcare 5.0: An interplay of blockchain and explainable AI', (2022, July), In *2022 IEEE International Conference on Computer, Information and Telecommunication Systems (CITS)*, pp. 1-5.

<sup>9</sup> LH Lee, and Others, 'All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda', (2021), *arXiv preprint arXiv:2110.05352*.

<sup>10</sup> D Buhalis, MS Lin, D Leung, 'Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing', (2022) 35(2) *International Journal of Contemporary Hospitality Management*, 701-716.

interact with one another in his 1986 book "Snow Crash." Many in the computing sector were drawn to the book, which became a cult classic.<sup>11</sup>

In the early 2000s, virtual worlds like World of Warcraft and Second Life were released, allowing users to create and interact with one another in an online environment. These virtual worlds were the first genuine attempts to establish a Metaverse. Still, they could not provide users with the desired level of immersion and involvement at the time due to technology limitations.<sup>12</sup>

Virtual Reality (VR) is a technique that uses hardware and software to create a digitally created perspective of the natural world to replace the user's perspective. The most popular virtual reality applications on the market today leverage all of the user's senses to produce a fully immersive experience that immerses the viewer in an incredibly realistic virtual environment. Augmented Reality (AR) is a technology that combines the virtual and physical worlds. Recognizing surfaces and things in the real world makes use of a range of technologies, including recognition of facial features, movement tracking, identifying objects, and plane detection. Augmented reality can potentially replace the present-day ecosystem of phones and other gadgets as our primary means of interacting with digital assets and as our primary portal to the metaverse.

Milgram and Kishino<sup>13</sup> defined Mixed Reality as a hybrid of augmented and virtual reality that exists in one of these contexts. Uses of mixed reality can improve the metaverse in the robotics, entertainment, military, and healthcare sectors. Van Niekerk<sup>14</sup> (2006) defines a digital asset precisely as "any item of text or medium that has been translated into a binary source which includes the right to use it". According to this perspective, the idea of a digital asset evolved due to implementing the digital citizenship concept rather than the effect of the Internet itself:<sup>15</sup> the strength of digital assets drives ongoing development in the metaverse's economic framework.

Given its magnitude and continual expansion, calling the metaverse the next great thing in the digital space wouldn't be an enormous exaggeration. and the projected counterpart to the online world.<sup>16</sup> Significant IT giants like Microsoft, Facebook, Tencent, NVIDIA, Unity, and Bytedance have declared their presence in the metaverse. Facebook has even gone so far as to call itself "meta." Microsoft acquired Activision Blizzard for an astounding \$68.7 billion to bolster its standing in the metaverse game business. This represents a significant metaverse investment for the corporation. These titans of industry from the technology sector are eager to steer this exciting new future because they

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<sup>11</sup>V Buterin, 'A next-generation smart contract and decentralized application platform', (2014) 3(37) 3(37) white paper, 2.

<sup>12</sup> E Chan, E Hay, Something Borrowed, Something Blue: 'The Best of Both Worlds in Metaverse-Related Disputes', (2022) 15 Contemp. Asia Arb. J., 205.

<sup>13</sup> K Cornelius, 'Responsibility under criminal law in virtual worlds', in *Virtual worlds and criminality* (Heidelberg: Springer Berlin Heidelberg, 2011), pp. 95-119.

<sup>14</sup> H Duan, J Li, S Fan, Z Lin, X Wu, W Cai, 'Metaverse for social good: A university campus prototype', (2021, October), In Proceedings of the 29th ACM international conference on multimedia, pp. 153-161.

<sup>15</sup> YK Dwivedi, L Hughes, AM Baabdullah, S Ribeiro-Navarrete, M Giannakis, MM Al-Debei, SF Wamba, 'Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy'(2022) 66 International Journal of Information Management, 102542.

<sup>16</sup> G Freeman, D Maloney, 'Body, avatar, and me: The presentation and perception of self in social virtual reality', (2021) 4(CSCW3) Proceedings of the ACM on human-computer interaction, pp. 1-27.

think the metaverse has the potential to transform the digital media landscape altogether.<sup>17</sup> These developments offer a glimpse into the expanding metaverse environment grabbing the attention of big online gaming corporations, social media networks, financial and commercial organizations, and more. In addition, it can be applied to various areas of human life, such as transportation, simulation, healthcare, and education.<sup>18</sup>

The world is increasingly transitioning into a digital economy with the advancement of digital technology. The digital economy is the primary economic form following the industrial and agricultural economies. According to Li and Jia,<sup>19</sup> this new economy combines efficiency and fairness. Its main components are data resources, modern information networks that serve as the primary carrier, technology for communication and information integration and application, and digital transformation factors that are significant driving forces. The digital economy is driving significant changes in manufacturing, lifestyle, and democracy. It is significantly impacted by reducing resources, reorganizing the world economy, and reshaping the global competitive environment.

Any digital content produced by metaverse users, including images, music, videos, and so on, is referred to as user-generated content (UGC). According to Lee et al.,<sup>20</sup> the generated material has potential commercial value and contains personal private data. UGC is a good stand-in technique to assess user demand. Common user-generated content, produced by users for users, serves as its central pillar. Anyone can upload content to the website. The content has either automatic or manual approval before being viewed by the public on the platform. Similar to the idea behind We Media, users can create a wide variety of personalized digital media, including blogs, podcasts, audio recordings, videos, and news.

There is a rising requirement for UGC property because UGC in the realm of the metaverse is typically diverse.<sup>21</sup> However, because artistic ability is not required, the standard of user-generated content varies. With so much informal and repetitive digital content, many UGCs cannot be effectively captured by the current approaches. Timoshenko et al.<sup>22</sup> use a deep learning-based method to weed out irrelevant material so they don't sample the same things twice. Even though several scholars have focused on essential study issues for user-generated content (UGC) in the metaverse, there are still specific challenges, including ownership control, payment framework, and incentive system.

