

Competition and IP in virtual worlds: granularity or dominance

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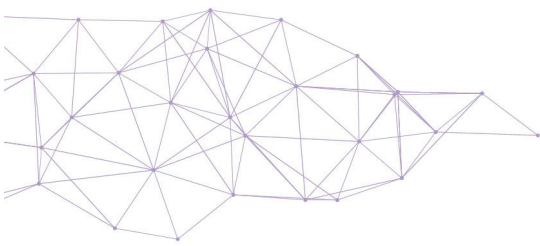
Vanessa Jiménez Serranía
University of Salamanca



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Abstract

Metaverses (now 'rebranded' as virtual worlds) are going to be the 'digital and phygital platforms' in the immediate future. Their development goes hand in hand with the evolution of other technologies such as blockchain, augmented reality, virtual reality and artificial intelligence. This paper aims to map the different possibilities offered by these new realities, starting from the study of new market configurations and pointing out the challenges they offer to current regulation, especially from the perspective of intellectual property and the applicability of rules on digital services.

Keywords: Web 3, NFTs, GAI, DAOs, intellectual property, tokenization, DSA

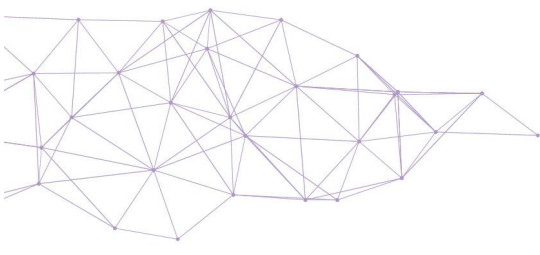
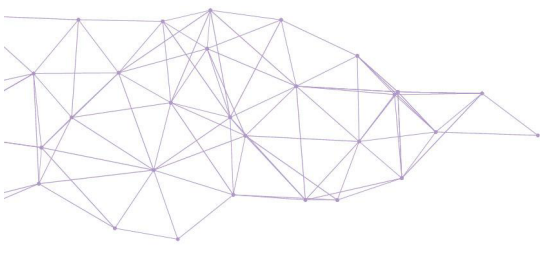


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1. Overview: Enter the web3

1.1. Virtual worlds: a rebranding of the metaverse

Although not a novel concept, the term metaverse started to become rapidly popular from 2020, with the emergence of metaverse platforms such as *Decentraland*¹ or *The Sandbox*² and, especially, with the development by Meta (formerly known as Facebook) of its own metaverse called *Horizon Worlds*³. This interest soon clashed with an obvious reality: it was an innovation that was in its early stages of development and needed (and still needs) years of technical development and gradual adoption to reach its true potential. The criticisms levelled at the metaverse (being considered either an ephemeral fad or a dotcom-like bubble) and the failures of certain metaverse experiments (due to the haste inherent to our times and the lack of adequate planning of business models⁴), caused the term metaverse to start to acquire a negative connotation.

For this reason, the industry began to change its name (in a sort of 'rebranding' of the industry) to terms such as "matterverse"⁵ or virtual worlds. In fact, the latter term is the one used in the most recent communications of the European Commission to refer to these new digital realities. According to this institution, virtual worlds are '**persistent immersive environments, based on technologies such as 3D and extended reality (XR), which allow physical and digital worlds to be mixed in real time, for a variety of purposes such as design, simulation, collaboration, learning, socialisation, transactions or entertainment**' (emphasis added)⁶.

These digital spaces are the result of the integration of various technologies that allow users to interact in a more direct and realistic way in a digital environment. Furthermore, synergies can be generated between these environments and the physical world generating "phygital interactions"⁷. Many of these technologies are not new, they

¹ Decentraland was launched in 2020 as a decentralised metaverse and the only open source metaverse. Although the Decentraland metaverse was created by the Decentraland Foundation, it is now structured as a DAO (Decentralised Autonomous Organisation). As stated in its manifesto of February 2022: 'On the Decentraland platform, anyone can run a server, which means that the platform's existence is not dependent on the Decentraland Foundation or any other entity. It can continue to function even if the Foundation no longer exists. The code is open. Anyone can extend the platform's capabilities, audit it or contribute to it / Ownership and governance data is stored on the Ethereum blockchain. No hacking of the database or theft of the keys can take away your virtual belongings.' <https://decentraland.org/blog/announcements/foundation-2022-manifesto/>, accessed on 30 June 2024.

² The Sandbox is another metaverse created using the Ethereum blockchain network, in which users can buy digital parcels of land, called LAND, and create experiences on them to share with other users by transacting on this platform using two native tokens (SAND and ASSET). (<https://www.sandbox.game/en/>), accessed on 30 June 2024.

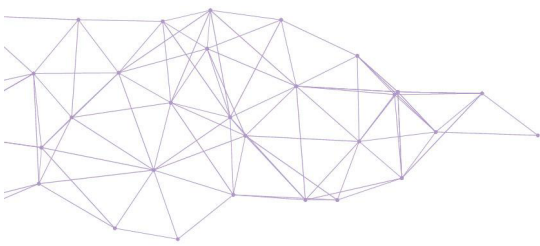
³ Meta Horizon Worlds is a centralised metaverse (traditional web 2.0 platform) developed by Meta Platforms for Meta Quest 2 that became publicly available in December 2021.

⁴ As Sandra Helou, CEO of MetaMinds Group, points out, '*The metaverse is not for short-term goals. It is definitely a long-term vision that requires a lot of effort, a lot of strategy, dedicated teams and funding*'. Vid. <https://es.cointelegraph.com/news/metaverse-projects-failed-lack-of-correct-business-model-meta-minds-ceo>, accessed on 30 June 2024.

⁵ Vid. <https://matterverse.com/>, accessed on 30 June 2024.

⁶ European Commission, Communication of 11 July 2023 to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions '*An EU initiative on Web 4.0 and virtual worlds: a head start in the next technological transition*', COM(2023) 442/final, p. 1.

⁷ A.A Mikheev, A. Krasnov; R. Griffith, M. Draganov, 'The Interaction Model within Phygital Environment as an Implementation of the Open Innovation Concept'(2021), J. Open Innov. Technol. Mark, 7, 114.



were already used in virtual reality and augmented reality experiences, but they are now combined with the latest developments regarding artificial intelligence and DLT technologies such as blockchain.

Exploring this last question, a little further, it seems interesting to mention the 'Seven layers of the metaverse' defined by Jon Radoff⁸. Going from the lower to the upper layer we find: (1) the infrastructure layer (which implies at least the development of 5G, WiFi6, cloud technology, especially in its decentralised version), (2) the human interface layer (which includes not only smartphones but also wearables -glasses, gloves, suits-, haptic technology and technologies that enable voice recognition and reproduction, gestures, etc.), (3) **the decentralization layer** (which requires, among other factors, the use of blockchain and artificial intelligence), (4) the spatial computing layer (which involves the use of 3D engines, virtual reality, augmented reality, extended reality and geospatial mapping), (5) the creative economy layer (which requires, among other factors, the development of design and design tools and the use of new technologies), (6) the discovery layer (which implies the development of advertising networks, ratings and other tools to bring users closer to these new realities) and, finally, (7) the experience layer (in its different modalities, i.e. games, social events, sports, theatres, museums, concerts, shopping, etc.).

Therefore, the development of virtual worlds requires the convergence of a wide variety of technologies, many of which are currently under development. As López-Taruella points out, these virtual worlds or metaverses will be characterized by three aspects: immersive realism, interoperability and concurrency (which will imply synchrony and persistence).⁹ Moreover, these virtual worlds are understood not to be limited to purely digital interactions, but they will allow for direct interconnection between virtual and physical (phygital) relations (which also entails synchronicity and correspondence between the two spheres).

Finally, within the current and projected models of virtual worlds, it is possible to distinguish between virtual worlds or metaverses with decentralized governance (i.e. those in which there is no intermediary or company that establishes the rules of the platform, but which are controlled by the users themselves and which would be constituted in the form of DAOs -Decentralized Autonomous Organisations-¹⁰) and virtual worlds with centralized governance (in which the current platform model would be replicated)¹¹.

