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Critical Analysis of The Legal Elements of Crimes Committed in the Metaverse in Light of The Egyptian Criminal Law

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أركان الجريمة في الميٲافيرس: دراسة في ضوء أحكام القانون الجنائي المصري

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Abstract

The objective of this article is to explore the fundamental characteristics of the metaverse from both a technical and legal point of view. The metaverse is a hypothetical world that is being discussed increasingly frequently, and this article aims to shed light on it in a comprehensive way. The interplay between three worlds- the physical world, the cyberworld, and the metaverse- is scrutinized. To accomplish this task, it is essential to grasp the nature of the metaverse, the activities that can be performed within it, and the legal repercussions of those activities. Even though the metaverse is sometimes referred to as a more advanced version of the internet, it has some crucial distinctions.

The most notable feature that distinguishes the metaverse from the cyberworld is the ability for users to feel bodily harm through the use of specialized devices that can transmit physical sensations. Misuse of these devices might lead to criminal acts within this new virtual realm. Consequently, the core components of criminal behavior must be reevaluated to assess the applicability of current criminal laws in regulating metaverse crimes. It is important to thoroughly investigate the ramifications of the metaverse to gain a clear understanding of how it operates and how to maintain the safety and security of its users.

Keywords: Metaverse, Metaverse Law, Metaverse Crimes, Actus reus.

الملخص

يتناول هذا البحث أركان الجريمة المرتكبة داخل عالم الميتافيرس المستجد في ظل التنامي غير المسبوق في القدرات التكنولوجية التي يخولها هذا العالم لمستخدميه. إذ تتيح خواص الميتافيرس المتفردة على سابقتها من التكنولوجيا تجربة فريدة للمستخدم، تتجلى هذه الخواص في أن المستخدم لا ينحصر وجوده على مجرد التفاعل الجامد مع الموجودات كما يحدث في حالة الإنترنت مثلاً، بل أنه يمكن أنه يشعر ويتفاعل "فيزيائياً" مع الموجودات والمؤثرات البصرية والحسية داخل الميتافيرس، فيمكنه من ملامسة الأشياء والتفاعل مادياً مع غيره من المستخدمين في تجربة تحاكي إلى حد بعيد العالم الحقيقي.

ومن غير المستبعد أن يجنح بعض المستخدمين إلى ارتكاب سلوكيات إجرامية اعتماداً على ما يتيحها الميتافيرس من قدرة غير مسبوقة على تفاعل البشر مع بعضهم مع إزالة تامة للعوائق المادية والجغرافية، إذ يمكن لمستخدم أن يقتل مستخدماً آخر رغم تواجد كل منهم في دولة مختلفة تماماً، فإذا كانت التكنولوجيا تسمح لنقل الشعور بما فيها الإحساس بالألم فما الذي يمنع أن يوجه مستخدم لآخر ضربة تؤدي إلى وفاته؟

والقانون الجنائي إذ يُعنى بتعريف السلوك الإجرامي والعقاب عليه يواجه العديد من التساؤلات حول انسحاب القواعد التقليدية خاصة ما يتعلق منها بمفهوم الركن المادي للجريمة وكذلك الركن المعنوي، فهل

يمكن أن يقوم الركن المادي في حق الجاني إذا كان هناك فصلًا بين جسده الذي يظل حبيس العالم المادي وبين وعيه وإدراكه الذي يرى ويتفاعل مع موجودات افتراضية؟ وعلى نفس المنوال يمكن النظر إلى ركن الجريمة المعنوي الذي يصعب إسناده إلى شخص الجاني بالنظر إلى نفس العوامل.

وعليه، يسعى هذا البحث إلى فهم أركان الجريمة المرتبطة داخل الميتافيرس في ضوء أحكام القانون الجنائي المصري من أجل رسم تصور عام لطبيعة الجريمة المرتكبة داخل ذلك الفضاء الافتراضي الجديد.

الكلمات المفتاحية: الميتافيرس، جرائم الميتافيرس، قانون الميتافيرس.

Introduction

The Metaverse, a nascent technology, has garnered significant attention following Mark Zuckerberg's announcement of investing billions of dollars to bring such a world to fruition. Since then, several other corporations and governments have also expressed interest in this area. Recently, Microsoft announced a new feature for its Microsoft Teams platform called "Holoportation"⁽¹⁾ which serves as a gateway to the Metaverse, allowing individuals to interact with others in a digital world as if they were physically present.⁽²⁾ It is noteworthy that the Metaverse has garnered support not only from private businesses, but also from the South Korean government, which has initiated policies and public outreach efforts on this subject. As many as 500 companies, including Samsung, Hyundai Motors, and SK Telecom, have invested in the Metaverse.⁽³⁾

In contrast to the internet, metaverses currently exist as separate platforms, and users are unable to transfer assets or move between different metaverses. The ability to achieve this would result in the creation of an entirely parallel artificial world, which has the potential to lead the fourth industrial revolution and be at the center of scientific advancement for decades to come. This development would also lead to a complete restructuring of the core principles and fundamental theories in several domains, including law, economics, media, policing, national security, state sovereignty, advertising, and the entertainment industry. Additionally, the line between the real world and the artificial world may become increasingly

⁽¹⁾"Holoportation is a new type of 3D capture technology that allows high-quality 3D models of people to be reconstructed, compressed and transmitted anywhere in the world in real time. When such technology is combined with mixed reality, it displays such as HoloLens. This technology allows users to see, hear, and interact with remote participants in 3D as if they are actually present in the same physical space. Communicating and interacting with remote users becomes as natural as face-to-face communication".

⁽²⁾John, "Mesh for Microsoft Teams Aims to Make Collaboration in The Metaverse Personal and Fun" (2021) <https://news.microsoft.com/innovation-stories/mesh-for-microsoft-teams/> accessed 7 November 2022

⁽³⁾Muhammet, "Metaverse Shape of Your Life for Future: A bibliometric snapshot" *Journal of Metaverse* (2021) pp. 1-8

blurred, as the reliance on metaverse technology becomes absolute. This could be likened to waking up in a world where the internet has ceased to exist.

It is reasonable to expect that with the increasing number of users on the metaverse, crimes will be committed using this technology, similar to what happened with the widespread use of the internet. Although there is currently no concrete evidence of malicious acts being committed on the metaverse, it is only a matter of time before the first cases of crimes committed in this virtual world are heard in courts. For instance, imagine a murder being committed by a perpetrator who is located thousands of miles away. It is uncertain whether the long-standing legal theories are sufficient to address such crimes, which have never been witnessed before in the history of humanity.