Professional Generated Content (PGC) indicates that the content was produced by field experts or institutions with specialized training in content

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<sup>17</sup> JM aron, 'Legal implications of a ubiquitous Metaverse and a Web3 future', (2022), *Marq. L. Rev.*, p.p. 106-163.

<sup>18</sup> A Gatt, E Krahmer, 'Survey of the state of the art in natural language generation: Core tasks, applications and evaluation', (2018) 61 *Journal of Artificial Intelligence Research*, pp. 65-170.

<sup>19</sup> M Georgantidou, 'Arbitration of Disputes involving Smart Contracts and Blockchain Technology', [2023].

<sup>20</sup> D Grider, M Maximo, 'The Metaverse: Web 3.0 virtual cloud economies', (2021), *Grayscale Research*, 1, 18.

<sup>21</sup> M Gupta, D Gupta, 'Investigating Role of Blockchain in Making your Greetings Valuable' (2023) 10(4) *Universal Research Reports*, 69-74.

<sup>22</sup> BE Howell, PH Potgieter, 'Uncertainty and dispute resolution for blockchain and smart contract institutions', (2021) 17(4) *Journal of Institutional Economics*, 545-559.



development. The competency of the content can be ensured in this way. PGC is, therefore, usually validated by the platform. It typically pays more attention to copyrights and contains original content. PGC can attest to the importance and effectiveness of the content. For instance, PGC video services offer capabilities related to specialisation and revenue in an environment that is easy to utilize for advertisements.<sup>23</sup>

One popular kind of blockchain-based digital asset is non-fungible tokens (NFTs), digital tokens that are linked to specific digital or physical assets and are recorded on a blockchain. NFTs are used in the Metaverse to conduct transactions with digital assets like virtual land, artwork in a virtual museum, and shoes that avatars might wear. Legal systems worldwide are investigating the legal standing and property rights granted by different digital assets.<sup>24</sup> By archiving past encrypted transactions on the linked blockchain indefinitely, NFTs ensure the distinctive qualities of digital assets.<sup>25</sup> NFT provides a futuristic option for art trade as a blockchain-based digital token as evidence of ownership and authenticity for crypto assets. For example, Niemeyer and Gerber<sup>26</sup> have developed a sophisticated economic framework that allows users to amass virtual currency in Axie Infinity, an NFT-driven Ethereum game. To provide uniqueness and authentication, NFT may tokenize various digital assets, including music, film, art, collectables, and in-game objects.<sup>27</sup> When defining legitimate rights for metaverse games, NFT is a significant factor. NFTs are distinguished by their cultural solid and interactive traits. When a user purchases an NFT, they will become the only owners of that asset. This purchasing activity has a lot of social significance because it enables users to display their unique preferences, purchasing prowess, and even social standing in the online community. Therefore, to recognize the ownership and worth of the NFT based on the technological blockchain, a certain number of participants must agree and engage in rich social activity. Using digital collections to materialize digital assets into tradeable entities is the primary goal of NFT.

### 3. Legal Frameworks for Digital Assets in the Metaverse.

#### 3.1 Challenges in Resolving Disputes on digital assets in virtual realms.

Digital assets include many items, such as self-executing smart contracts, tokenized stocks, NFTs, cryptocurrencies like Ethereum and Bitcoin, and digital tokens representing ownership rights. Several factors make these assets challenging, chief among them being the technological intricacy of blockchain,

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<sup>23</sup> T Huynh-The, QV Pham, XQ Pham, TT Nguyen, Z Han, DS Kim. 'Artificial intelligence for the Metaverse: A survey', (2023) *Engineering Applications of Artificial Intelligence*, 117, 105581.

<sup>24</sup> HJ Jeon, HC Youn, SM Ko, TH Kim, 'Blockchain and AI Meet in the Metaverse' (2022) *Advances in the Convergence of Blockchain and Artificial Intelligence*, 73 (10.5772).

<sup>25</sup> A Joy, Y Zhu, C Peña, M Brouard, 'Digital future of luxury brands: Metaverse, digital fashion, and non-fungible tokens' (2022) 31(3) *Strategic change*, 337-343.

<sup>26</sup> M Kalyvaki, 'Navigating the Metaverse Business and Legal Challenges: Intellectual Property, Privacy, and Jurisdiction' (2023) 3(1) *Journal of Metaverse*, 87-92.

<sup>27</sup> K Kamenov, 'Immersive experience—The 4th wave in tech: Learning the ropes', (2017), Retrieved from Accenture: <https://www.accenture.com/gb-en/blogs/blogs-immersive-experience-wave-learning-ropes>.

dispersed networks, and cryptography.

Regulatory issues result in additional complexity since legislation varies throughout jurisdictions. Security is crucial since there is a chance of fraud and hacking due to the digital nature of these assets. Interoperability issues arise from protocol differences, and market dynamics are influenced by sentiment, technology advancements, and legal changes. Determining ownership responsibilities and rights in the digital domain is a challenging governance and legal matter. Scalability becomes a problem when acceptability rises; therefore, it's essential to be informed about how things change. A multidisciplinary approach combining finance, technology, legal, and regulatory expertise is required to negotiate this challenging environment successfully.

Thus far, the metaverse hasn't directly caused many commercial problems.<sup>28</sup> Numerous potentials use for VR, MR, AR, and metaverse platforms are either unconsidered or in the theoretical stages of study. However, there are currently a lot of cases of disputes involving technological assets.<sup>29</sup> More disputes of this kind are expected to arise because digital assets will be central to the metaverse. Few business issues have resulted directly from the Metaverse thus far.<sup>30</sup> Many possible applications for VR, MR, AR, and platforms in the Metaverse are still in the theoretical research stage or have not yet been considered. On the other hand, there are already many instances of conflicts concerning technology asset.<sup>31</sup> Given that digital assets will play a significant role in the Metaverse, additional disagreements of this nature are expected to occur.