1.2. The future web 3.0

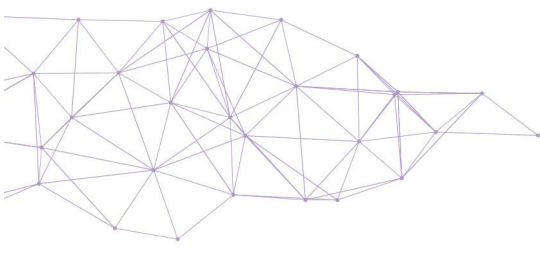
These new virtual worlds, as mentioned above, are generally linked to a broad decentralization (at least from a technical point of view) derived from the development of the so-called web 3.0. This web 3.0 is understood as the new iteration of the Internet that aims both to achieve a more immersive experience. As Cathy Hackl, Dirk Lueth, Tommaso Di Bartolo explain, web 1.0 was the internet of the 1990s and early 2000s; web 2.0 added

⁸ J Radoff, 'Seven layers of the metaverse', <https://medium.com/building-the-metaverse/the-metaverse-value-chain-afcf9e09e3a7>, accessed on 30 June 2024.

⁹ See, A López-Tarruella Martínez, 'Definiendo el metaverso', in A López-Tarruella Martínez (ed) *Protección y gestión de la propiedad intelectual en el metaverso* (Reus, Madrid, 2023), pp. 25-35.

¹⁰ Examples of such metaverses are the aforementioned Decentraland and The Sandbox.

¹¹ See, A López-Tarruella Martínez, *ob.cit.* pp. 21-42 and V Jiménez Serranía, 'El metaverso y el derecho de la competencia: nuevas estructuras digitales, nuevos modelos de negocio, ¿nuevas reglas?', in A Robles Martín-Laborda (ed.), A Zurimendi Isla (ed.), *Estudios de la Red Académica de Defensa de la Competencia (RADC) 2022* (Thomson Reuters-Aranzadi, Cizur Menor, 2022), pp. 89-119.



the possibility of social networking, ecommerce, user content creation and the emergence of the collaborative economy; web 3.0 includes smarter search engines and social networks and other platforms will focus on individual user experiences and the delivery of content based on the user's context. *'This means virtual reality and augmented reality systems that mimic physical interaction and break down the barriers between user and technology. This is why we need to consider the underlying technology in these new experiences, such as blockchain, cloud computing and 5G'*¹². Taking these elements into account, the European Commission points to openness, decentralisation and full empowerment of users, allowing them to control and realise the economic value of their data, manage their online identities and participate in the governance of the web as the main characteristics of web 3.0¹³.

Although web 3.0 is not fully developed yet and will not be in the next few years either, (we should remember that it took more than ten years to go from web 1.0 to web 2.0), there are already applications linked to it, such as NFTs, cryptocurrencies, decentralised finance platforms (DeFi), decentralised applications (dApp) or decentralised autonomous organisations (DAO), including some metaverse platforms such as Decentraland. Regarding this relationship between the development of Web 3.0 and virtual worlds, it is pertinent to mention the 'Seven rules of the metaverse' proposed by Tony Parisi¹⁴. For Parisi, the metaverse is only a tool for users to experience the virtual world. While the development of technologies that enable immersive experiences will greatly improve users' capacity for sensory perception and their interactions, Web 3.0 will ensure decentralisation in such sensitive aspects as identity, personal and non-personal data, means of payment and the creative economy.

2. Taxonomy of Virtual Worlds (metaverses)¹⁵

Bearing in mind the elements described above, we can identify 'decentralisation' as one of the characteristics of Web 3.0 and virtual worlds. For this reason, this section will analyse the potential types of virtual worlds or metaverses of this web 3.0, since the platforms and virtual worlds of web 2.0 have been extensively studied.

Real decentralisation is an element that is often not taken into account even if it is essential for a comprehensive analysis of this subject. Indeed, let us remember that one of the 'mantras' of many of the existing metaverses is to return to the 'users' (which comprehends from content creators to the 'consumers') the capacity to decide on their activity on the platform (and, therefore, on the exploitation of their creations and their data) and to obtain direct rewards for their activity within these platforms (thus, without intermediaries - platforms- who 'take advantage' of the platform's activity of the users).

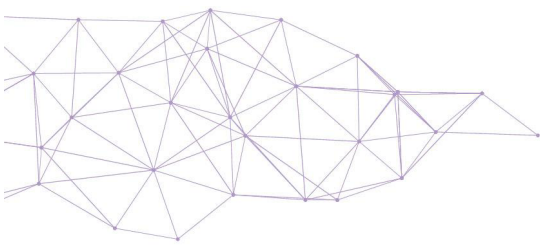
Nevertheless, before trying to establish a taxonomy of virtual worlds, it should be borne in mind that decentralisation, generally linked to distributed ledger technologies or

¹² C Hackl, D Lueth, T Di Bartolo, *Navigating the Metaverse: A Guide to Limitless Possibilities in a Web 3.0 World* (John Wiley & Sons Inc, Hoboken, New Jersey, 2022).

¹³ European Commission, *ob.cit.*, p. 1.

¹⁴ According to these rules, the Metaverse must be unique (rule no. 1); it must serve everyone (rule no. 2) and be open to everyone (rule no. 4); it must not be controlled by anyone (rule no. 3); it must be hardware independent (rule no. 5); it must function as an accessible network (rule no. 6) and it can constantly self-improve (rule no. 7). T Parisi, *The Seven Rules of the Metaverse* (2021) <https://medium.com/meta-verses/the-seven-rules-of-the-metaverse-7d4e06fa864c>, accessed on 30 June 2024

¹⁵ Throughout the text, the words virtual worlds and metaverses are used interchangeably.



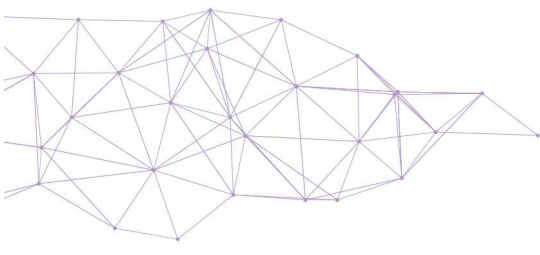
DLT (especially the blockchain), can be purely technical, while their 'governance' can be centralised¹⁶. In a very simplistic nutshell, this 'governance' can be defined as the rules that determine who takes the decisions in these new virtual worlds (decisions such as the conditions for the access to a specific virtual world, the rules that govern the activity within this metaverse and, even, the requirements for interoperability).

Hence, two main groups or types of metaverses can be identified: 'improper' or 'centralized governance' metaverses and 'proper' or 'decentralized governance' metaverses. 'Improper' metaverses are those whose governance is centralized. In other words, a company or consortium of companies creates a metaverse and establishes both its structural and functional rules, determining (amongst others): (i) the conditions for entering the metaverse and developing business (or applications) interoperable with this metaverse ; (ii) the conditions for the sale of products, (iii) the tokens allowed; (iv) the wallets that must be used to hold the digital products (tokens or NFTs); (v) the means of payment allowed; (vi) the fees for the use of the metaverse and the different services and products offered therein, etc.

The second group would include decentralized metaverses (e.g. Decentraland), created within the so-called DAOs (Decentralized Autonomous Organisations)¹⁷. In this kind of metaverses, the participating nodes (i.e. the users - in a broad sense-) will have the

¹⁶ Blockchains networks can be technically classified in their main types (even if, nowadays, there are some 'hybrid' networks): (i) *permissionless* networks, also known as public blockchains; and (ii) *permissioned* networks, also known as consortium blockchains and (iii) private blockchains. *Permissionless* networks do not require any type of permission to be able to participate as a validating node in the blockchain. To avoid fraud, a system (consensus algorithm) is applied, the best known being the so-called 'proof-of-work' whereby the node, before incorporating a new block, must solve a set of cryptographic problems and if it manages to be the first to solve this problem, it will receive its reward. In the case of a permissioned net only a limited number of nodes can access the network as validating nodes, and this depends on the requirements that are established. In other words, in this case, hierarchies are established between nodes based on trust criteria established by consensus algorithms. Thus, for example, the incorporation of a new block will depend on passing either a 'proof of authority' or a 'proof-of-stake' test. On this structural basis derived from access to validator nodes, there are two main types of blockchains: 'open' or public blockchains and 'closed' or permissioned blockchains. Open networks are those that, as a general rule, will have a '*permissionless*' structure (i.e. Bitcoin). Closed networks, on the other hand, will have a '*permissioned*' structure and are divided, for the time being, into two broad categories, consortia (i.e., Hyperledger Fabric, Tendermint, Symbiont, R3 Corda, Iroha, Kadena, Chain, Quorum, MultiChain, Sawtooth Lake, Ripple, Stellar, and IOTA) and private networks, also known as corporate networks (i.e., Mediachain). To this 'classical' classification, a new typology of blockchains must be added, which are the so-called '*permissioned public*' blockchains. These blockchains would be halfway between '*permissionless*' open blockchains and permissioned blockchains. In fact, it has been said that these blockchains 'combine the permission of private consortia with a decentralised governance model, trying to achieve the best properties of both models. Examples of such networks are the Spanish blockchain Alastria or the European Blockchain Services Infrastructure (EBSI). For further information see, S Bouraga, 'A taxonomy of blockchain consensus protocols: A survey and classification framework', (2021) Expert Systems With Applications 168, 1143; P De Filippi and A Wright, *Blockchain and the Law : The Rule of Code* (Harvard University Press, Cambridge, Massachusetts, 2019); T Schrepel, *Blockchain + Antitrust : The Decentralization Formula*, (Edward Elgar, Northampton, 2021).

