

Response to Call for Contributions: Virtual Worlds

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What are virtual worlds? For the purposes of this contribution, we assume that it is currently unknown what virtual worlds will look like. The definition of the metaverse, virtual world, or whatever we should call it – and what it will come to be – will likely depend on whose narrative or narratives are being pushed most forcefully.¹ One thing is certain, however: virtual worlds, supported by increasingly powerful AI systems, bear the potential to pervade human lives at a level hitherto unknown. It is therefore crucial that EU institutions not simply approach virtual worlds as another market to be regulated. They should take an active part in the shaping of virtual worlds, and not leave this process predominantly in the hands of private entities.

This submission is structured under five sections. Each section roughly corresponds to one or two questions from the Virtual Worlds questionnaire as indicated below.

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¹ Matthew Ball, ‘On Spatial Computing, Metaverse, the Terms Left Behind and Ideas Renewed’ (matthewball.co, 06.02.2024) <https://www.matthewball.co/all/metaversespatialandmore>

Virtual worlds as “nothing new” (Questions 3 & 4)

Virtual worlds² are growing out of existing ecosystems in video games, app stores and hardware. Therefore, currently, the main players in virtual world development have already been around for some time, and some of them wield considerable economic and ecosystem power. There is a high likelihood that absent regulatory intervention, market power in existing ecosystems will translate into market power in virtual worlds. This is, however, not to say that there are no new players and business models in virtual world development. In this Section I, we highlight the connections between virtual world development and existing ecosystems, in particular video games. Building on Section I, Section II highlights the specificities of virtual worlds. Section III focuses on the emerging players and business models.

In June 2023, the European Commission (EC) provided its definition of virtual worlds. It focused on three elements (1) *platform* (‘persistent, immersive environments’), (2) *means of access* (‘based on technologies including 3D and extended reality (XR)’), and (3) *purpose* (‘blend physical and digital worlds [...] for a variety of purposes such as [...] entertainment’).³ We need to look no further than the General Secretariat of the Council’s publication on the metaverse to see a similar definition that focuses on (1) *platform* (‘an immersive and constant virtual 3D world’), (2) *purpose* (‘where people interact through an avatar to enjoy entertainment’), and (3) *means of access* (‘accessible through a virtual reality (VR) headset’),⁴ which echoes the sentiments of President von der Leyen on the future of the metaverse.⁵

Many of these publications focus on the novel aspects of virtual worlds. For example, the EC emphasized the emergence of virtual worlds with Web 4.0, which does not even exist yet. However, a focus on novelty risks obfuscating the clear links between the video game industry and virtual worlds, as well as the efforts of established digital ecosystem providers to push for specific visions of virtual worlds in a way that leverages their existing ecosystems.

First of all, the same three elements (1) *platform* - a video game and/or game engine; (2) *means of access* - personal computer, (portable) console, or mobile phone; and (3) *purpose* - genres, e.g., shooter, multiplayer online battle arena (MOBA), sports simulation, sandbox or more specifically subgenres, e.g., tactical and battle royale shooter; have been the ubiquitous standard for evaluating any type of video game and gaming hardware. Virtual worlds will expand the

² The term ‘virtual worlds’ appears to us as the latest iteration of ‘metaverse’, since the latter lost some of its appeal after Facebook’s rebranding to Meta. We do not have a preference on the choice of term and note that many still opt for ‘metaverse’.

³ Communication from the Commission, ‘An EU initiative on Web 4.0 and virtual worlds’ (EC, 11.07.2023) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0442> 1, 1.

⁴ General Secretariat of the Council (Council of the European Union), ‘Metaverse Virtual world, real challenges’ (European Council, 09.03.2022) <https://op.europa.eu/en/publication-detail/-/publication/93dbc29a-4ad0-11ee-aeff-01aa75ed71a1/1,2>.

⁵ European Commission, ‘People, technologies & infrastructure – Europe’s plan to thrive in the metaverse’ (European Commission, 14.09.2022) https://ec.europa.eu/commission/presscorner/detail/es/STATEMENT_22_5525

number of concurrent users or players in a virtual location, subject to overcoming spatial partitioning,⁶ and will provide (in fact, are already providing) use cases other than gaming.