Although the decentralized structure of various metaverse systems allows users to transact freely with each other, it also increases the risk of user disputes mimicking contracts over any aspect of a transaction or agreement, such as a sale, license, or service. Users themselves will choose the terms under which these transactions are done.<sup>32</sup> Contractual arrangements for the industry and technological know-how necessary to establish and maintain a presence in the metaverse will be made by commercial entities. As new products and services, as well as new partnerships, are established, new disputes will undoubtedly surface.

There is currently little control in the metaverse area, even though state authorities have begun examining the regulatory implications of digital assets.<sup>33</sup> Governments will certainly wish to exercise control over the metaverse by applying existing rules and regulations or passing new ones. This

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<sup>28</sup> O Kanevskaia, 'Regulation (EU) No 1025/2012 of the European Parliament and of the Council, (14th November 2012) [2012] OJ L316/12).

<sup>29</sup> S Kasiyanto, MR Kilinc, 'The legal conundrums of the Metaverse', (2022) 1(2) *Journal of Central Banking Law and Institutions*, 299-322.

<sup>30</sup> C Kerdvibulvech, 'Exploring the impacts of COVID-19 on digital and metaverse games', (2022, June) In *International conference on human-computer interaction*, Cham: Springer International Publishing, pp. 561-565.

<sup>31</sup> SN Khan, F Loukil, C Ghedira-Guegan, E Benkhelifa, A Bani-Hani, 'Blockchain smart contracts: Applications, challenges, and future trends', (2021) 14, *Peer-to-peer Networking and Applications*, 2901-2925.

<sup>32</sup> J Kim, 'The institutionalization of YouTube: From user-generated content to professionally generated content', (2012) 34(1) *Media, culture society*, 53-67.

<sup>33</sup> O Kostenko, V Furashev, D Zhuravlov, O Dniprov, 'Genesis of legal regulation web and the model of the electronic jurisdiction of the metaverse', (2022) 6(2) *Bratislava Law Review*, 21-36.



could include following the law on taxes, banking regulations, competition, money laundering prevention, criminal offences, video games, and rules protecting consumer privacy and data.<sup>34</sup> This regulatory action may give rise to conflicts other than those already stated, including disputes with other regulators. Some metaverse platforms have included taxation disclaimers in their use conditions, implying that they have thought about possible tax-related difficulties.<sup>35</sup>

When negotiating the legal environment of the metaverse, there are several other ethical and legal considerations, such as cybercrime. The metaverse is becoming a target for cybercriminals as it develops. This may involve problems like fraud, hacking, and selling illicit products and services. Furthermore, online worlds can foster discrimination and harassment, and the metaverse's anonymity may make it harder to hold individuals accountable.<sup>36</sup>

In the metaverse, "digital identity" refers to how a person's identity is portrayed in virtual spaces such as social media platforms, online forums, and virtual worlds.<sup>37</sup>

Cybercrimes are also handled internationally through treaties and contracts like the Council of Europe Convention on Cybercrime or the Budapest Convention, ratified by 57 nations, including the US, Canada, Japan, and many European nations.<sup>38</sup>

Several businesses have teams of moderators that watch for infractions in the virtual world and take appropriate action. Additionally, some VR companies employ third-party technologies, including anti-cheat tools, to identify and stop hacking and cheating in virtual environments.

### 3.2 LegalTech Challenges in the Metaverse.

Enforcing intellectual property laws, like trademark and copyright regulations, in the Metaverse could prove difficult due to its decentralized and virtual nature. Additionally, determining ownership and authorization to use virtual assets in the Metaverse may present challenges. In addition to the existing intellectual property regulations, it is crucial to acknowledge that resolving disputes arising from digital assets within the Metaverse requires considerations beyond mere copyright infringement. The intricate nature of this virtual realm introduces a plethora of complex issues, including but not limited to ownership disputes, instances of fraud, and the enforcement of contractual agreements. Consequently, as the Metaverse continues to evolve, it becomes imperative for legal frameworks to adapt and address these

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<sup>34</sup> LH Lee, Z Lin, R Hu, Z Gong, A Kumar, T Li, P Hui, 'When creators meet the Metaverse: A survey on computational arts', (2021), arXiv preprint arXiv:2111.13486.

<sup>35</sup> V Lehdonvirta, 'Real-money trade of virtual assets: ten different user perceptions', (2005), Proceedings of Digital Arts and Culture (DAC 2005), IT University of Copenhagen, Denmark, 52-58.

<sup>36</sup> L Li, H Jia, 'Analysis of Metaverse Development in the Context of Digital Economy', (2023, August), In 2023 2nd International Conference on Artificial Intelligence, Internet and Digital Economy (ICAID 2023) (pp. 481-490). Atlantis Press.

<sup>37</sup> X Li, X Wang, T Kong, J Zheng, M Luo, 'From bitcoin to solana—innovating blockchain towards enterprise applications', (2021, December), In International Conference on Blockchain, Cham: Springer International Publishing (pp. 74-100).