Initially, the metaverse was primarily an environment for graphical representations of human beings to interact in gaming or social contexts. However, there is growing interest in expanding its application beyond entertainment to include fields such as education, healthcare, and tourism. Recently, advancements in gadgets used to log in to the metaverse have allowed for a more immersive experience, including the possibility of transmitting other senses beyond visual interactions between metaverse users or other elements of the world. As a result, criminals will have an increased potential to commit a range of crimes that were not possible in the past due to the limitations of the cyber world, such as causing direct bodily harm to specific users.

The emergence of the metaverse has raised numerous legal questions due to its complex nature. Creating an entire 3D virtual world governed by a set of predefined rules implies that traditional legal rules may not be adequate to govern acts occurring in the metaverse.⁽⁴⁾ Similarly, in the real world, acts are solely governed by the rules established in each legal jurisdiction. However, a solid differentiation between the two worlds is impossible since they are interrelated in various ways. For instance, the same individual who exists physically within a specific country may also exist virtually in the metaverse and commit a bodily harm to another person who is physically located within the jurisdiction of a certain state.

This poses a fundamental legal question, which is whether the same actions committed in the metaverse can be classified in the same way as in the real world according to the Egyptian Penal Code.

⁽⁴⁾Lik Hang Lee *et al*, 'All One Needs to know about Metaverse: A complete survey on Technological Singularity, Virtual Ecosystem, and research agenda' journal of latex class files (2021), Cornell University p. 1.

The unprecedented nature of crimes committed in the metaverse presents significant legal challenges, and an examination of the technical aspects of this virtual world is necessary to determine the adequacy of current legal provisions. Comparisons between the physical world, cyberworld, and the metaverse are also essential to ensure that penal provisions are sufficient to maintain order and safety for metaverse users. In the literature, the metaverse is portrayed as a complete virtual world with its own physical, social, and ethical rules, running parallel to the real world. However, the strong interconnections between these worlds blur the boundaries between them, a topic that will be explored further in this paper.

To expound further, the metaverse provides its users with an immersive experience that transcends the limitations of the physical world⁽⁵⁾. It enables individuals to explore new horizons virtually, purchase virtual commodities⁽⁶⁾, and even construct buildings without leaving their physical location.⁽⁷⁾

Technical Definition of Metaverse

The concept of the “Metaverse” was first introduced in Neal Stephenson’s 1992 science fiction novel “Snow Crash,” in which it was described as an enormous virtual world parallel to the real world.⁽⁸⁾ The Metaverse was accessible through a virtual reality headset, allowing users to transform into avatars.⁽⁹⁾ A more recent example of the Metaverse in literature is the OASIS, a massively multi-user online virtual reality game depicted in Ernest Cline’s 2011 novel “Ready Player One.” The OASIS has become a leading destination for work, education, and entertainment, and users connect to it using virtual reality headsets, haptic gloves, and suits.⁽¹⁰⁾ The term “Metaverse” is derived from the words “Meta,” meaning “beyond,” and “Verse,” a shorthand for “universe.” Therefore, it refers to a universe beyond the physical world, or a computer-generated world that is distinct from the metaphysical realm.⁽¹¹⁾ The Metaverse can be considered a twin reflection of the physical world, and it is a synthetic world.

⁽⁵⁾Kai Cornelius, Dieter Hermann, “Virtual Worlds and Criminality” p. 19. Springer

⁽⁶⁾DiLella and Day, ‘Investors are paying millions for virtual land in the metaverse’ (2022) <https://www.cnn.com/2022/01/12/investors-are-paying-millions-for-virtual-land-in-the-metaverse.html>

⁽⁷⁾Waterworth 2022 <https://www.nasdaq.com/articles/3-ways-to-buy-real-estate-in-the-metaverse> Last accessed Feb 2023

⁽⁸⁾Ibid. ref. 6, p. 1

⁽⁹⁾Stephenson “Snow Crash”.

⁽¹⁰⁾Mystakidis, S. Metaverse. *Encyclopaedia* 2022, 2, P. 486–497. <https://doi.org/10.3390/encyclopedia2010031> accessed 6 December 2022

⁽¹¹⁾M Camacho and VE, ‘Moving Beyond Learning: The Potential of Immersive Environments in Education’ in Gisbert M and Bullen M (eds) *Teaching and Learning in Digital Worlds* (Publicacions Universitat Rovira i VirgiliAv Catalunya 2015) pp. 109-15

Metaverse is a complex technological system that relies on a diverse range of first-rate technologies such as 5G, cloud computing, computer vision, blockchain and artificial intelligence. It is a 3D virtual shared world that leverages augmented reality technology to provide a mirror image of the physical world⁽¹²⁾. Thus, it offers its users the opportunity to experience new and exciting activities using virtual and augmented reality services⁽¹³⁾. Scholars have been devoting significant efforts to provide a clear, yet flexible definition of the term “Metaverse”. The challenge is that the literature uses a variety of terms such as virtual world (VW), virtual environment (VE), multi-user virtual environment (MUVE), massively multiplayer online role-playing game (MMORPG), immersive virtual world (IVW), immersive world, immersive online environment, open-ended virtual worlds, simulated worlds, serious virtual world, social virtual world, synthetic virtual world, and virtual learning environment (VLE) to describe the Metaverse⁽¹⁴⁾.

To date, there remains a lack of consensus regarding the definition of the term “Metaverse.” Nevertheless, various scholars have made attempts to define it. For instance, some have defined Metaverse as a three-dimensional virtual environment, which contrasts with the more inclusive concept of cyberspace that encompasses all shared online space across all dimensions of representation.⁽¹⁵⁾ Other scholars have emphasized the experiential dimension of Metaverse, which allows people to live internet content with others. Facebook has embraced this perspective as well⁽¹⁶⁾. Furthermore, Metaverse has been associated with other concepts such as embodied internet⁽¹⁷⁾, lifelogging⁽¹⁸⁾, and a mirror world. Therefore, Metaverse may be viewed as a 3D internet where the physical world and virtual spaces are interconnected.⁽¹⁹⁾

⁽¹²⁾Ning, Wang and Lin, “A Survey on Metaverse: The State-of-the-art, Technologies, Applications, and Challenges” arXiv cornell university (2021) p.6