¹⁷ A Decentralised Autonomous Organisation (DAO) can be defined as a computer programme, running on a peer-to-peer network, that incorporates rules for governance and decision-making. DAOs can be programmed to operate autonomously, without human intervention, or the code can provide direct, real-time control of the DAO and the funds controlled by it. The first DAOs were experiments in software-controlled community organisations that aim to re-implement certain aspects of traditional corporate governance, substituting voluntary compliance with a corporation's bylaws for actual compliance with pre-agreed computer code. See, A F Muñoz Pérez, *LAS DAOs y el reto de controlar al algoritmo*, (Aranzadi, Navarra, 2023); O Borgogno and E D Martino, 'Decentralised Autonomous Organizations: Targeting the Potential Beyond the Hype' (2024). European Banking Institute Working Paper Series 161, Amsterdam Law School Research Paper No. 2024-02, Amsterdam Center for Law & Economics Working Paper No. 2024-01, <https://ssrn.com/abstract=4692754>.



decision-making capacity regarding the access and activity rules of the virtual world. Certainly, many of these metaverses will start from the initiative of a company or a group of individuals who build them, but these platform will be designed to ensure that decisions are decentralized, being the users who 'govern' them.

One example is the Sandbox metaverse. The Sandbox started with a centralized governance, but currently its governance is intended to perform in a decentralized manner, where users can 'build, own and monetize their game experiences' using SAND, the platform's utility token¹⁸. Those who hold SAND tokens will also be able to participate in the governance of the platform through a Decentralized Autonomous Organisation (The Sandbox DAO), where they will be able to exercise their voting rights. Another example is Audius, which, although it is not strictly a metaverse but an NFT-streaming platform, has developed a model with a decentralized decision-making process¹⁹. Finally, a paradigmatic example is Decentraland where the DAO decides on interactions within the metaverse, and even on changes in the Decentraland metaverse structure²⁰.

Therefore, taking into account what we have mentioned in the previous sections, when studying the conditions of access or activity of metaverses or virtual worlds, we will have to analyse these different governance structures, as they will condition certain potential legal problems. Nonetheless, regardless of this issue, all the virtual worlds that will compose the future Web 3.0 present a number of elements that will have to be considered when approaching their study.

3. Markets of Access to Virtual Worlds

3.1. Key aspects of access markets

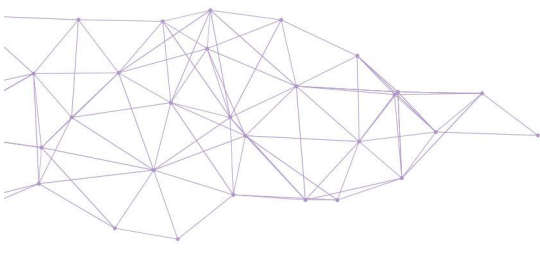
The conditions of access to virtual worlds cover a wide range of aspects that have to be taken into account such as: the rules and means of access to a metaverse, the type and content of smart contracts that are developed in that metaverse, the standards that are implemented in that metaverse for tokenizing products (both non-fungible and fungible tokens²¹), the utility tokens used, the means of payment allowed (cryptocurrencies or

¹⁸ Utility tokens means a type of crypto-asset that is only intended to provide access to a good or a service supplied by its issuer (Article 3, 9) of the Regulation 2023/1110 on Markets in Crypto-assets, hereinafter **MiCA Regulation**).

¹⁹ Audius has a decentralised protocol, whereby, creators, listeners and node operators will be individually and collectively involved in making decisions about changes and updates to the platform (its governance). In this case, according to the terms set out in its Section 7 'are only applicable to registered users with an active account at the time an applicable proposal is put to vote. is put to vote. A user shall be entitled to one (1) vote per Audius token.'. <https://audius.co/legal/terms-of-use>, accessed on 1st July 2024.

²⁰ 'The Decentraland DAO is the decision-making tool for MANA, NAMES and LAND holders (different kinds of token holders within Decentraland) in the Decentraland virtual world. Through voting in the DAO, the community can issue grants and make changes to the lists of banned names, POIs and catalyst nodes'. <https://docs.decentraland.org/player/general/dao/overview/what-is-the-dao/>, accessed on 1st July 2024.

²¹ Non-fungible tokens and fungible tokens are created based on different technical standards that give them their different features. Thus, for example, a non-fungible token of a metaverse developed on the Ethereum blockchain will have the ERC-721 standard and a fungible token will have the ERC-20 standard. NFT are characterised as unique and non-fungible. For a further understanding of the taxonomy of crypto assets and their financial implications, see ESMA, *Consultation paper on the draft Guidelines on the conditions and criteria for the qualification of crypto-assets as financial instruments*, 29 January 2024, ESMA75-453128700-52, <https://www.esma.europa.eu/sites/default/files/2024-01/ESMA75-453128700->



crypto assets), the wallets that will or can be used in that metaverse, the fees generated by all the aforementioned aspects, the interoperability of that metaverse with other metaverses or applications, and even the means of interaction with the physical world – hardware, software, IoT – (in the case of a hybrid metaverse, i.e. one that interacts with the real world). This list of aspects may be more or less complex depending on the type of metaverse and the interactions that take place in it.

It should be borne in mind that the metaverse can be a space for the development of interactions and can include not only the development of social networking activities, marketplaces (both for NFTs and for other types of goods), online content sharing services and streaming services (music, video) but also a space for co-creation and business development (including the sale or rental of virtual spaces for ‘virtual establishments’).

3.2. Main legal challenges in access to metaverses

To analyse in detail the characteristics and problems related to each one of the aspects mentioned above would go far beyond the scope and purpose of this paper, therefore, there will be pointed out some of the most relevant issues:

a) **The norms or rules for access to a metaverse:** These rules refer to the terms and conditions that will determine access by users who will constitute the ‘purchasers’ and by users who will be able to offer goods or services in the metaverse. In these new virtual worlds, we will find the peculiar situation (although not novel, as it is frequent in platform business models such as e-games) in which users receive rewards or incentives for the use of the platform²², either for the use or for the creation or collaboration in the development of new virtual products or services. Bearing in mind these new structures, questions arise almost automatically (especially in view of the problems that have already affected web 2.0 digital platforms), such as: (i) what types of incentives are introduced in these metaverses; (ii) what impact such incentives will have on the market; (iii) who will own the intellectual property rights arising from the development by users of new creations or products; (iv) how these new creations will be exploited; (v) what uses will be made of user data; (vi) what entry (and exit) requirements will be necessary, etc.

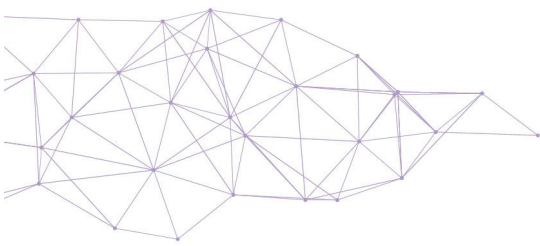
b) **Certain technical aspects linked to DLT technologies:** It is already commonplace that the development of metaverses in Web 3.0 will mean the consolidation of the token economy²³, which will lead to the massive implementation of smart contracts²⁴. On the other hand, especially in the case of decentralised governance

[52_MiCA_Consultation_Paper_-_Guidelines_on_the_qualification_of_crypto-assets_as_financial_instruments.pdf](#), accessed on 1st July 2024.