<sup>38</sup> WYB Lim, Z Xiong, D Niyato, X Cao, C Miao, S Sun, Q Yang, 'Realizing the Metaverse with edge intelligence: A match made in heaven' (2022) IEEE Wireless Communications.

multifaceted challenges effectively. By doing so, a robust and comprehensive system can be established to safeguard the rights and interests of all participants engaging with digital assets within this virtual world. Since users may require greater authority over their personal information and how it is gathered, used, and shared, privacy is a significant concern in the Metaverse. Data protection regulations, including the EU General Data Protection Regulation (GDPR), may be broken.<sup>39</sup>

Blockchain technology and smart contracts also lay the foundation of Bitcoin, a digital money with fungible (interchangeable) tokens that will be utilized for transactions in the Metaverse. Blockchain is a term for a decentralized digital ledger that uses cryptography to record assets and transactions in a safe network. This ledger provides quick, shared, and open access to data stored in an unchangeable, unbreakable format only accessible by network users with permission. However, a lot of data, including digital content and movies taken by VR devices, are frequently transferred and stored in data centres without the necessary security and privacy protections, leaving them vulnerable to cyberattacks within the virtual universe known as the Metaverse. In light of these privacy and security issues, blockchain technology, with its unique features, offers a workable solution for data protection in the Metaverse. Several innovative methods for gathering, storing, and dispersing data have been proposed during the past ten years by combining blockchain technology with artificial intelligence in various industries to provide the highest level of data security and privacy. These techniques have shown great promise for use in the Metaverse.<sup>40</sup>

Prospective buyers can now "visit" a house virtually instead of only seeing images or videos, giving them a more significant idea of the property's design, features, and general atmosphere. Luxury real estate developers also utilise the Metaverse to build virtual showrooms to present their assets to a worldwide clientele. This enables them to market their real estate in a more dynamic and captivating manner and to connect with a larger spectrum of prospective purchasers.<sup>41</sup> Furthermore, the development of virtual rights to ownership and the capacity to exchange virtual assets is made possible by applying blockchain and smart contract technology. This creates a new business benchmark and expands the luxury real estate market in the Metaverse.<sup>42</sup>

Different nations have different legal and regulatory frameworks. This diversity encompasses consumer protection legislation, privacy laws, and intellectual property rights. Conflicts may occur when users from different countries are subject to contradictory rules or when disparate legal systems collide in the need for a standard legal structure for the Metaverse. The Metaverse frequently lacks a single governing body, unlike conventional legal systems, where a centralized governing body or government organization

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<sup>39</sup> K Lippert, MNR Khan, MM Rabbi, A Dutta, and R Cloutier, 'A framework of Metaverse for systems engineering', 2021 December, In 2021 IEEE International Conference on Signal Processing, Information, Communication Systems (SPICSCON) (pp. 50-54). IEEE.

<sup>40</sup> A Singh, RM Parizi, Q Zhang, KKR Choo, A Dehghantanha, 'Blockchain smart contracts formalization: Approaches and challenges to address vulnerabilities', (2020), *Computers Security*, 88, 101654.

<sup>41</sup> N Stephenson, 'Snow crash: A novel', (2003), *Spectra*.

<sup>42</sup> G Stobbs, *The Digital Millennium Copyright Act. In Multimedia Security Technologies for Digital Rights Management* (Academic Press, 2006), pp. 457-482.

offers a framework for dispute resolution. Although decentralized platforms and virtual worlds might have proper regulations and governance processes, they need to be compatible with conventional legal frameworks. Although decentralization might support user autonomy, it makes it challenging to enforce uniform regulations.<sup>43</sup>

The meta-universe is neither novel nor lawless; it is not above the laws of the real world. The difficulty lies in comprehending how legislation might operate at several levels to control various facets of an online experience as technology advances (Aydin, 2023). It is crucial to remember that the regulations that govern the actual world and the internet now will largely govern the Metaverse: the meta-universe order is already subject to existing laws covering topics like contracts, data protection, anti-money laundering, defamation, torts, gaming and gambling, intellectual property, taxation, and financial regulations.<sup>44</sup>

Contracts are also necessary to determine intellectual property rights, the validity of terms and conditions, user usage of the software, and any constraints. It is also feasible for legal professionals to mediate contractual disputes online. In the virtual world today, smart contracts are widely used. The practice of activating embedded codes in contract terms with data to enable honest transaction execution without intermediaries and virtually eliminate the possibility of outside intervention is known as smart contracting. "Buying food or drinks from food machines after an individual's instruction in return for a given amount" is the most famous example of a fundamental overview of this notion. Because copyright laws grant authors the exclusive right to reproduce, share, and exhibit their creations, they can protect artists in the metaverse. Examples include avatars, virtual worlds, 3D models, and other digital content produced in the metaverse. The U.S. Copyright Act of 1976 provides a framework for protecting creative works of authorship, including literary, dramatic, musical, and artistic works, including those that might be produced in the metaverse, according to the United States Copyright Office (2020): the law states that when a work is created in a fixed form, its copyright protection is applied and remains in effect for several years following the author's death. The Digital Millennium Copyright Act (DMCA) and the Copyright Act safeguard works secured by copyright in digital contexts. It has provisions for the safe harbour for internet service providers and the notice-and-takedown process for removing unlawful content.<sup>45</sup>

Since collecting and sharing vast amounts of personal data can occur in virtual worlds and online communities, protecting privacy in the metaverse can be difficult. A mix of organizational, legal, and technical protections could be required to preserve privacy. Although rules pertaining to privacy in the metaverse are still being developed, a number of them already in place can

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<sup>43</sup> DP Sheldon, 'Claiming ownership, but getting owned: contractual limitations on asserting property interests in virtual goods' (2006) 54 UCLA L. Rev., p. 751.

<sup>44</sup> P Shrivastava, M Damle, 'Investment decision in cloud gaming-based businesses opportunities: An analysis of the cloud gaming industry,' (2022, March), In 2022 International Conference on Decision Aid Sciences and Applications (DASA), pp. 1224-1228.