⁽¹³⁾M Damar, “Metaverse Shape of Your Life for Future: A bibliometric snapshot” Journal of Metaverse (2021) p. 1-8

⁽¹⁴⁾Carina, “What is a virtual world? Definition and classification” 2018 Education Tech Research Dev 66, (2018) pp. 1087–1100. <https://doi.org/10.1007/s11423-018-9577-y>

⁽¹⁵⁾JDN Dionisio, WG, R, “3D Virtual Worlds and the Metaverse: Current status and future possibilities” (2013) ACM Computing Surveys pp.1-38 <https://doi.org/10.1145/2480741.2480751>

⁽¹⁶⁾Martinez, ‘Facebook changes its corporate name to Meta’ (2021) <https://www.npr.org/2021/10/29/1050379828/facebook-changes-its-corporate-name-to-meta> accessed 24 December 2022

⁽¹⁷⁾Kayle, ‘Facebook wants us to live in the metaverse’(2021) <https://www.newyorker.com/culture/infinite-scroll/facebook-wants-us-to-live-in-the-metaverse> accessed 24 March 2022

⁽¹⁸⁾Anders, and Martin, ‘Lifelogging in the wild: Participant experiences of using lifelogging as a research tool’ in Human-Computer Interaction –Interact (2-6 September Paphos) (2019) 431- 451

⁽¹⁹⁾Siyaev A and Jo JS “Towards Aircraft Maintenance Metaverse Using Speech Interactions with Virtual Objects in Mixed Reality” (2021) Sensors 1-21

In recent years, metaverses have evolved beyond the original concept depicted by Stephenson in 1992. They are no longer just immersive 3D virtual worlds but are also integrating physical world objects⁽²⁰⁾, actors, interfaces, and networks that construct and interact with virtual environments. Recent advancements in this domain have surpassed mere visual representations to enable user interaction with virtual objects. Users can now have a fully immersive experience of the metaverse, to the extent of feeling physical sensations akin to those experienced in the real world. This breakthrough is made possible through haptic technologies that create tactile experiences by applying forces, vibrations, or movements to the user.⁽²¹⁾ Spanish startup “OWO” has designed a jacket equipped with sensors that enable users to feel different sensations, ranging from gunshots to hugs. The jacket’s sensations include being punched and stabbed, insect bites, or having a bullet exit the body⁽²²⁾. The company stated that “Before, we had to rely on vision and hearing to create experiences. Now, OWO has created a system that allows us to use a new sense that had only existed in the physical dimension: touch.”⁽²³⁾

The aforementioned devices are not yet commercially available. Currently, the metaverse is still in its nascent stage, and is limited to the reproduction of real-world activities in a few fields, such as communication, financial transactions, gaming, and corporate events via avatars in 3D graphical representations. However, as technology advances at an accelerated pace, the metaverse is expected to offer increasingly realistic experiences in a broader range of areas in the near future.

Virtual Reality and Metaverse

Virtual reality (VR) has been a topic of interest for decades, dating back to the 1960s and 70s when it was developed by the military aerospace. This technology allows users to experience a completely virtual world that is immersive and can simulate a different physical location⁽²⁴⁾. In 2019, it was estimated that 42.9 million people would use virtual reality in the United States alone⁽²⁵⁾. While VR is often used as an umbrella term to describe similar

⁽²⁰⁾Sundaravelu A, ‘New Gadget Will Inflict Physical Pain on People in The Metaverse’ (2022)<https://metro.co.uk/2022/03/25/new-gadget-will-inflict-physical-pain-on-people-in-the-metaverse-16344235/> accessed 6 October 2022

⁽²¹⁾Sundaravelu A, ‘New Gadget Will Inflict Physical Pain on People in The Metaverse’ (2022)<https://metro.co.uk/2022/03/25/new-gadget-will-inflict-physical-pain-on-people-in-the-metaverse-16344235/> accessed 6 October 2022

⁽²²⁾Jewett A, ‘Companies are Developing Pain-Mimicking Technology for Metaverse Users to Wear’ (2022) <https://thebossmagazine.com/feeling-the-metaverse/> accessed 4 August 2022

⁽²³⁾OWO <https://owogame.com/sensations/> accessed 29 October 2022

⁽²⁴⁾Dede, Jacobson and Richards “Introduction: Virtual, Augmented, and Mixed Realities in Education” P.2-3.

⁽²⁵⁾Dede CJ, ‘Jacobson J and Richards J ‘Introduction: Virtual, Augmented, and Mixed Realities in Education’ in Liu D

technologies, it is distinct from mixed reality (MR) and augmented reality (AR).⁽²⁶⁾ MR combines the physical and digital worlds using advanced sensing and imaging technologies, allowing users to interact with both virtual and physical items. On the other hand, AR overlays digital information onto the physical world, supplementing the user's reality with digital details without completely immersing them in a virtual environment. It is important to note that these technologies differ based on the devices they use and the scope of their features, with VR offering a fully immersive experience and AR providing virtual images within a limited physical area.

The relationship between virtual reality (VR) and Metaverse has been the subject of some discussion, with some arguing that VR is part of the Metaverse process, blurring the line between surfing a social platform and using VR.⁽²⁷⁾ While some features of Metaverse resemble those of VR, it is much larger in scope, especially if accessing Metaverse does not require wearing a VR headset and is not limited to a set amount of time. VR systems can be divided into two main categories: game-oriented VR worlds and socially oriented worlds. The primary difference between these categories is the freedom granted to users to act within these metaverses. Game-oriented VR worlds are characterized by strict rules and regulations that users cannot violate due to technical barriers, while social virtual worlds are more flexible in terms of the set of actions that users can perform within them⁽²⁸⁾.