²² For example, the Audius platform determines that users should be compensated in proportion to the ‘value’ they create (<https://whitepaper.audius.co/AudiusWhitepaper.pdf>, accessed on 1st July 2024). Within this type of NFT-streaming platform, there are two main categories: those that pay artists following a tokenisation model, such as Audius and Emanate, and those that follow a blockchain-based revenue system, such as OPUS. Regarding token-based models, the platform will issue a token (for example, in the case of Audius, \$AUDIO), which will be used by the platform’s users to grant rewards to the artists. This model responds to a blockchain-based remuneration system focus on establishing smart contracts that allow both the traceability of transactions and the remuneration due for listening to the songs.

²³ On this issue see section 3.2.1.

²⁴ ‘A smart contract is code deployed in a blockchain environment, or the source code from which such code was compiled. It is executed in a distributed manner by the miners of the underlying blockchain network if and



metaverses, smart contracts will be used to self-execute the conditions of entry and governance of these virtual worlds. Thus, it will be highly recommended to analyse the content of these smart contracts implemented in each metaverse, since it is possible that they contain illicit instructions or abusive conditions, and their modification or cancellation is complex²⁵. Moreover, both the smart-contracts and the technical tokenization standards used in a metaverse will influence the possibility of data interoperability and portability of digital products. Certainly, sometimes these aspects will depend on the inherent characteristics of the blockchain network used to build the metaverse in question, but other times they will depend on strategic decisions regarding market foreclosure.

c) **The existence of utility tokens for access to the metaverse** (and eventually for governance of the metaverse): It will have to be clearly established the way in which they are allocated, the rights attached to them, their real cost and their real utility level. It should be noted that these tokens are considered as crypto assets regulated by the MiCA Regulation, so they have to respect a series of requirements for their emission in the EU. Furthermore, from a purely economic (and competition) approach these tokens may rise service pricing cost structures that may provide incentives for artificial price increases²⁶.

d) **The means of payment allowed in a metaverse**: This issue is particularly important with regard to 'native' cryptocurrencies for a specific metaverse, especially if these cryptocurrencies that are considered the means of payment are 'stablecoins', because of the financial and competitive risk they may entail, depending on their structure and the size of the metaverse in question²⁷.

e) **The technical requirements for access to metaverse**: The required hardware and software must be taken into consideration (i.a. specific aspects such as the wallets needed to operate in the metaverse in question, the need for native mining of tokens - especially NFTs-, the need to use specific gadgets or not -glasses, gloves, suits²⁸ - or the

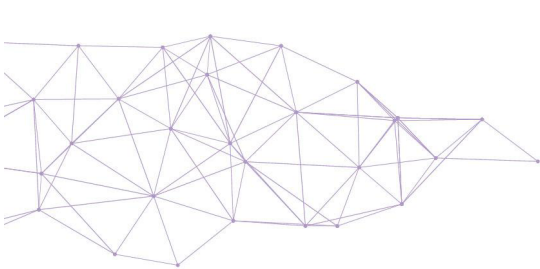
when the underlying conditions are met. Execution of a smart contract is triggered via a blockchain transaction and will produce a change in the blockchain state'. P De Filippi, C Wray and G Sileno, 'Smart contracts', (2021), Internet Policy Review, 10(2)

²⁵ It is possible to create alterations, i.e. by means of forks. Nevertheless, this would imply compelling the network governance 'owners' to alter the wording of the smart contract, which in decentralized metaverses would be particularly complex.

²⁶ For example, models that offer users a share in the exploitation rights of a given artist or in the profits obtained from the exploitation of a given work or works. (ia. Audius y Royal.io).

²⁷ Stablecoins can be defined as cryptocurrencies that aim to maintain a stable value relative to a specified asset, or a pool or basket of assets. BIS, *Stablecoins: risks, potential and regulation*, Working Paper 905(2020). See also, BIS. G7 Working Group on Stablecoins, *Investigating the impact of global stablecoins*, p.11. <https://www.bis.org/cpmi/publ/d187.pdf>, accessed on 1st July 2024; PANETTA, F, *The two sides of the (stable)coin*, Speech by Fabio Panetta, Member of the Executive Board of the ECB, 2020, <https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp201104~7908460f0d.en.html>, accessed on 1st July 2024. Also, MiCA Regulation established a legal framework for two kinds of stable coins: 'asset-referenced token' (a type of crypto-asset that is not an electronic money token and that purports to maintain a stable value by referencing another value or right or a combination thereof, including one or more official currencies -art. 3, 6- and 'electronic money token' or 'e-money token' (a type of crypto-asset that purports to maintain a stable value by referencing the value of one official currency -art. 3, 7-).

²⁸ It should be recalled that already in December 2020, the Bundeskartellamt initiated proceedings for abuse of dominant position against Facebook due to the link between Oculus and Facebook. Vid. https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2020/10_12_2020_Facebook_Oculus.html?sessionid=F162AAAA8CB2CE1E0642270CCC9C1F07.2_cid378?nn=3591568



means of interaction with the real world in the case of hybrid metaverses). The diversity of devices and assets compatible with each metaverse as well as the ownership of intellectual and industrial property rights (essentially copyright, design, patents and utility models) on such items and their interoperability should be analysed.

f) **Fees and commissions:** Last but not least, it is essential to bear in mind the necessity of control (or, at least, the implementation of transparency obligations) regarding fees established for each of the above-mentioned features (from access to the use of tools necessary for the development of the user's activity). We should also take into account that many of these fees will be integrated into the smart contracts mentioned above, which makes it even more important to ensure that they comply with the law.

4. Markets within virtual worlds

4.1. Main characteristics of the 'activity' markets within the metaverses

Firstly, it is pertinent to point to the growing development of products linked to these new digital scenarios and to two of their key technologies: artificial intelligence -especially in its generative aspect- and blockchain. The development of digital 'products' offers a territory of exponential interest. Traditionally associated with video games (i.a. digital skins and other digital accessories or ornaments), these products are now expanding to virtual worlds linked to their use by virtual avatars, the emergence of virtual collecting trends (especially through non-fungible tokens -NFTs-) and the new financing possibilities associated with them (token economy or tokenomics). In addition, alongside these new digital products (or assets), there are others products which allow to mix the physical and digital worlds (the so-called 'phygital').

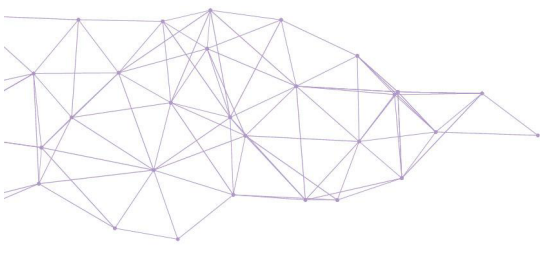
Secondly, linked to these new products, new specialised services are emerging. The new service providers use, understand and interact with the new technologies that integrate these products for offering their services. These services range from minting services of NFTs or the minting of other types of tokens in blockchain networks, virtual shops, marketplaces specialising in these new virtual products, virtual exhibition space services and other forms of exploitation of these new virtual products.

Thirdly, undoubtedly, one of the areas that will be most affected by these new realities is advertising. In fact, there are already clear examples of the emergence of synthetic avatars replacing models in advertising, or the creation of synthetic 'influencers' design using Generative Artificial Intelligence.

Finally, as we have already mentioned, these new digital scenarios favour the expansion not only of new products and new ways of exploiting them, but also new means of financing (much broader than it might seem at first glance) both for creators and for users.

4.2. Challenges from the legal perspective

4.2.1. Challenges relating to new virtual products



There are four major controversial issues: (i) the 'co-design' on virtual platforms²⁹; (ii) the development of these products using generative artificial intelligence (hereinafter GAI); (iii) the tokenisation of creations; (iv) the rising of 'phygital' products:

- The first of the aspects indicated ('co-design' on virtual platforms) already occurs in the universe of current digital platforms (especially in the environment of certain video games). In the event that the result of this joint effort is protectable, it will be necessary to determine who would be the creator (or in this case creators) of either the design, the work or both (if it is considered that there is an accumulation of protections in this specific case) and, therefore, who would be the holder of the exploitation rights over this specific 'creation' and/or 'design'. Furthermore, if protection by means of a specific trademark is sought for these 'creations' and/or 'designs' produced 'collaboratively' on the platform, it would be necessary to determine, at the same time, who is the owner of that trademark.