<sup>45</sup> P Si, J Zhao, H Han, KY Lam, Y Liu, 'Resource allocation and resolution control in the metaverse with mobile augmented reality,' In GLOBECOM 2022-2022 IEEE Global Communications Conference, pp. 3265-3271.

serve as a foundation for safeguarding privacy in virtual environments. For example, under the General Data Protection Regulation (GDPR) in the EU and the California Consumer Privacy Act (CCPA) in the US, individuals have rights to their data, including the opportunity to view, modify, and erase personal information. Sensitive personal data, including health information, is further protected by the Personal Information Protection and Electronic Documents Act (PIPEDA) in Canada and the Health Insurance Portability and Accountability Act (HIPAA) in the United States. One specific example of legislation protecting privacy in the metaverse is the Children's Online Privacy Protection Act (COPPA) in the United States, which regulates the gathering of personal information from children under the age of thirteen. This law requires that websites and online services geared at minors seek verifiable parental consent before acquiring, using, or disclosing private data from children. Virtual private network (VPN) technology is another way to safeguard privacy in the metaverse. By encrypting data as it is transferred between a user's device and the virtual environment, VPNs can increase the difficulty of third parties intercepting or accessing personal data.<sup>46</sup>

In the Metaverse, NFTs are governed by customary financial laws, including those about securities, banking, and commodities. These assets might be classified as investment contracts depending on how they are made and traded, putting them under the purview of securities law. Banking, money transfer, and other financial regulations will probably be applied to the system as a result of the issue, lending, and trading of cryptocurrencies on the Metaverse.<sup>47</sup> The blockchain has been known for more than ten years as a technology in which every transaction that has ever occurred in a peer-to-peer network is recorded in a distributed database. It is considered a distributed computing model that effectively resolves the problem of centralized party trust. As a result, multiple nodes work together in a blockchain network to maintain a set of shared transaction records securely and independently. Executable scripts running on top of the blockchain are called smart contracts, and they are used to allow, carry out, and maintain agreements between untrustworthy parties without the help of a trustworthy third party<sup>48</sup>. Network automation and the conversion of paper agreements into digital contracts were made possible by smart contracts. Smart contracts, being replicated to every blockchain node to guard against contract manipulation, are opposed to traditional contracts and allow users to automate transactions under the oversight of a central authority, thereby codifying agreements and trust relationships<sup>49</sup>. Human error might be decreased to prevent conflicts about such contracts by allowing the operations to be carried out by computers and the services offered by blockchain platforms: without the help of a central

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<sup>46</sup> H Snee, C Hine, Y Morey, S Roberts, H Watson, 'Digital methods as mainstream methodology: An introduction', (2016) In *Digital methods for social science: An interdisciplinary guide to research innovation*. London, Palgrave Macmillan UK, pp. 1-11.

<sup>47</sup> JH Tan, 'Blockchain "Arbitration" for NFT-Related Disputes,' (2023) 16(1) *Contemporary Asia Arbitration Journal*, pp. 145-186.

<sup>48</sup> Y Zhu, C Peña, A Joy, and M Brouard, 'Digital future of luxury brands: Metaverse, digital fashion, and non-fungible tokens', 2022 31(3) *Strategic change*, pp.337-343.

<sup>49</sup> A Timoshenko, JR Hauser, 'Identifying customer needs from user-generated content,' (2019) 38(1) *Marketing Science*, pp. 1-20.

server or trusted authority, smart contracts' decentralisation, auto-enforcement capability, and verifiability allow their encoded business regulations to be carried out in a peer-to-peer network where every node is "equal" and lacks special authority. Therefore, smart contracts are anticipated to completely transform several established industries, including banking, healthcare, and energy. We thoroughly analysed blockchain-enabled smart contracts in this study, covering their use and technical aspects.<sup>50</sup>

Courts adhere to certain norms and criteria when determining whether digital evidence can be admitted and considered during legal procedures. The admissibility of digital evidence is a dynamic field influenced by technological advancements and evolving legal standards. Here are some future trends and policy considerations that may shape the admissibility of digital evidence. Transparency and tamper-proof transaction recording are provided by blockchain technology. It might be essential in guaranteeing the validity and integrity of digital evidence.<sup>51</sup> Courts may need to consider the admissibility of evidence kept on blockchains and the legal standing of blockchain records. Courts will have to decide whether evidence produced by AI and machine learning systems is admissible as these systems gather and analyze more data. One possible policy issue is to set up standards for certifying the correctness and dependability of evidence produced by AI. Provenance, or the details surrounding the creation and history of digital files, can play a significant role in verifying digital evidence's legitimacy and custody chain. Policy frameworks may be created to ensure that metadata is handled and preserved correctly. Policy frameworks may be created to ensure that metadata is handled and preserved correctly.<sup>52</sup>

As the metaverse continues to evolve and expand at an unprecedented rate, the complexity of legal disputes within this virtual realm is bound to escalate. With the convergence of diverse individuals, businesses, and entities in this digital landscape, the question of jurisdictional laws looms large, presenting a challenging maze for legal professionals and stakeholders alike. Delving into the intricacies of the metaverse's legal framework, one realizes that traditional approaches to conflict resolution may prove inadequate in this tech-driven, alternative reality. As traditional court systems grapple with the concept of jurisdiction over virtual spaces, a more agile and innovative method is poised to assume dominance: arbitration. Arbitration, a recognized form of dispute resolution deeply rooted in legal principles, stands poised to play a central role in resolving conflicts within the metaverse. Offering an efficient and authoritative means of settling disputes, it provides metaverse inhabitants with a reliable mechanism for justice in an otherwise uncertain environment. The allure of arbitration lies in its ability to transcend conventional jurisdictional boundaries, allowing for the resolution of metaverse conflicts on an international scale. As digital content intertwines with global audiences, this method presents a universally recognized platform for fair and enforceable

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<sup>50</sup> HC Youn, SM Ko, TH Kim, and HJ Jeon, 'Blockchain and AI Meet in the Metaverse,' 2022, *Advances in the Convergence of Blockchain and Artificial Intelligence*, 73(10.5772).

<sup>51</sup> A Toygar, CE Rohm Jr, J Zhu, 'A new asset type: digital assets', (2013) 22(4) *Journal of International Technology and Information Management*, p. 7.