It is of significance to note that metaverses had originated as extensive platforms for online gaming, which were referred to as Massively Multiplayer Online Role-Playing Games (MMORPGs)⁽²⁹⁾. However, they rapidly evolved into alternative virtual spaces that encompassed other aspects of our daily lives, such as providing governmental services⁽³⁰⁾ and e-commerce⁽³¹⁾. Given the remarkable surge in the number of metaverse users, particularly after the outbreak of Covid19, crossovers between both worlds have become more frequent.

et al (eds) *Virtual, Augmented, and Mixed Realities in Education* (Springer Nature Singapore 2017) pp.1-16

⁽²⁶⁾Hoppe D, 'Eleven Crimes that Occur in Virtual Reality' (2019) <https://gammalaw.com/eleven-crimes-that-occur-in-virtual-reality/> accessed 10 August 2022

⁽²⁷⁾Intel (date unknown) <https://www.intel.com/content/www/us/en/tech-tips-and-tricks/virtual-reality-vs-augmented-reality.html>. accessed 10 August 2022

⁽²⁸⁾Nesbo E, 'The Metaverse vs. Virtual Reality: 6 key differences' (2021) <https://www.makeuseof.com/metaverse-vs-virtual-reality/> accessed 26 December 2022

⁽²⁹⁾Liu D *et al* (eds) 'Virtual, Augmented, and Mixed Realities in Education', Springer Nature Singapore (2017) pp. 105-30

⁽³⁰⁾Bourlakis M, Papagiannidis S and Li F "Retail spatial evolution: paving the way from traditional to metaverse retailing" 2009 *Electronic Commerce Research* pp. 135-148 <https://doi.org/10.1007/s10660-009-9030-8>

⁽³¹⁾Hyeong-woo K 2022 Korea Aims To Become 5th-Largest Metaverse Market By 2026 <http://www.koreaherald.com/view.php?ud=20220120000709> accessed 31 November 2022

As a result, legal implications associated with actions that take place in virtual worlds have come to the fore.⁽³²⁾

Cyberworld and Metaverse

The concept of Cyberworld is defined as a complex environment of interactions between individuals, software, and services facilitated by information and communication technology (ICT) devices and networks.⁽³³⁾⁽³⁴⁾ It has been considered as the fifth dimension of human interaction on Earth, expanding into other domains such as land, sea, air, and space⁽³⁵⁾, allowing various acts to be performed through this medium. As such, Metaverse can be regarded as an evolution to the Cyberworld, providing users with more features and a more immersive experience. As mentioned earlier, the Cyberworld is built by internet nodes⁽³⁶⁾, which may affect and trigger the real world, creating an overlapping relationship between the Cyberworld and the physical world. This overlapping occurs through four different layers, namely personal identity, software or operating system, information infrastructure, and location in the real world, which relates to the cyberspace operation.⁽³⁷⁾ When human interaction takes place in the physical world, it uses information extracted from its origin, and this information constitutes an idea in the Cyberworld, which has an impact back on the physical world.

⁽³²⁾Hyeong-woo K 2022 Korea Aims To Become 5th-Largest Metaverse Market By 2026 <http://www.koreaherald.com/view.php?ud=20220120000709> accessed 31 November 2022

⁽³³⁾Snoeck J 2022 H&M in talks over first store in Metaverse, Retail Detail, <https://www.retaildetail.eu/en/news/fashion/hm-talks-over-first-store-metaverse> accessed 5 November 2022

⁽³⁴⁾Maurer T and Morgus R *Compilation of Existing Cybersecurity and Information Security Related Definitions* (New America 2014), Definitions p. 37.

⁽³⁵⁾Azmi R and Kautsarina 'Revisiting "Cyber" Definition: Context, History, and Domain' in Winfred Y *et al* (eds) *Modern Theories and Practices for Cyber Ethics and Security Compliance* (IGI Global 2020) P. 27 <https://doi.org/10.4018/978-1-7998-3149-5>

⁽³⁶⁾Adler PA and Adler P "The Cyber Worlds of Self-Injurers: Deviant Communities, Relationships, and Selves" (2008) *Symbolic Interaction* 33-56.

⁽³⁷⁾Kuusisto T and Kuusisto R 'Cyber World as a Social System' in Lehto M and Neittaanmaki P (eds) *Cyber Security: Analytics, Technology and Automation*, Springer International Publishing Switzerland (2015) 31-44

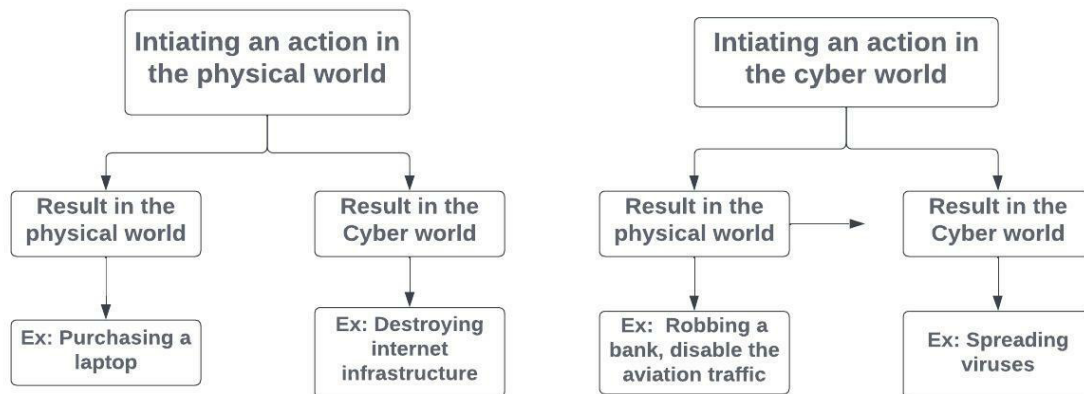


Fig. 1: The overlapping nature of physical world and cyberworld and how actions committed in each of them could affect the other.

The relationship between the cyberworld and the physical world has long been studied, and the emergence of the metaverse has brought new dimensions to this debate.⁽³⁸⁾ The cyberworld is a complex environment that involves the interactions between people, software, and services, enabled by information and communication technology (ICT) devices and networks. As a fifth dimension of human interaction, it extends beyond the traditional domains of land, sea, air, and space. However, the metaverse goes beyond the cyberworld by dissolving the boundaries between the physical world and technology, transferring the illusions of human beings to another world. While the cyberworld has no physical existence and relies on the interaction of internet nodes as previously mentioned, the metaverse allows users to interact, roam, and even feel the texture of objects in a virtual space that blurs the line between the real and the virtual. This ability to interact with the metaverse in a way that is impossible in the cyberworld, or the physical world opens up a wider range of possibilities for users presence.

In academic literature, the concept of “presence” has been divided into two distinct notions: Place Illusion (PI) and Plausibility Illusion (Psi). The former refers to the illusion of being present in a virtual place,⁽³⁹⁾ while the latter refers to the strong feeling that events occurring in the virtual world are truly happening despite being aware that it is a virtual world. Combining these two concepts in a single metaverse creates a realistic environment that encourages participants to behave in the same way they would in the physical world.⁽⁴⁰⁾

⁽³⁸⁾Ibid, Reference 37, P. 25.