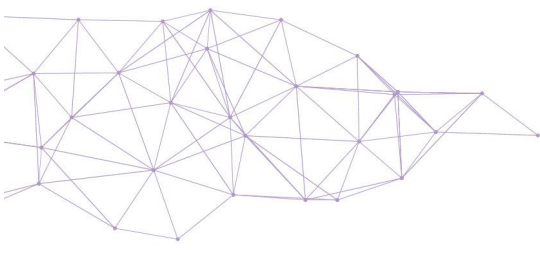
We are therefore faced with an extension of the problem of 'user-generated content', although this time in virtual reality or immersive reality environments in which interactions take place in a metaverse. We must also take into account three other possible problematic situations: the case of one of the 'co-creators' making a contribution that infringes the intellectual or industrial property rights of an owner; the case of the product being used unfairly by one of the co-creators or by a third party; and, finally, the use of artificial intelligence, especially generative artificial intelligence, in these 'collaborative' products.

- This last consideration brings us to the second of the aspects mentioned above (product development using AI). There are several possible scenarios: the simple use of data mining for the development of new products, the use of machine learning tools, assistance from artificial intelligence tools in the development of digital products and the use of generative artificial intelligence (hereinafter, GAI). In the latter case, we can find two situations: the use of GAI directly by the designer or the company that markets the product in question, or the case we mentioned in the previous paragraph, i.e. the utilization of GAI by users of virtual worlds. In these cases (although the use of data mining may certainly entail some controversy in the case of mining on elements protected by intellectual property rights), the lawfulness of GAI's use of protected works and performances³⁰ as well as the protection of creations generated by GAI remain the most important issues³¹.

²⁹ For a comprehensive review of the economic literature regarding this issue, see Y Kim, 'Not just for play: Why the metaverse should be leveraged for co-creation', 2023, Business Horizons, BUSHOR 1932, <https://www.sciencedirect.com/science/article/pii/S0007681323001180>, accessed on 1st July 2024.

³⁰ In my opinion, when dealing with these cases, the following iter should be followed: 1) determine whether there is a reproduction of the work or not (or another type of unauthorised use); 2) determine what type of reproduction we are dealing with (whether it is expressive or merely incidental or non-significant); 3) determine whether we can apply a certain limit to copyright (namely, fair use in the case of the United States or text and data mining or pastiche limits in the case of the European Union, as indirectly indicated by the brand new EU regulation on artificial intelligence). For further discussion on this issue, among many others, P Fernández Carballo-Calero, *La propiedad intelectual de las obras creadas por inteligencia artificial*, (Thomson-Reuters-Aranzadi, 2021); C Saiz García, 'Las obras creadas por sistemas de inteligencia artificial y su protección por el derecho de autor', *Indret: Revista para el Análisis del Derecho*, 2019, núm.1; E Bonadio, P Dinev and L McDonagh, '¿Can Artificial Intelligence Infringe Copyright? Some Reflections', *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar, Cheltenham 2022), 245-257.

³¹ In my opinion, it would not be necessary to grant any type of sui generis right to the owner of the artificial intelligence program over the products that are created by it, since the investment made in the creation of the GAI would be covered economically by the already existing protection of the GAI software (or commercial secret regarding the GAI algorithm) that will be exploited by means of licences for its use. It would be different if it is



- Regarding the tokenization of digital creations and products, it is unavoidable to refer to NFTs and the profound change they imply in digital markets. However, as it will be discussed below, this revolution is not limited to NFTs, but goes much further. Nevertheless, NFTs raise interesting legal challenges, especially regarding their very legal nature. Although the legal nature of NFTs is still controversial, we advocate their definition as a certificate of ownership that allows a given digital good to be considered unique and facilitates its transmission (distribution) by means of smart contracts.

Excursus: NFTs as certificates of property of digital (and/or physical) goods

The current technological context has boosted the development of new intangible assets. These intangible assets are digital assets (data, tokens, etc.) that can have a significant economic value in the markets and that can also be used to obtain financing. These new assets have raised a number of important legal questions, starting with the determination of their legal nature and the rights that can be exercised over them. One of the main controversial aspects is whether these assets can be considered as the subject of personal property rights³².

Certainly, at least in most continental legal systems, the main object of property law is tangible property. For example, the Spanish Civil Code speaks of property as ‘the right to enjoy and dispose of a thing or an animal’ (art.348 Cc). The ownership of certain intangibles good is traditionally considered as special property, i.e. intellectual property rights (copyright) and industrial property rights (trademark law, patent law, design). Nevertheless, in the last century, the advent of digitisation made it possible to begin to create certain dematerialised (securitised) and digitised representations of ownership over certain non-tangible assets (for example, regarding company shares).

the user (artist, creator or designer) who makes use of a GAI system as a tool for the creation of their works or designs. In these cases, the protection by copyright and even by design can be contemplated, as long as a series of parameters are met. These parameters could be: (i) the prior planning of the final result to be achieved, (ii) the achievement of which will determine the modulations of the responses offered by the artificial intelligence, (iii) the number of prompts used, their relevance, (iv) as well as the use of other instructions and adjustments that can be made before the creation is finalized. On this issue, among many others, P Fernández Carballo-Calero, *La propiedad intelectual de las obras creadas por inteligencia artificial*, (Thomson-Reuters-Aranzadi, Cizur Menor, 2021); S Yanisky-Ravid, ‘Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era--The Human-like Authors are Already Here- A New Model’, (2017) Mich. St. L. Rev. 659; E Bonadio and L McDonagh, ‘Artificial Intelligence as Producer and Consumer of Copyright Works: Evaluating the Consequences of Algorithmic Creativity’ (2020) Intellectual Property Quarterly, 2, pp. 112-137. In fact, there is an incipient jurisprudential recognition of this issue in the judgement of the Beijing Internet Court (2023) Jing, 0491 Min Chu 11279. In this case, the plaintiff, Mr. Li filed a copyright lawsuit alleging that the defendant, Ms. Liu, a blogger on Baijiahao platform, violated his copyrights in the AI-generated picture labelled as ‘Spring Breeze Brings Tenderness—AI generated picture’ (春风送来了温柔) because she used it for illustrate her article title ‘Love in March, Among Peach Blossoms’ (三月的爱情,在桃花里). In its Judgement the Beijing Internet Court, analyse the different decisions that took the artist during the elaboration of the image (such as: model selection, positive and negative prompts (art type + subject + environment + composition + style) and other parameters – i.a. sampler, definition, and CFG scale). Finally, the Court rules: ‘Therefore, the picture involved is not a “mechanical intellectual achievement”. Unless there is contrary evidence, it can be found that the picture involved is independently completed by the plaintiff and reflects the plaintiff’s personalized expression’. https://english.bjinternetcourt.gov.cn/2023-12/28/c_688.htm, accessed on 1st July 2024.

³² UNCITRAL, Taxonomy of legal issues related to the digital economy, United Nations, 2023, <https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/digitaleconomytaxonomy.pdf>, pp. 40-44.

Certainly, this question is far from settled at the present time, due to the classical conception (present in many legal systems of the restriction of property rights to tangible goods or assets)³³.

In the case of NFTs (also called asset-backed digital tokens), a layer of complexity is added as questions arise as to its very legal nature (alongside, of course, the nature of the underlying asset)³⁴.

In my opinion, in order to determine this question, we have to take into account the technological configuration of the NFT itself and the consequences that result from it.

NFTs offer the technical capacity to certify the 'uniqueness' of a digital (or physical good), i.e. the unique character of a given digital good (asset) that distinguishes it from the rest and allows it to be assimilated to a physical good, being traceable and distinguishable from others³⁵. Indeed, part of the IP academics considers that NFTs cannot be considered as a certificate allowing the full transfer of ownership of digital works, precisely because of the digital character of the underlying asset³⁶. Nevertheless, in recent years, the judicialization of cases concerning NFTs has been consolidating a case law that clearly recognises that NFTs can be certificates that recognise ownership rights over unique digital assets that can be the object of legal transactions of transfer of ownership³⁷. In addition, this interpretation is beginning to permeate the latest proposals on digital assets at the European level (e.g. in trademark law³⁸ or securities market law³⁹). Therefore, in my opinion, the transfer of an NFT

³³ This situation has led to the impulse in some jurisdictions for a revision of the very object of property law. Thus, for example, in the United Kingdom, we find a Draft legislation for the Property (Digital Assets etc) Act 2024 which states 'A thing (including a thing that is electronic in nature) is capable of being the object of personal property rights even though it is neither: (a) a thing in possession nor (b) a thing in action.'