<sup>52</sup> S Yong, HY Moon, Y Sohn, M Fernandes, 'A survey of security issues in collaborative virtual environment', (2008) 8(1) *Ijcsns*, pp. 14-19.

rulings. Complex questions surrounding intellectual property, virtual asset ownership, and contractual agreements can find resolution through the impartiality and expertise of arbitrators specialized in the metaverse domain. By harnessing their knowledge of emerging technologies and legal nuances, arbitrators can navigate the intricate web of virtual disputes, ensuring a balanced and equitable outcome for all parties involved. With the metaverse heralding a new era of interaction and commerce, it is essential to establish a robust and adaptable system for conflict resolution. The incorporation of arbitration as the preferred method in metaverse conflicts not only safeguards the interests of digital content creators and users but also fosters an environment of trust and stability. This approach reflects the growing recognition of digital assets as legitimate forms of property and the need for specialized dispute resolution mechanisms. Thus, through its legally binding rulings, arbitration holds the potential to harmonize, protect, and propel the metaverse towards a future defined by fairness, innovation, and digital progress.<sup>53</sup>

Notwithstanding, it is important to highlight the significant impact the current rules have on the arbitration process. They have not only streamlined and enhanced the efficiency of resolving digital disputes but have also paved the way for greater trust and confidence among parties involved. The provisions allowing parties to maintain their anonymity during proceedings have proven to be particularly valuable in ensuring a level playing field and avoiding any bias. This level of confidentiality ensures that parties can present their cases without fear of repercussion or prejudice. Moreover, the establishment of clear timelines within the rules has had a tremendous impact on the efficiency of dispute resolution. By implementing specific timeframes for each stage of the process, parties are able to anticipate and plan accordingly, reducing unnecessary delays. This expeditious approach to resolving disputes avoids prolonged periods of uncertainty, providing a quicker resolution while still maintaining the necessary thoroughness and integrity. In addition, the authority granted to arbitrators to adapt, revise, or revoke digital assets has been instrumental in ensuring the effectiveness of the resolution mechanism. In the rapidly changing digital landscape, where the value and nature of assets can evolve rapidly, this flexibility is crucial. By empowering arbitrators to make swift decisions regarding digital assets, the resolution process remains up-to-date and capable of addressing emerging issues effectively. This adaptability ensures that the rules remain relevant in the ever-evolving realm of digital disputes.

Looking beyond the UK Jurisdiction Taskforce's Digital Dispute Resolution Rules, the 2018 JAMS Draft Rules Governing Disputes Arising out of Smart Contracts further demonstrate the flexibility and adaptability of dispute resolution in the digital realm. These tailored rules specifically address the unique challenges posed by smart contracts, allowing for a more comprehensive and effective resolution process. By acknowledging and accommodating the intricacies of smart contracts, parties involved in such disputes can have confidence in the ability of arbitration to navigate through

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<sup>53</sup> M Turdialiev, 'Legal Discussion of Metaverse Law,' (2023), *International Journal of Cyber Law*, 1(3).



complex contractual arrangements. In conclusion, the Digital Dispute Resolution Rules and the JAMS Draft Rules prove that dispute resolution in the digital realm is not only possible but can be efficient, fair, and reliable. These rules exemplify the ongoing efforts to keep pace with the ever-changing world of technology and its impact on legal processes. By embracing innovative ideas, maintaining confidentiality, establishing clear timelines, and providing flexibility, these rules ensure that the resolution of digital disputes remains effective and satisfactory for all parties involved. One aspect of these regulations designed for digital disputes is that the arbitrator will only consider the conditions of the smart contract to the degree that they are converted to the English language if there is ambiguity or logical conflict in code.<sup>54</sup>

The strong attraction of cross-border applicability under the New York Convention is a feature of conventional international arbitration. However, due in part to the due process procedural requirements, determining small claims is not adequately time and cost-economical. An arbitral award's enforcement may be a drawn-out, complex, and expensive procedure. Given the nature of the case, a standard arbitral procedure may be too expensive for some types of disputes that occur in the metaverse, such as conflicts between users or between users and platforms.

In a fully immersive three-dimensional environment where products and services are easily accessible online, there is an expectation for efficient conflict resolution processes. Online dispute resolution (ODR), such as decentralized justice platforms like Kleros, Jur, and Aragon, is gaining traction as an alternative to traditional arbitration methods. These dispute-resolution methods are at various stages of development and have yet to be widely adopted.<sup>55</sup> ODR tools included in the platform is probably the best choice if a large amount of trade happens within the metaverse among users or through platforms. Smart contracts used for on-chain decisions come with restrictions that require a lot of confidence in the potential risks and situations, and they are also susceptible to mistakes or misuse. The significance and relevance of utilizing ODR platforms to resolve disputes of low monetary value cannot be overstated. ODR platforms serve as effective and efficient mechanisms for resolving conflicts at a diminished cost, saving both time and resources for all parties involved. By leveraging the power of technology, ODR platforms enable individuals and businesses to navigate and address legal issues in a simplified and accessible manner. Similarly, the evolution of cryptocurrency and NFTs has revolutionized the way we perceive and engage with digital assets: in today's fast-paced and interconnected world, the adoption of ODR platforms empowers disputants to seek timely resolutions without the need for traditional, in-person court proceedings. These platforms offer a variety of tailored features and tools that facilitate communication, negotiation, and the overall dispute resolution process. From online mediation and arbitration to facilitated settlement discussions, ODR platforms provide a comprehensive

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<sup>54</sup> AJ van Niekerk, 'The strategic management of media assets: A methodological approach' (2006) In Allied Academies, New Orleans Congress.