⁽³⁹⁾Ibid, reference 38, P. 33.

⁽⁴⁰⁾Slater M ‘Implicit Learning Through Embodiment in Immersive Virtual Reality’ in Liu D *et al* (eds) *Virtual, Augmented, and Mixed Realities in Education*, Springer Nature Singapore (2017) pp. 19-34

Avatars, which are representations of human users in the metaverse, serve as an extension of their human counterparts in this virtual space. While autonomous agents are software systems that interact independently within the virtual environment to achieve specific goals⁽⁴¹⁾, such as changing color during the virtual day or appearing when an avatar is within a certain distance.⁽⁴²⁾

In other words, the existence of the avatars is linked to the human existence in the metaverse, they can neither act nor exist independently in metaverses. Contrarily, the autonomous agents are completely independent from human users therefore acts their acts cannot necessarily be attributed to human users. Therefore, it's legally difficult, if not impossible to hold a human user liable for malice acts committed by autonomous agents and this is reason behind the growing trend to granting legal personhood to any non-biological autonomous entity.

From a sociological perspective, it is widely accepted that human interaction in the physical world is based on reciprocal influence, which means that individuals rely on the feedback and reactions of others in the society. It is therefore crucial to differentiate between the concepts of interaction and interactivity, as they pertain to social behavior in the virtual world. Starting from the fact that metaverse is a virtual social environment that operates on a similar basis of interactivity, which describes the degree of influence and responsiveness that individuals have in relation to one another within a given social context. This notion would be of almost importance to critically evaluate the legal dimension to the essence of the human behavior in the metaverse.

Crimes in Metaverse

Metaverse is often considered as a virtual parallel world to the physical world. However, the main difference between the life in the physical world and the life in the Metaverse lies in the fact that in the latter, people interact with other individuals or objects through virtual representations of themselves, known as avatars. Avatars can be defined as “any digital representation (graphical or textual) that has agency (the ability to perform actions) and is controlled by a human agent in real-time.”⁽⁴³⁾ Therefore, the avatar is essentially a mirror

⁽⁴¹⁾Yuheng, *et al* “Metaverse: Perspectives from graphics, interactions and visualization” 2022 Visual Informatics pp. 56-67

⁽⁴²⁾Jens F., “Virtual Inhabited 3D worlds: Interactivity and Interaction Between Avatars, Autonomous Agents and Users” in Granum E *et al* (eds) Virtual Interaction: Interaction in Virtual inhabited 3D Worlds, Springer-Verlag London (2018) pp. 23-48

⁽⁴³⁾Robert Brym and John Lie “Sociology: Your Compass for a New World”, (2007), 3rd ed (Thomson Wadsworth pp.

image of the metaverse user existing in the real world, and this image is directly linked and controlled by the user through the equipment used to enter the metaverse. Moreover, human activities inside the Metaverse take on the same form as those in the physical world, such as buying or selling virtual real estate, attending virtual musical concerts,⁽⁴⁴⁾ or investing money in various commercial activities⁽⁴⁵⁾, such as racing in a metaverse horse championship⁽⁴⁶⁾.

The Metaverse, a virtual world where people interact as avatars, is not immune to criminal activity. The commission of criminal acts in virtual spaces is not a new phenomenon, as seen in the early days of the internet when cybercrime emerged. However, as millions of people enter the Metaverse and explore its features, a new form of crime, known as Metaverse crimes, is expected to arise. This new form of crime differs from conventional crimes and cybercrimes⁽⁴⁷⁾. Metaverse crimes can take two forms: crimes against avatars in the Metaverse, and crimes committed against Metaverse users that cause bodily harm. From a legal perspective, this raises questions about the jurisdiction, regulation, and enforcement of laws in virtual worlds. The emergence of Metaverse crimes highlights the need for proactive measures to prevent and mitigate such criminal activity in the Metaverse⁽⁴⁸⁾.

The first set of crimes involving virtual spaces has already occurred, as illustrated by a reported incident in October 2008 where a Japanese woman hacked her virtual husband's "Maple Story" account and destroyed his avatar after he initiated divorce proceedings.⁽⁴⁹⁾ While the second set of crimes targeting real people in the Metaverse has yet to be committed, it is highly expected to occur in the near future⁽⁵⁰⁾. It is important to note that targeting an avatar may not, by itself, constitute a criminal offense under certain legal frameworks, such as the Egyptian legal system, where avatars do not have legal personality and are therefore not afforded legal protection. However, in some jurisdictions, such acts may be considered

125-126.

⁽⁴⁴⁾KYLE Orland, 'So What Is The Metaverse Exactly' (2021) <https://arstechnica.com/gaming/2021/11/everyone-pitching-the-metaverse-has-a-different-idea-of-what-it-is/> accessed 12 December 2022

⁽⁴⁵⁾Rupendra Brahabhatt, 'What Exactly Is The Metaverse And How Is It Challenging Reality' (2021) <https://interestingengineering.com/the-metaverse-is-taking-over-the-physical-world> accessed 18 November 2022

⁽⁴⁶⁾Earth2 (date unknown) <https://app.earth2.io/#thegrid/d3817c93-9b25-4e8e-9acc-fe718e416b22>. Accessed 18 November 2022

⁽⁴⁷⁾Evan, "Who Invented the Internet" (2019), <https://www.history.com/news/who-invented-the-internet> accessed 24 August 2022

⁽⁴⁸⁾Evan, "Who Invented the Internet" (2019), <https://www.history.com/news/who-invented-the-internet> accessed 24 August 2022

⁽⁴⁹⁾G K Ayswariya and Aswathy Rajan, "A Comparative Study on the Difference Between Conventional Crime and Cyber Crime" (2018) *International Journal of Pure and Applied Mathematics* pp. 1451-64

⁽⁵⁰⁾KYLE Orland, 'So What Is The Metaverse Exactly' (2021) <https://arstechnica.com/gaming/2021/11/everyone-pitching-the-metaverse-has-a-different-idea-of-what-it-is/> accessed 12 December 2022

a violation of a person's moral integrity. It is worth noting that the current Egyptian penal code exclusively addresses acts committed by natural persons.⁽⁵¹⁾⁽⁵²⁾

On the other hand, committing a crime against a specific metaverse user during the course of playing a certain game or being in a virtual gathering could result in the infliction of physical harm on the user in the real world. With the accelerated pace at which sensory devices are being developed, it is only a matter of time before users can sense actions such as stabbing or pain. Consequently, vulnerability to such sensations or having a medical history could pose a real threat to the health of users. Moreover, any malfunction in these gadgets could lead to increased sensation, which might cause severe physical problems for users.