³⁴ 'While the existence of property rights in the linked asset itself might not be problematic (after all, the asset itself may not be an object that is new to property law), questions may arise as to (i) whether the holding of the token can confer rights in the linked asset and (ii) whether transferring the token to another person can lawfully transfer to that person the rights in the linked asset'. UNCITRAL, ob.cit., p.44.

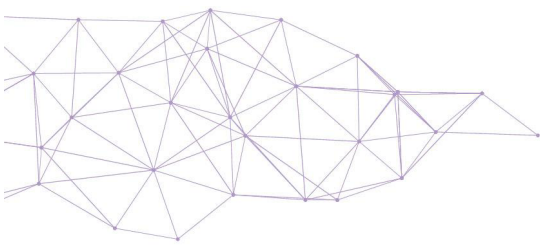
³⁵ I discuss this notion in more depth in V Jiménez Serranía, 'Metaverso(s): nuevos retos para las industrias culturales (Especial referencia a los NFTs) FODERTICS 11.0: derecho, entornos virtuales y tecnologías emergentes (Comares, 2023), pp. 207 a 209 y V Jiménez Serranía, 'Web 3.0, NFTs y Propiedad Intelectual', Protección y gestión de la propiedad intelectual en el metaverso, (Reus, 2023), pp. 90-100. See also, Alicante Commercial Court Order, 13 July 2023, nº 168/2023, ECLI:ES:JMA:2023:2264.

³⁶ B Bodó, A Giannopoulou, J Quintais y P Mezei, 'The Rise of NFTs: These Aren't the Droids You're Looking For'(2022), European Intellectual Property Review, pp. 9-12; P Mezei y G Chawla Arora, 'Chapter 11 - Copyright and Metaverse' en *Research Handbook on Metaverse and the Law*, (Edward Elgar, Cheltenham 2024), <https://ssrn.com/abstract=4444608>, accessed on 2nd July 2024.

³⁷ I.a. Lavinia Deborah Osbourne v Persons Unknown Category A & Ors [2023] EWHC 39 (KB) in UK and, in Singapur, Janesh s/o Rajkumar v. Unknown Person ('chefpierre') HC/OC 41/2022.

³⁸ 'NFTs are used as unique digital certificates registered in a blockchain and can be used to record an interest in an item (e.g. the alleged ownership of a digital artwork or collectible). Like conventional certificates, NFTs in this form relate to something other than themselves, which is often digital goods but can also be physical goods' EUIPO, Trade mark Guidelines, Ed. 2024, <https://guidelines.euipo.europa.eu/2214311/2215372/trade-mark-guidelines/4-4-3-non-fungible-tokens--nfts->, accessed on 2nd July 2024.

³⁹ 'MiCA does not apply to crypto-assets that are unique and not fungible with other crypto- assets. It is the same for crypto-assets representing unique and non-fungible services or physical assets (such as product guarantees or real estate). Non-Fungible Tokens (NFTs) which cumulatively meet the criteria of uniqueness and non-fungibility remain exempt from MiCA. As such, crypto-assets possessing its own uniqueness are not readily interchangeable. Their value cannot be compared to an existing market or equivalent asset (...). In assessing the uniqueness and non-fungibility of a crypto-asset, such crypto-asset may be considered as unique and not fungible if its characteristics and/or the rights it provides distinguish it from the other tokens issued by the same (and any other) issuer.' ESMA, cit., p. 20.

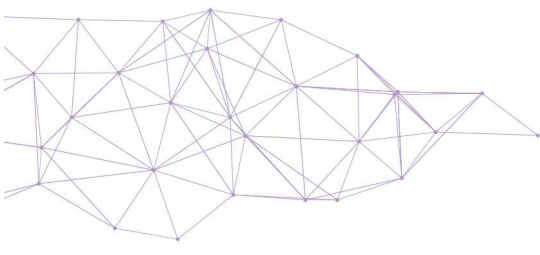


will imply the transfer of ownership of the underlying asset (in the case of works of art, of the 'support' of the digital file of the work), without necessarily implying the granting of any intellectual property rights over the work in question beyond a simple licence of use (in many cases implicit and, of course, limited) so that they can 'expose' this work in their social networks and resale marketplaces. This interpretation, although it may seem novel, is not, at least in the Spanish legal system, since we would simply be applying the theory of title and mode (art. 609 Cc). The NFT would be a certificate of ownership that we would transfer by means of the smart contract in which the sale is formalised, implying the transfer of the digital asset (good) that it certifies as unique and as the property of the transferor.

In light of the above, there is no doubt that there is a significant impact of NFTs on the exercise of certain important intellectual and industrial property rights. In fact, if we go back to the essential characteristics that NFT certify, i.e. uniqueness, authenticity and ownership, we can easily deduce the potential impact (and not just potential, at least at the contractual level) of this technology on a classic issue which is the possibility of the consideration of the distribution right in the digital sphere. Let us bear in mind that, in the case of works of art, regardless of the licences that may exist on the intellectual property rights of the work that has been minted, the NFT, as we said above, is a certificate of ownership over the medium – corpus mechanicum- (digital, in most cases) of the work. The purchaser of an NFT will, as a general rule, become the owner of that 'unique' digital corpus mechanicum of the work. NFTs allow such distinction because they provide a unique identification of this digital asset, guarantee its ownership, as well as its transmission. We are therefore faced with a technological advance that changes the rules of the game in the digital world by making it possible to create an analogy between the physical and digital worlds and, therefore, in our opinion, to contemplate the existence of the digital distribution right and, furthermore, the existence of an exhaustion of this digital distribution right, which would allow the resale of these works (or of the products protected by design or trademark), without the need to request permission from the original owner. In fact, if we analyse the commercialization of NFTs in the marketplaces themselves, we see that resellers are not hindered in any way by the original seller regarding the sale of these NFTs.

- Leaving aside NFTs, the blockchain allows the creation of different types of crypto assets linked both to creative projects and to the NFTs themselves. Without being exhaustive, these include (i) the possibility of creating utility tokens for access to events or communities (ii) and the possibility of tokenizing the 'exploitation rights' of intellectual property (which, more strictly explained, would consist of issuing tokens – generally in the form of 'security tokens' – that allow participation in the future income obtained from the commercialization or other forms of exploitation of a given work)⁴⁰, and, obviously, (iii) the possibility of collateralisation of the 'exploitation rights' of intellectual property (which, more strictly speaking, would consist of issuing tokens – generally in the form of 'security tokens' – that allow participation in future revenues obtained from the commercialisation or other forms of exploitation of a given work), including, (iv) collateralisation of the 'exploitation rights' of intellectual property (which, more specifically, would consist of issuing tokens that allow participation in future

⁴⁰ For instance, in the music industry, through the Royal platform, rights holders (this is intended for artists) can issue tokens that represent a percentage of the share of the remuneration generated by the public communication of the work in question in the form of making it available via streaming. When the artist receives the corresponding remuneration, payment of this percentage is generated to the token holders. <https://royal.io/legal/tos>. An example is the tokens issued by Diplo in respect of royalties for his well-known song Don't Forget My Love. In this case, the artist has set a percentage per token of 0.004%. <https://royal.io/editions/diplo-dontforgetmylove>.



revenues obtained from the commercialisation or other forms of exploitation of a given work), of course, (v) the collateralisation of NFTs of certain collections to obtain financing (which may be carried out either by the creator or owner of the collection or by the acquirer of the NFT)⁴¹.