<sup>55</sup> Q Wang, R Li, Q Wang, S Chen, 'Non-fungible token (NFT): Overview, evaluation, opportunities and challenges', (2021) arXiv preprint arXiv:2105.07447.

range of dispute resolution methods.<sup>56</sup>

One of the key advantages is their accessibility: by eliminating the need for physical presence, individuals are able to engage in resolving low-value disputes irrespective of geographical constraints. This opens up opportunities for parties who may find it challenging to attend in-person hearings due to location, time constraints, or financial limitations. ODR platforms create a level playing field, ensuring equal access to justice for all, regardless of their circumstances. In the world of cryptocurrency and NFTs, these platforms are revolutionizing the way legal disputes are resolved. Moreover, ODR platforms offer flexibility and convenience, allowing disputants to engage in the process at their own pace and choose the most appropriate time for their discussions. This flexibility enables individuals and businesses to juggle their personal and professional commitments while actively participating in dispute resolution procedures. Another crucial aspect of ODR platforms is the transparency they bring to the dispute resolution process. Through clear communication channels and document sharing capabilities, all parties involved can access relevant information, track progress, and maintain a record of their discussions. This transparency promotes accountability and assists in fostering trust among the disputing parties. In addition to these benefits, ODR platforms contribute to reducing the burden on traditional court systems by diverting low-value disputes to alternative channels, freeing up valuable resources for more complex cases. This efficient allocation of resources allows courts to focus on cases that require their specialized attention, ultimately strengthening the overall justice system<sup>57</sup>. Smart agreements are executable software that operate on top of the blockchain to facilitate, carry out, and maintain a contract between unreliable parties without the involvement of an unbiased third party<sup>58</sup>. Smart contracts enabled network automation and the transfer of paper obligations into digital contracts. Unlike traditional contracts, smart contracts let users automate transactions with a central authority monitoring them, helping formalise agreements and trust relationships. From enhanced accessibility and convenience to increased transparency and reduced burden on traditional courts, ODR platforms offer a multitude of advantages for individuals and businesses seeking swift and cost-effective resolutions. By harnessing the potential of technology-driven solutions, we can revolutionize the way we approach dispute resolution and ensure justice for all.<sup>59</sup>

Nevertheless, much data, like movies and digital content captured by VR equipment, are often moved and kept in data centres without the required privacy and security safeguards, making them open to cyberattacks inside the Metaverse, a virtual reality. Given these concerns about security and privacy, blockchain technology, with its particular characteristics, provides a practical

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<sup>56</sup> W Wang, DT Hoang, P Hu, Z Xiong, D Niyato, P Wang, DI Kim, 'A survey on consensus mechanisms and mining strategy management in blockchain networks,' (2019) *Ieee Access*, 7, 22328-22370.

<sup>57</sup> Y Wang, Z Su, N Zhang, R Xing, D Liu, TH Luan, X Shen, 'A survey on Metaverse: Fundamentals, security, and privacy', (2022) *IEEE Communications Surveys Tutorials*.

<sup>58</sup> Q Yang, Y Zhao, H Huang, Z Xiong, J Kang, and Z Zheng, 'Fusing blockchain and AI with metaverse: A survey,' 2022 'IEEE Open Journal of the Computer Society', 3, pp.122-136.

<sup>59</sup> AD Yemenici, 'Entrepreneurship in the world of Metaverse: virtual or real?,' (2022) 2(2) *Journal of Metaverse*, 71-82.

way to protect data in the Metaverse.<sup>60</sup> The development of safe and transparent methods for registering and transferring ownership is facilitated by blockchain and smart contract technologies, opening the door for the emergence of virtual property rights and the trading of virtual assets.<sup>61</sup>

With the development of technology, it is now feasible to create more realistic and immersive virtual environments, which creates new and exciting opportunities for exhibiting luxury properties. Instead of only seeing pictures or videos, prospective buyers may now "visit" a house virtually, which helps them get a better sense of the property's layout, amenities, and overall feel.<sup>62</sup> Furthermore, the development of virtual ownership rights and the exchange of virtual assets are made possible by applying blockchain and smart contract technology. As a result, the market for opulent real estate in the metaverse is expanding, and the industry norm is being raised.<sup>63</sup>

Algorithms based on artificial intelligence (AI) can be used to execute smart contracts, handle digital evidence automatically, and even predict future disputes through predictive modelling. As a result, resolution processes might become more proactive and efficient.<sup>64</sup> Another pivotal facet involves fostering cross-platform cooperation, advocating collaboration among diverse metaverse platforms, and establishing standardized procedures for resolving disputes that traverse multiple virtual worlds. Common standards and interoperability mechanisms must be developed to facilitate dispute resolution across several platforms.<sup>65</sup>

Integrating oracles capable of real-time data retrieval in smart contracts further contributes to resolving disputes arising from unforeseen events. Legal frameworks recognizing and safeguarding virtual property rights, particularly concerning digital assets like NFTs and virtual currencies, are essential to clarify ownership and transaction disputes. Lastly, international cooperation in addressing jurisdictional concerns within the metaverse is advocated, promoting the establishment of clear legal frameworks through treaties or agreements for a standardized and globally recognized dispute resolution procedure.<sup>66</sup>

## 4. The future of digital assets in the Metaverse.

### 4.1. 4.1 Key Findings.

The study concludes that it is essential to set up a user-centred, open conflict

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<sup>60</sup> A Schmitz, C Rule, 'Online dispute resolution for smart contracts' [2019] J. Disp. Resol, p. 103.

<sup>61</sup> R Schroeder, A Huxor, A Smith, 'Activeworlds: geography and social interaction in virtual reality', (2001) 33(7)Futures, pp. 569-587.

<sup>62</sup> M Xu, WC Ng, WYB Lim, J Kang, Z Xiong, D Niyato C Miao, 'A full dive into realizing the edge-enabled Metaverse: Visions, enabling technologies, and challenges,' (2022), IEEE Communications Surveys Tutorials.

<sup>63</sup> P Ortolani, P Wolters, A Janssen, 'International Arbitration and Technology,' (2022) International Arbitration and Technology, 1-264.

<sup>64</sup> SM Park, YG Kim, 'A Metaverse: Taxonomy, components, applications, and open challenges', (2022) 10 IEEE access, 4209-4251.