It is important to differentiate between metaverse crimes and cybercrimes. Cybercrimes are conducted through electronic media, and their existence is mainly dependent on the availability of computers and/or the internet.⁽⁵³⁾ In other words, computers are essential elements of these types of crimes. On the other hand, metaverse crimes represent a deeper level of technological advancement, which is not limited by the constraints of the cyber world. Users can engage in more comprehensive actions that are impossible using ordinary cyber tools.

The Metaverse is a distinct virtual world that has its own set of features. Although both the Metaverse and the cyberworld rely on computational power, the outcomes of criminal activities differ significantly. While cybercrimes often result in monetary losses, metaverse crimes can cause physical harm. For example, metaverse gadgets can simulate real-world sensations, and if these sensations are intense enough, they can cause pain to users. If a user with a heart disorder were to be stabbed in the heart while playing a game or attending a virtual gathering, the consequences could be dire.

When it comes to the legal elements of metaverse crimes, the actus reus and mens rea are similar to those of conventional crimes. However, determining the occurrence of these elements in metaverse crimes is complex. Some elements may occur in the physical world, while others may occur exclusively in the metaverse.⁽⁵⁴⁾ Nonetheless, the harm caused by the

⁽⁵¹⁾Guinchard A "Crime in virtual worlds: The limits of criminal law" 2010 International Review of Law, Computers & Technology, 24:2, (2010), pp.175-182, DOI: 10.1080/13600861003748284

⁽⁵²⁾Egyptian Court of Appeal no. 24480 Judicial Year 64 (28 May 2003).

⁽⁵³⁾Egyptian Court of Cassation, Appeal no. 136 Judicial year 37 (16 May 1967).

⁽⁵⁴⁾Sharma M, Kaur S and Singh RK "Cyber Crimes Becoming Threat to Cyber Security" (2019) Academic Journal of Forensic Sciences pp. 36-40

crime may occur in both the physical world and the metaverse. For instance, the actus reus may take place in the metaverse, but the mens rea is always expected to occur in the physical world, especially in cases of physical assault crimes.

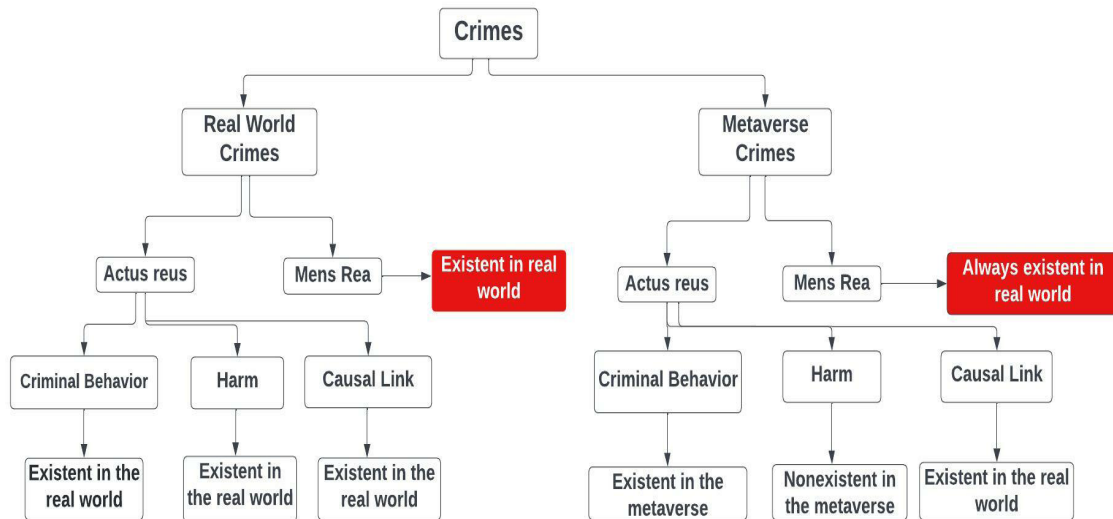


Fig. 2: the ultimate world in which elements of crimes take place for conventional crimes and metaverse crimes.

Throughout history, traditional crimes in every legal system adopted by Egypt were built on a set of punishable deeds.⁽⁵⁵⁾ However, the development of legal systems, especially with the advent of the age of renaissance in Europe and the principle of legality, required certain elements for a crime to legally exist. The general rule recognized by legal jurisprudence is that the elements of crimes are actus reus and mens rea. Egyptian legal literature recognizes the same elements for a crime to legally exist.⁽⁵⁶⁾ The emergence of the metaverse has posed new challenges and questions to the traditional form of crimes because the different elements of crimes hypothetically take place in different worlds.⁽⁵⁷⁾ While the physical world holds superiority over any other world or space created or inhabited by humans, traditional legal rules need to be revisited to govern acts committed in multiple worlds and achieve justice in both.⁽⁵⁸⁾

⁽⁵⁵⁾Sharma M, Kaur S and Singh RK “Cyber Crimes Becoming Threat to Cyber Security” (2019) Academic Journal of Forensic Sciences pp. 36-40

⁽⁵⁶⁾Sadiq Reza, “Egypt: Criminal Law-Handbook of Comparative Criminal law” (2011) Stanford University Press pp. 8-10.

⁽⁵⁷⁾Renate Muller, “Crime and Punishment in Pharaonic Egypt” (2015) Near Eastern Archaeology pp. 228-235

⁽⁵⁸⁾Hosni Sharh qanoun Al-Oqoubat, Dar ELNahda Alarbia (1962) p. 36.

Metaverse Crimes Under the Egyptian Penal Code

Egyptian lawmakers have been hesitant in enacting laws and regulations to govern newly emerging technological crimes such as cybercrimes, artificial intelligence crimes, and metaverse crimes. Despite the Emirati Law no. 5 of 2012⁽⁵⁹⁾, Bahrain Information Technology Crimes Law no. 60 of 2014⁽⁶⁰⁾, and Kuwait Law no. 63 of 2015⁽⁶¹⁾ regulating crimes in cyber worlds, Egypt has only recently promulgated a law addressing crimes arising from newly emerging technologies in 2018⁽⁶²⁾. Unfortunately, this law only enumerates certain punishable acts without specifying general provisions. This lack of general provisions makes it impossible to deduce general features of cybercrimes. Moreover, it is not valid to draw analogies between cybercrimes and metaverse crimes due to their core differences. One of which is the possibility of metaverse gadgets inflicting bodily harm on the user in the real world. The Egyptian Penal Code does not provide statutory explanation on the elements of a crime such as actus reus, actus reus, or causal link, only requiring their existence, which leaves the interpretation of these elements to judicial and jurisprudential construction.