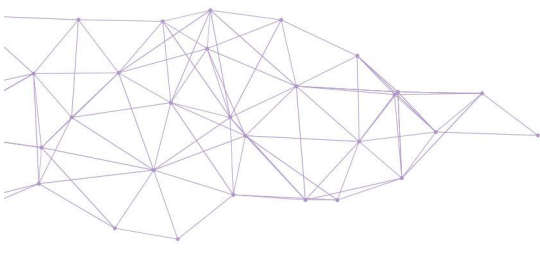
- Lastly, 'phygital' products (i.e. those products that link the physical world with the virtual world), arise the need to develop interoperability between the physical world and the virtual world will arise and, also, the development of tools (not only at the technical level but also at the legal level) that allow the recognition and the execution of legal relations on the physical and digital level, simultaneously. Finally, the proliferation of 'digital twins' should be mentioned, and also their need for legal protection, ('patentability' being a particularly relevant issue).

4.2.2. Challenges related to the new virtual marketplaces

As already pointed out in a previous section, the development of the new virtual worlds or metaverses entails the emergence of new ways of understanding the marketing and exploitation of products. Hence, we will encounter (i) the need to establish new procedures or tools associated with the technical nature of these new products, (ii) the emergence of new operators (service providers for these digital worlds) and new market structures (platforms) linked to the new technical structures based on DLT technologies, and (iii) the proliferation of new types of infringements.

- The first of the above-mentioned issues refers to the need for the implementation of smart contracts, which are key to the fluid commercialization of new digital products and their traceability. Smart contracts, as is well known, cannot be considered contracts in themselves; they are technical instructions that make it possible to execute a contract agreed between the parties. At present, these smart contracts are quite basic, essentially serving for the transfer of control over a given digital asset. The real challenge for the coming years will be how to efficiently integrate more complex contractual clauses, especially those relating to intellectual property rights, into these smart contracts.
- Regarding the emergence of new service providers and platforms for these virtual worlds, we encounter, on one hand, the potential for the use of decentralized technologies not only at the technical level but also at the governance level (which can give rise to fully or partially decentralized platforms and services), which raises important doubts as to their legal qualification and the attribution of liability; and, on the other hand, linked to the previous point, the enforceability of the current rules to these new realities (especially with regard to the Digital Services and Markets Regulations - DSA and DMA) as well as competition law itself (both in its antitrust and unfair competition aspects)

⁴¹ It is noteworthy these tokens may be considered either financial products (securities) within the Directive 2014/65/EU of 15 May 2014 on markets in financial instruments or crypto assets subject to MiCA Regulation. The qualification of crypto assets is a quite controversial topic. Just as a reminder, by 30 December 2024, the European Securities Market Authority shall issue guidelines in accordance on the conditions and criteria for the qualification of crypto-assets as financial instruments. For further information, see ESMA, *Consultation paper on the draft Guidelines on the conditions and criteria for the qualification of crypto-assets as financial instruments*, 29 January 2024, ESMA75-453128700-52, https://www.esma.europa.eu/sites/default/files/2024-01/ESMA75-453128700-52_MiCA_Consultation_Paper_-_Guidelines_on_the_qualification_of_crypto-assets_as_financial_instruments.pdf, accessed on 1st July 2024.



- Finally, any new scenario entails the development of new forms of infringement. Concerning new products, especially in tokenization scenarios, it will be necessary to consider the mandatory implementation of oracles that certify the veracity of the attributions of a given digital good, even more so when intellectual and industrial property rights are affected. The scope of study of infringements in these new virtual worlds, in our opinion, will fundamentally cover three aspects: infringements involving the creation of the product itself (the use of AI and the tokenisation of products protected by intellectual or industrial property being of particular interest due to their novelty); the new forms of infringement linked to their commercialisation and the adaptation from a procedural point of view to these new technical realities that have a clear transnational dimension.

5. Enforceability of DSA and DMA in Virtual Worlds: Special reference to decentralised virtual worlds

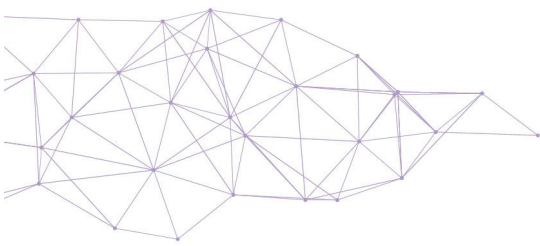
To conclude this article, we believe it is essential to make a brief reference to the applicability of the Digital Service Act Package to these new realities. This section will focus on two of the most controversial aspects, from a market perspective: the application of the DSA and the DMA to decentralized metaverses and the application of certain provisions of the DSA to NFTs-marketplaces.

5.1. DSA and DMA and decentralised virtual worlds: the concept of granularity

The application of both regulations will encounter a major obstacle: their enforcement in decentralised virtual worlds. While it is true that, a priori, these regulations, could be applicable to private 'centralised' metaverses (i.e. those whose governance is in the control of a company), their applicability in the case of metaverses with their governance control by a consortium, and especially in the case of decentralised governance (DAO), raises doubts.

Decentralised Autonomous Organisations (DAO) can be defined as a computer programme, running on a peer-to-peer network, which incorporates governance and decision-making rules. DAOs are therefore organisations that operate without the need for a central authority and are governed by the governance rules that have been established. Their lack of representative bodies and the granularity of their decision-making and their spatial location (they will no longer have a specific domicile and have an international vocation) do not allow them to accommodate in the regulation of traditional legal entities⁴².

⁴² Certainly, attempts at regulation are beginning to emerge. For example, the Coalition of automated legal applications (COALA) Model Act and the Wyoming DAO Act apply the Wyoming Limited Liability Company Act to DAOs so that they can have legal status as limited liability companies. The registered name of a decentralised autonomous organisation shall include a phrase or abbreviation to denote its status as a decentralised autonomous organisation, specifically DAO, LAO or DAO LLC. In addition, the model law proposed by COALA is intended as a guide for the national laws that will be created with regard to DAOs. In this model law, the DAO is considered to have a legal personality that is distinct and separate from its members and is therefore subject to rights and obligations and has limited liability. With regard to its administration, it is stated that the DAO: '(1) is not required to have administrators, including a board of directors or a trustee, unless provided for in its Articles of Association. In the absence of such provision, all powers and duties of the Trustees shall be vested in the Members of the DAO as a class; (2) The voting mechanism for nominating and appointing trustees shall be set out in the Articles of Association.' (Art.13). Although many of the aspects covered (legal representation,



Therefore, (whatever the white papers of many of the DAO projects may say), a DAO cannot be legally recognised, at least nowadays, as a holder of goods and rights, and, therefore, cannot be held liable.

Essentially, therefore, the main impediment to implementation is that in such cases there is no subject (intermediary platform) to which the DSA or the DMA is to be enforced. Regarding the DMA it would be completely inapplicable, since we would not have that 'central' intermediary considered as a gatekeeper.

Concerning the DSA, one could certainly consider the need for adaptation or selection within these rules (for example, to avoid certain situations considered illicit -dark patterns, marketing of certain products or services, etc.- or to protect certain individuals -especially in the case of minors-) that should be integrated into the design of these platforms. In other words, taking into account the uniqueness of this type of platform and its governance model, rules on 'legal by design' should be adopted (we should not forget that DAOs do not emerge spontaneously, but they will be originally driven and programmed, at least at their foundation, by a limited number of individuals or even by companies in the traditional sense of the term). Nevertheless, in order to fully achieve this 'legal by design' approach, it is necessary to bear in mind two problematic aspects: i) the need (or opportunity) to justify the applicability of the rules emanating from the European Union in these transnational and fragmented environments; ii) the translation of the principles or rules mentioned into 'code' because these DAOs are technically 'self-governing' by means of smart-contracts (which will require the generation of instructions or sequences of instructions that standardize the different rules considered applicable).

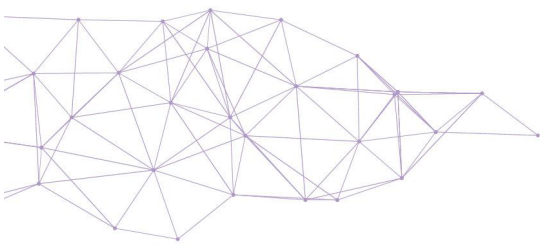
5.2. Applicability of the DSA to (centralised) NFTs marketplaces

In this section, the analysis is limited to the activity as a marketplace, not to the mining service that may or may not take place through a NFT marketplace. Furthermore, it will study centralised NFTs-marketplaces (as it has already been explained above how difficult it is for decentralised entities to fit into the current regulation).