<sup>65</sup> PG Watts, KF Low, 'The Case for Cryptoassets as Property', (2022), Available at SSRN 4354364.

<sup>66</sup> I Nikolaidis, 'Networking the metaverses', (2007) 21(5) IEEE Network.

settlement framework, including blockchain for transparency, dealing with issues of authority, and encouraging people from different fields to work together. This method ensures disagreements about digital assets are settled quickly and fairly in the Metaverse. It also keeps the Metaverse's open nature and encourages growth and wealth. Resolving Metaverse disputes requires close cooperation between engineers, legal experts, and business players. Formulating practical and fair solutions requires an interdisciplinary approach that combines legal knowledge with technical insights and corporate viewpoints. Legal experts contribute their knowledge of jurisdictional concerns, legal frameworks, and user rights to the table, helping to build a regulatory framework that protects people in the Metaverse.<sup>67</sup>

Frameworks for jurisdiction, data protection, and the legal acceptance of digital evidence depend heavily on the junction of legal and technological expertise. Second, the Metaverse is a quickly changing environment where user behaviour, business models, and technology standards constantly change. Working with company stakeholders guarantees that dispute resolution procedures comply with industry standards and are flexible enough to accommodate new developments. This proactive strategy contributes to the general stability of the Metaverse by anticipating and resolving possible conflicts. Third, interdisciplinary approaches encourage the development of novel dispute-resolution techniques. Conventional legal frameworks might not meet the unique difficulties presented by the Metaverse. New and creative solutions, including decentralized management models, smart contract-based resolution of disputes, or industry-specific standards for digital evidence, can be developed by fusing legal, technological, and business viewpoints. In the end, cooperation between technologists, business stakeholders, and legal experts guarantees that Metaverse conflict resolution processes are thorough, equitable, and adaptable to the dynamic character of this digital environment. In addition to helping resolve disputes, this cooperative synergy fosters a regulatory atmosphere that encourages openness, trust, and the Metaverse's responsible expansion.<sup>68</sup>

Collaboration between these disciplines will be essential in the future to shape a legal and technological structure that serves the many demands and interests of the Metaverse's users. As decentralized governance models become more common in virtual communities, individuals will be able to actively influence the norms and regulations of the Metaverse. The transition to community-driven governance will call for adaptable and flexible conflict resolution procedures that consider the varied expectations and values of these online groups.<sup>69</sup>

As users navigate many virtual environments, the emergence of diverse Metaverse platforms may give rise to interoperability issues. Harmonized dispute resolution methods will become more necessary as disputes resulting

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<sup>67</sup> DJ Niemeyer, HR Gerber, 'Maker culture and Minecraft: Implications for the future of learning,' (2015) 52(3) Educational Media International, 216-226.

<sup>68</sup> Nils Köbis and Luca D Mossink, 'Artificial intelligence versus Maya Angelou: Experimental evidence that people cannot differentiate AI-generated from human-written poetry', (2021), *Computers in human behavior* 114 (2021), 106553

<sup>69</sup> H Ning, H Wang, Y Lin, W Wang, S Dhelim, F Farha, M Daneshmand, A Survey on the Metaverse: The State-of-the-Art, Technologies, Applications, and Challenges' (2023) *IEEE Internet of Things Journal*.

from cross-platform interactions, ownership of assets across different platforms, and differing terms of service agreements grow more common.

## 4.2. Future Research Directions

In addressing the imperative of establishing robust mechanisms for conflict resolution within the Metaverse, it is recommended that industry-wide best practices and standards be formulated collaboratively. This collaborative effort should involve technologists, legal professionals, and business stakeholders to devise comprehensive rules to facilitate efficient, equitable, and consistent digital asset dispute resolution. Integrating direct conflict resolution mechanisms into smart contracts is integral to enhancing efficiency.<sup>70</sup>

To resolve disputes across various virtual worlds, efforts must be focused on creating standardized procedures and encouraging collaboration between various Metaverse platforms. Developing common standards and interoperability protocols is essential for smoothing the conflict resolution processes in cross-platform interactions. It is crucial to inform Metaverse users about their rights, obligations, and available dispute resolution channels. Encouraging users to learn about digital asset ownership, transaction security, and available dispute settlement avenues is vital for fostering a well-informed and cooperative online community.<sup>71</sup> Several intricate legal issues surround the Metaverse, including disagreements about jurisdiction, digital assets, and intellectual property.<sup>72</sup>

It is impossible to overestimate the significance of effective conflict resolution methods in this fast-paced digital world. Some of the most important conclusions are that the Metaverse is decentralised, that traditional legal frameworks are difficult to enforce, and that smart contracts and blockchain technology influence virtual property ownership. Effective conflict resolution is essential to maintaining the Metaverse's stability and reliability. Cooperation between technologists, legal experts, and commercial players is essential without a centralised regulatory agency. Developing creative solutions that fit with industry standards and adjust to the Metaverse's changing nature requires an interdisciplinary approach. There is a need for constant cooperation and adaptability as the Metaverse develops. There is a legal void because the swift advancement of technology has surpassed the creation of thorough legal frameworks. Closing the knowledge gap between industrial practices, technological advancements, and legal expertise will take continued cooperation. In addition to facilitating effective dispute resolution, this cooperative synergy will assist the Metaverse's responsible and dependable expansion.

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<sup>70</sup> P Milgram, F Kishino, 'A taxonomy of mixed reality visual displays', (1994) 77(12) IEICE TRANSACTIONS on Information and Systems, pp. 1321-1329.

<sup>71</sup> S Nakamoto, 'Bitcoin: A peer-to-peer electronic cash system,' (2008), Decentralized business review.

<sup>72</sup> MD Murray, Trademarks, NFTs, and the Law of the Metaverse (2022) 6 Ariz. LJ Emerging Tech., i.