Actus Reus

The Egyptian Constitution affirms the legality principle in Article 95, which holds that every crime must have a material element, whether an act or omission that contravenes a punitive provision. Fawzeya Abdussattar⁽⁶³⁾ has argued that the material element of a crime need not be a physical act but could also be a non-physical act, such as shooting a firearm at a victim who dies out of fear.⁽⁶⁴⁾ Criminal acts are distinguished by their realistic appearances and physical characteristics, which are considered to be the method of identifying other crimes. However, the metaverse effect, which occurs when a person wears the necessary gear to enter the metaverse, creates a separation between the user's body and their mind and consciousness. This separation affects the legal elements of a crime, including actus reus, actus reus, and the conscious state of the person, and may render traditional legal rules inapplicable to such incidents. The use of technology to create this unprecedented situation, where the aforementioned elements are separated, causes a person to act in an

⁽⁵⁹⁾Cybercrimes Law 175 of 2018.

⁽⁶⁰⁾Bahraini Law 60 of 2014.

⁽⁶¹⁾Bahraini Law 60 of 2014.

⁽⁶²⁾Christian, 'Crime Potential of Metaverse' in Cornelius K and Hermann D (eds) *Virtual Worlds and Criminality* (Springer-Verlag Berlin Heidelberg 2011) pp.19-29

⁽⁶³⁾Dr. Abdussattar "Sharh qanoun Al-Oqoubat", Dar ELNahda Elarabia, pp. 268-69.

⁽⁶⁴⁾Chawki2020 <https://cybercrime-fr.org/wp-content/uploads/2020/04/Egyptian-cybercrime-law-.pdf>.

unusual manner and respond to various virtual stimuli. For instance, a person's mind cannot differentiate between a dream and reality when stimulated by an alarm while sleeping. Thus, further conceptual research is required to understand the notion of actus reus in relation to the metaverse effect.⁽⁶⁵⁾⁽⁶⁶⁾

Mens Rea

The Egyptian Penal Code requires the presence of criminal intention in order for full criminal responsibility to be established. This element is clearly stipulated in article 62 of the Code, which provides that no penalty shall be imposed on an individual who loses consciousness or the faculty of choice due to insanity, mental disability, or unconsciousness resulting from drugs. It is essential to rely on this approach and expand its interpretation to include virtual crimes. Although entering the metaverse is a voluntary act, it results in an absolute separation between the user's awareness and their physical existence. Therefore, the punishment for any act that occurs within the metaverse must be classified by the same legal classifications entrenched in article 62. It may be argued that metaverse users are in the same state as individuals provided for in article 62; however, logging into the metaverse is neither done by force nor unknowingly. The decision to commit an act in the metaverse is made based on virtual factors or considerations, and therefore, it cannot be claimed that the metaverse user was deprived of their consciousness or normal state of mind.⁽⁶⁷⁾ Nonetheless, the question remains whether it is legally sound to apply a legal rule to a human being whose mind was manipulated by other avatars and 3D world. The answer to this question will open the door towards formulating a governing legal theory for emerging technologies, including the metaverse.

The philosophical essence of any act performed by a human being can be divided into two main factors: a mental state and a material expression of such a mental state. In this context, the term "mental state" refers to the will or desire that takes place inside the mind of a certain person, and the individual then behaves in a material way to fulfill that desire. The combination of these two factors achieves what is called an "act". The advent of the metaverse has caused a division between these components, as logging into the metaverse means that the mental state of the person lies and resides in the real world while their physical expressions happen in an entirely virtual world (the Metaverse). Starting from this

⁽⁶⁵⁾SCC case no. 114 Judicial Year 21.

⁽⁶⁶⁾SCC case no. 49 Judicial Year 17 (15 June 1996).

⁽⁶⁷⁾SCC case no. 49 Judicial Year 17 (15 June 1996).

fact, it is not possible to firmly determine the occurrence of a specific act in a specific world. For instance, an individual inside the metaverse willing to climb a tree will take the decision (the mental state), which takes place in the real world and creates a complete illusion upon which the person feels false presence in a different world, thus their material expression doesn't coincide with their mental state.

In the same vein, crimes committed in the metaverse are different by nature in comparison to conventional crimes and cybercrimes, due to the significant difference in medium. This adds another layer of disparity between cybercrimes and metaverse crimes. Hence, the legislator should be more alert to the unprecedented pace with which modern technology develops in order to avoid having the relevant laws become outdated.

There are no major legal issues that arise from crimes in the real world since both actus reus and mens rea occur in the very same traditional sense stated in legal references. However, there might be some legal ambiguity regarding crimes committed in the Metaverse. To date, cybercrimes cannot cause physical bodily harm to a human being. This is because cyberworlds can either be used as a means to commit a traditional crime such as trespass, theft, violence or they can be the object of the criminal conduct. Either way, there is no evidence that bodily harm could be caused through any of the aforementioned misuses of cyber technology.

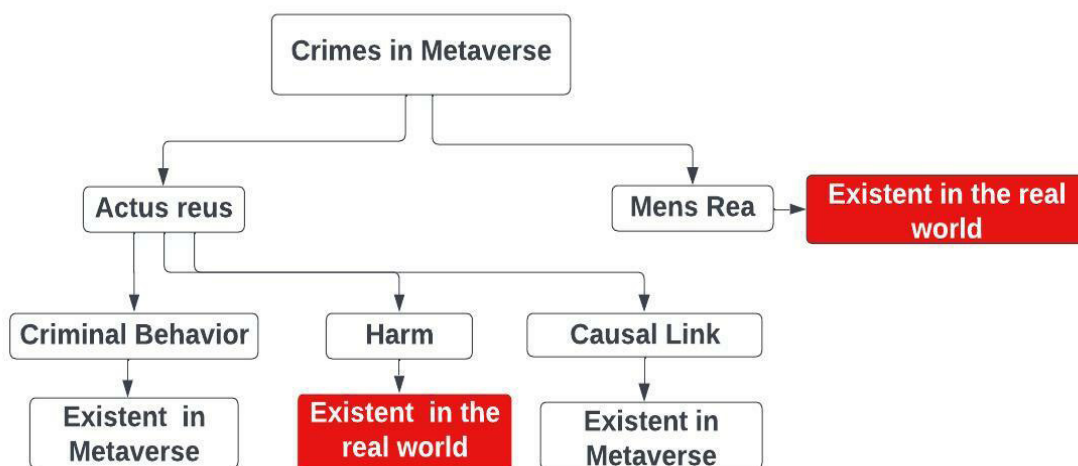


Fig. 3: the place where each of the elements of metaverse crimes take place.