One may think of this as a similar progression from single player (one person) to multiplayer (two people) to MOBA games (10 people) to massively multiplayer online role-playing game (MMORPG, 100 people) per map. For example, during the Fortnite Galactus event in November 2020, there were 15.3 million concurrent Fortnite players,⁷ even though in most virtual world precursors, most users are on maps with 40 to 100 concurrent users.⁸

Platform

The video game origins shape the current competitive landscape of virtual worlds. It is possible that the market-leading *platform* of the future already exists as a precursor, with Fortnite and Roblox being the most promising examples, or that it is yet to be created. The software or *platform* element is, at least for now, primarily driven by gaming companies, their platforms, and other platform capabilities, such as Epic Games' Fortnite and the Unreal Engine, Microsoft's Minecraft, and platforms like Roblox or Decentraland, which do not offer XR immersion. This is perhaps best illustrated by Fortnite's expansion from the battle royale shooter subgenre to virtual worlds, leveraging the network effects of its player base and eSports and gaming ecosystem.⁹ Each of these companies has a unique selling point, such as Roblox's focus on facilitating cross-platform creation, which has enabled it to amass 350 million monthly active users, while Fortnite hosts an ecosystem of virtual worlds with transportable accessories: in Ball's words, a cross-entitlement platform.¹⁰ Pokémon Go and virtual eSports arenas (eva.gg) are examples of partial and full immersion respectively.

If we unpack this picture, one thing becomes clear: there are not many players that can develop large-scale virtual world platforms. The most relevant platforms today are Roblox, Fortnite (40% owned by Tencent), Minecraft (owned by Microsoft), Decentraland, The Sandbox, and Second Life (although user numbers have declined significantly, capabilities remain). While platforms like Roblox have seen significant user numbers in recent years¹¹, and despite annual

⁶ Most games are limited to 100-120 player per region, see: Kendra M. L. Cooper and Walt Scacchi (eds), *Computer Games and Software Engineering* (1st edn, CRC Press, 2020) 155-160.

⁷ Statista, 'Number of concurrent Fortnite players during in-game live events as of December 2020' (Statista, 14.12.2022) <https://shorturl.at/cmzR5>

⁸ Metagravity, 'Why spatial partitioning is not the answer to scaling the metaverse' (13.06.2023, Medium) <https://shorturl.at/enqQL>. In addition, player movement was severely restricted during the event to avoid overloading the servers. Consequently, the assumption of a new market based on the desire to expand the number of concurrent users on a map, i.e., an area in a video game, does not follow. MMORPGs are still called games, despite the increase in the number of people interacting with each other.

⁹ Andrew Webster, 'Fortnite is winning the metaverse' (08.02.2024, The Verge) <https://shorturl.at/lprLV>; Rajesh Mani Kumar G, 'The Future of Virtual Worlds: Comparing Metaverse, Second Life, Fortnite, and World of Warcraft' (04.03.2024, Medium) <https://shorturl.at/auHX2>

¹⁰ Ben Thompson, 'An Interview with Matthew Ball About the Vision Pro and the State of Gaming' (Stratechery, 22.02.2024) <https://shorturl.at/kGL28>

¹¹ Roblox was launched back in 2006.

revenues of \$2.8 billion in 2023,¹² it reported a net loss of \$1.158 billion, which has grown exponentially since 2018 due to the need for significant investment,¹³ with R&D and infrastructure spending of more than \$2.1 billion annually.¹⁴ Similarly, in 2023, Epic Games faced approximately \$4.9 billion in costs of sales,¹⁵ compared to \$5.6 billion in gross revenue.¹⁶ In other words, building virtual worlds requires high investment costs (barriers to entry) that only a few companies, such as an independent Activision Blizzard, could afford.¹⁷ Moreover, it should be noted that the monthly active users of Roblox, Fortnite and Minecraft are between 350 and 166 million respectively,¹⁸ compared to several hundred thousand for The Sandbox, Decentraland and Second Life combined. Monthly active users in smaller platforms are difficult to quantify due to the lack of official reports, but their numbers pale in comparison to Roblox, Fortnite and Minecraft.

MMORPGs are also seen as a precursor to virtual worlds and require similar capabilities. The most important are World of Warcraft (now owned by Microsoft), The Elder Scrolls Online (owned by Microsoft), Eve Online, and Guild Wars 2. Riot Games is reportedly working on an MMORPG,¹⁹ but since it is 100% owned by Tencent, and due to Tencent's 40% stake in Epic Games (Fortnite), it is unlikely that these games will compete and thereby cannibalize each other. Idem for the battle royale shooter genre. The most relevant players in this genre are Fortnite (40% owned by Tencent), Call of Duty (now owned by Microsoft), Apex Legends (Developer Respawn Entertainment owned by Electronic Arts), PlayerUnknown's Battlegrounds (PUBG) (13.73% owned by Tencent), and Garena Free Fire (18.7% owned by Tencent).²⁰ In addition to these holdings, it should be noted that Tencent continues to increase its direct and indirect ownership of Ubisoft,²¹ and other companies.²² An overall picture of ownership structure of game studios as of February 2022 (including Microsoft's acquisition of Activision Blizzard, which has since been confirmed) shows that post-acquisition Microsoft controls 32 game studios, followed by Sony and Electronic Arts which each own 21 studios, and Tencent

¹² J. Clement, 'Roblox Corporation global revenue 2018-2023' (28.02.2024, Statista) <https://shorturl.at/cgikU>

¹³ J. Clement, 'Roblox Corporation global net loss 2018-2023' (28.02.2024, Statista) <https://shorturl.at/forwG>

¹⁴ J. Clement, 'Roblox Corporation global OPEX 2020-2023' (29.02.2024, Statista) <https://shorturl.at/divS3>

¹⁵ J. Clement, 'Epic Games annual cost of sales 2018-2026' (08.12.2023, Statista) <https://shorturl.at/alqIS>

¹⁶ J. Clement, 'Epic Games annual gross revenue 2018-2026' (08.12.2023, Statista) <https://shorturl.at/cvDJK>

¹⁷ Vice versa, this means that access to funding constitutes a barrier to entry for the virtual world layer, discussed below.