First, it is necessary to determine whether we can consider them as an 'online platform'. As a reminder, the definition of online platform in Article 3 i) of the DSA is '*a data hosting service which, at the request of a recipient of the service, stores and disseminates information to the public, unless that activity is a minor and purely ancillary feature of another service or a minor functionality of the main service and cannot be used without that other service for objective and technical reasons, and the integration of the feature or functionality into the other service is not a means of circumventing the applicability of this Regulation*'. Furthermore, article 3 g) iii) determines that the activity of a 'hosting' service consists of the storage of information provided by, and at the request of, a recipient of the service.

It should be borne in mind that both the NFT and the underlying asset which the NFT certifies will not be 'hosted' directly on the platform (but will be on a specific blockchain in the case of the NFT -such as Ethereum or Solana- and in a decentralized repository - such as IFPS- in the case of the work of art or digital asset). Nevertheless, the NFT-

protection of minority shareholders, etc.) refer to what is established in the DAO's Articles of Association, it is interesting that at least aspects such as decision-making with regard to hard Forks (Art.16) or the restructuring of the DAO (Art.17) are provided for. COALA, Model Law For Decentralized Autonomous Organizations (DAOs). <https://coala.global/wp-content/uploads/2022/03/DAO-Model-Law.pdf> For further understanding of DAOs modelisation see, A F Muñoz Pérez, *LAS DAOs y el reto de controlar al algoritmo*, (Aranzadi, Navarra, 2023).



marketplaces provide certain essential data, which allow the identification and publicity of NFTs, their creators, their owners, their transactions and other important information linked to them (such as information regarding IP rights granted by the purchase of an NFT⁴³). Therefore, in my opinion, NFTs-marketplace can fall under article 3 i) DSA definition of online platform.

Therefore, should centralized NFTs marketplaces be considered as 'online platforms allowing consumers to conclude distance contracts with traders' regulated by the DSA? As a reminder, Section 4 of Chapter III DSA sets out the '*Additional provisions applicable to providers of online platforms allowing consumers to conclude distance contracts with traders*' (Articles 29 to 32). These articles establish a series of obligations for this type of platforms relating to (i) traceability of traders, (ii) compliance with information obligations by traders from the design of the platform itself and (iii) the right to information on illicit products that have been commercialized on the platform. It is obvious that if these obligations were enforced on NFTs marketplaces, many of the problems that exist today (identification of NFTs on illicit works or products, identification of sellers, etc.) should be avoided.

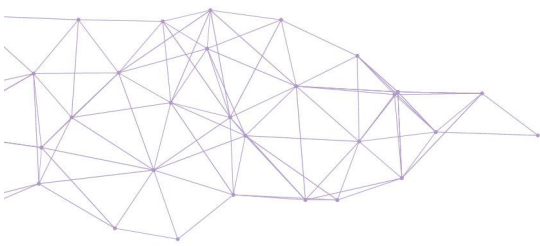
Nonetheless, there are certain problems with the application of these measures. First, the legal nature of the transactions regarding NFTs on these kinds of platforms. In my opinion, as I have already stated in this paper, we would be talking about contracts for the sale and purchase of digital goods certified by NFTs. These contracts of sale are formalised and self-executed by means of smart contracts. Thus, these contracts will fall under the definition of 'distant contracts of products'.

Secondly, articles 29 to 32 DSA apply only to business-to-consumer contracts (consumers who conclude distance contracts with traders). In this case, there is necessary to distinguish between the first sale of the NFT and its secondary market. Certainly, regarding the secondary market, it will be more complicated determining a B2C relationship between the parties, due given that in many cases we will be talking about civil consumer relationships (unless they are, for example, professional digital art collectors or dealers).

Nevertheless, if articles 29 to 32 are applicable to the first sale of NFTs in NFTs-marketplaces, a large part of the problems existing on these platforms (at least those related to IP infractions) would cease. It should be noted that most of the current problems regarding NFTs are linked to minting made by an unauthorised person who, on many occasions, is not easily identifiable. Meanwhile, article 30 establishes the obligation by the platform to obtain a series of essential data on the trader to be able to identify and locate him/her properly and articles 31 and 32 determine, amongst other important duties, some specific obligations for the platform regarding illicit goods⁴⁴. In our opinion, this first sale

⁴³ Generally, NFTs of copyrighted works will be accompanied by a very limited licence to use the work for its communication to the public on the buyer's social networks and on secondary markets where it can be traded. In other words, in the case of an NFT of an original work that has been minted by its author or right holder, the acquisition of an NFT does not entail the transfer of any exploitation (reproduction, communication to the public, distribution or transformation) rights in the work (in the case of musical works, composer and lyricist) or performance (i.e. those belonging to performers or producers). For the time being, smart contracts linked to NFTs do not include information on copyright or related rights, which will continue to depend on the terms of external licences that the parties must be aware of and respect. V Jiménez Serranía, 'Web 3.0, NFTS y Propiedad Intelectual', *cit.*, pp.96-97.

⁴⁴ In a nutshell, Section 4 of Chapter III DSA establishes that providers of online platforms allowing consumers to conclude distance contracts with traders shall ensure that traders can only use those online platforms to promote messages on or to offer products or services to consumers located in the Union if, prior to the use of



of goods certified by NFTs on an NFT marketplace will enter the scope of applications of these articles. As a reminder, trader is defined by article 3 f) DSA as 'any natural person, or any legal person irrespective of whether it is privately or publicly owned, who is acting, including through any person acting in his or her name or on his or her behalf, for purposes relating to his or her trade, business, craft or profession'. Thus, the first seller of an NFT (for instance, a crypto artist) shall fall within this definition. Therefore, if the first sale of an NFT can be qualified as a distance contract between a trader and a consumer through a provider of online platforms, articles 29 to 32 should be enforceable (at least regarding this first sale).

6. Conclusions

Virtual worlds or metaverses, as discussed in this paper, imply important legal challenges that are likely to reshape certain legal institutions. It should not be forgotten that we are in the early stages of their development and that we are facing a highly dynamic context, both technologically and economically. Regulators need to accompany these new developments without falling into either excessive regulation (which would be counterproductive for innovation) or under-regulation (which could lead to inefficient or abusive situations that would be difficult to amend given the characteristics of the technologies used (especially in the cases of DLT networks and GAI).

In my opinion there are three elements that will be key in future developments: on the one hand, two technical aspects, such as standardisation (both with respect to digital assets and smart-contracts themselves) and interoperability and, on the other hand, the need to develop approaches to the development of metaverses based on legal by design, which implies close collaboration between legislators and developers.

Linked to this consideration, we would also point to the need to develop standardized formulas to harmonize the content of smart contracts at international level, which would also allow for their interoperable self-execution in the different service platforms and virtual worlds.

We have, therefore, a long and intense road ahead of us in the development of these new virtual worlds. It is up to us not to fall back into the inefficiencies of today's digital ecosystems.

their services for those purposes, they have obtained the following information, where applicable to the trader: (a) the name, address, telephone number and email address of the trader; (b) a copy of the identification document of the trader or any other electronic identification as defined by Article 3 of Regulation (EU) No 910/2014 of the European Parliament and of the Council; (c) the payment account details of the trader; (d) where the trader is registered in a trade register or similar public register, the trade register in which the trader is registered and its registration number or equivalent means of identification in that register; (e) a self-certification by the trader committing to only offer products or services that comply with the applicable rules of Union law. In addition, platforms should assess the reliability and completeness of the information by using official public databases or by requesting supporting documents from reliable sources. If a provider has sufficient indications or reason to believe that the information provided is inaccurate, incomplete or outdated, it should request immediate correction. Finally, platforms should design the interface in such a way that sellers can comply with their pre-contractual information, conformity and security obligations, and should also inform the consumers concerned about the purchase of an illicit product through the platform in the last six months. They must inform about the illegality, the identity of the seller and the remedies available, provided they have the seller's contact details.



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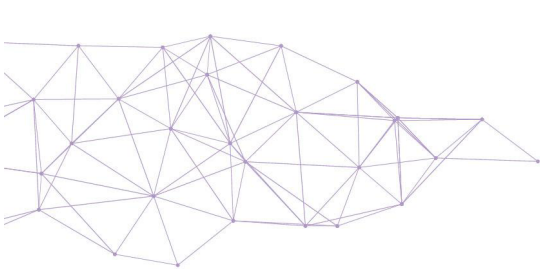
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