The legal implications of criminal acts in the Metaverse are complex, and there is no clear consensus on the role of actus reus in this context. While actus reus is not explicitly defined in the Egyptian penal code, it is generally understood to refer to the intentional commission of an act with knowledge of its consequences⁽⁶⁸⁾. This is equivalent to the concept of knowledge in the American Model Penal Code. However, it is clear that actus reus can only take place in the real world, since the true existence of individuals inside the Metaverse is a function of their presence in the real world. As a result, there can be no multiple mens rea, and actus reus will always take place in the real world. However, the main legal challenge with criminal acts in the Metaverse is that the actus reus may occur in the virtual world but lead to real-world consequences. In addition, new technologies such as OWO's jacket, which transmits sensations such as hugs, may create new opportunities for sexual harassment in the Metaverse. It is therefore essential for legislators to stay abreast of technological developments and update the law accordingly to prevent the emergence of new forms of criminal behavior.

The Egyptian Penal Code does not provide a clear definition of the concept of actus reus, which is an essential component for the establishment of criminal liability. Nevertheless, it is well-established in Egyptian legal literature that actus reus refers to the intentional commission of an act with the knowledge of its consequences. This corresponds to the notion of knowledge in the American Model Penal Code. In Egypt, actus reus is regarded as an element of the crime that occurs exclusively in the real world. The absence of legal clarity regarding the actus reus element in crimes committed in the metaverse can result in legal ambiguities. While criminal behavior can take the form of an act or omission, omissions are excluded from consideration in this study as there is currently no conceivable way in which an omission could result in material harm to an individual in the metaverse. The Egyptian Supreme Constitutional Court⁽⁶⁹⁾ has held that actus reus refers to both acts and omissions that contravene a penal provision. Therefore, criminal conduct is a fundamental element of any crime and should be governed by the penal code.

Imposing criminal sanctions⁽⁷⁰⁾ in the metaverse presents various legal and ontological challenges that require a deep understanding of any legal system. Throughout human

⁽⁶⁸⁾Ibid, reference 63, pp. 21

⁽⁶⁹⁾The Egyptian supreme constitutional court, which is the highest judicial body in Egypt and mandated to annul legal rules in contradiction with the constitution, construed article 66 of the Egyptian constitution of the year 1971 (annulled) that "actus reus are acts or omissions that happen in violation to a penal provision".

⁽⁷⁰⁾Egyptian Penal Code year 1937 Articles 241-243

history, it has never been possible for a criminal to physically assault someone who exists in a different world or dimension. In the real world, a conventional crime, such as assault, is straightforward, and the actus reus is attributed to the wrongdoer. However, the same action in the metaverse raises several problems. Firstly, the principle of “actus non facit reum nisi mens sit rea” might not be fulfilled due to the separation between mind and body. Secondly, attributing the action to a particular metaverse user requires significant technical effort, which may not be available to the Egyptian authorities. The principle of “actus non facit reum nisi mens sit rea”⁽⁷¹⁾ is not applicable in the metaverse due to the nature of the experience. In the metaverse, the user’s presence is a strong illusion that makes them believe they are physically present in the virtual world, and their bodily senses cannot recognize their physical surroundings in the real world. However, harm in the metaverse could materialize in the real world. A hypothetical scenario could involve two people fully equipped in the real world wandering around the metaverse, where their true existence is in the real world, and their minds are immersed in a different world. This separation between their body, consciousness, senses, and surroundings is not complete, and some stimuli could affect their physical body.

The Egyptian legal system does not currently afford protection to avatars, as they are not recognized as legal persons. This means that any harm inflicted upon an avatar cannot be adjudicated before Egyptian courts, unless future legal provisions stipulate otherwise. While this means that murdering an avatar cannot result in criminal charges, if the harm extends beyond the avatar to the user behind it, the harmed user may have legal remedies available.⁽⁷²⁾ It is worth noting that MMORPGs often have policies in place to address threats that users may encounter while playing, such as harassment, theft of virtual items, or virtual murder.

Comparing metaverse crimes to crimes committed while under the influence of drugs or alcohol is not appropriate, as intoxication is a deliberate voluntary act that may cause a loss of free will. In contrast, metaverse users are transmitting their mind and consciousness from the real world to an artificial one, which is the fundamental nature of the technology. As such, metaverse crimes cannot be treated in the same manner as crimes committed while under the influence of drugs or alcohol. If metaverse crimes continue to go unpunished, it may be necessary to consider either banning the technology altogether or creating a new legal framework to address such crimes.

⁽⁷¹⁾Egyptian Penal Code year 1937 Article 58

⁽⁷²⁾Chan Wing, “The Requirement of Concurrence of Actus reus and Mens Rea in Homicide” (2000), *Singapore Journal of Legal Studies* pp. 75-91

Conclusion

The legal system in Egypt is still in its early stages of regulating emerging technologies, which presents a challenge especially when it comes to handling crimes committed in the metaverse. The very nature of the metaverse from a technical aspect complicates matters even further, as users are subject to a separation between their physical body and consciousness, and each user is subject to a different set of stimuli.

Based on an analysis of Egyptian penal statutes, it is unlikely that the courts would hold any criminal liability for crimes committed against mere avatars without any harm inflicted upon a real person outside of the metaverse, due to the non-recognition of the Egyptian penal code of an interest of an avatar that could be criminally protected. However, if the harm extended beyond the boundaries of the metaverse and affected a user in the real world, legal intervention would be necessary since the existing penal rules might not be legally adequate to address these offences.

As a proactive legal step, a special law should be enacted to define crimes in the metaverse and set punishments for them. The criminal procedures law should also be modified to establish a proper method of proving crimes and acquiring evidence, while taking into account the technical nature of this synthetic world.