¹⁸ See respectively, Ben Thompson, 'An Interview with Matthew Ball About the Vision Pro and the State of Gaming' (Stratechery, 22.02.2024); Rohit Shewale, 'Fortnite Statistics For 2024 (Active Players, Revenue & More)' (DemandSage, 16.12.2023) <https://shorturl.at/jNRU>; Rohit Shewale, '25 Minecraft Statistics For 2024 (Users, Servers, & More)' (DemandSage, 01.01.2024) <https://shorturl.at/kmuY6>

¹⁹ Abhishek Mallick, 'Riot Games League of Legends MMORPG: Release window, what to expect, and more' (11.07.2023) <https://shorturl.at/arKP6>

²⁰ Steven Messner, 'Every game company that Tencent has invested in' (09.08.2020, PCGamer) <https://shorturl.at/zMX12>; Hwang Soon-min and Yoon Yeon-hae, 'China, Saudi Arabia eye Korean game companies' (Pulse, 06.12.2023) <https://shorturl.at/gpQ57>; Garena Free Fire: Anshuman Daga, Kane Wu and Scott Murdoch, 'Tencent raises \$3 bln by trimming stake in Shopee-owner Sea' (Reuters, 05.01.2022) <https://shorturl.at/psDI8>

²¹ Dean Takahashi, 'Ubisoft beefs up ties to Tencent through sale of Guillemot Brothers Ltd. stake' (06.09.2022, GamesBeat) <https://shorturl.at/rUZ37>

²² Steven Messner, 'Every game company that Tencent has invested in' (09.08.2020, PCGamer)

owning 14 studios.²³ Lax merger control in the eSports and gaming space has facilitated this picture of concentration and cross-ownership. As we wrote elsewhere, the EC's clearance of the *Microsoft/Activision Blizzard* merger has implications not just for video games but also virtual worlds.²⁴

Means of access

The *means of access* to virtual worlds does not need to be VR technology: this is an idea that is being driven primarily by the undertakings that stand to gain the most from its adoption. Similar to video games, virtual worlds can be accessed without VR technology, via PCs, consoles, and mobile devices. As discussed further in Section 2, Meta and Apple will likely try to ensure that it requires some form of VR/AR/XR *means of access*, because they are pushing the business model that Apple has succeeded with for smartphones, a device-centric bottleneck that allows Apple and Meta to control everything that happens in this new virtual environment. Instead of the iPhone and the App Store, they call it Meta Quest 3 and Meta Quest Store and Apple Vision Pro and its app store. Given the challenges of regulating Apple's and Google's smartphone and app dominance, the EC must consider whether it is desirable to allow this business model to become entrenched for the next hardware technology.

Purpose

Purpose, use cases, or content is largely determined by what original equipment manufacturers (OEM's) and platform orchestrators deem as most useful to attract users and/or provide greater control and is best understood on a spectrum. This ranges from doctors using AR for training purposes, to the already alarming rate of mental health issues exacerbated by living in an immersive virtual society.²⁵ *Purpose* becomes economically and competitively problematic when the OEM or platform orchestrator also controls it. For instance, it is advantageous for Apple to have exclusive rights to Major League Soccer (MLS), allowing it to make investments that are not possible in the National Football League (NFL) due to fragmented rights.²⁶ Linking MLS to the Vision Pro may initially be attractive until Apple can control all uses of MLS content. This is as much a competition issue as it is an intellectual property issue, with platforms either ignoring the law or effectively replacing it.²⁷

²³ Florian Zandt, 'The Gaming Giants Building A Studio Empire' (02.02.2022, Statista) <https://shorturl.at/agw16>

²⁴ See Ayşe Gizem Yaşar, Amy Thomas, Kenny Barr, Magali Eben, 'Gaming without Frontiers: Copyright and Competition in the Changing Video Game Sector' CREATE Working Paper 2023/10, 32-33; Fabian Ziermann, 'Assessing the World's Largest Gaming Acquisition under EU Competition Law' (2023) 14(4) JECLAP 203, 205, 208, 215, 218, 219.

²⁵ Vincent Paquin, Manuela Ferrari, Harmehr Sekhon and Soham Rej, 'Time to Think "Meta": A Critical Viewpoint on the Risks and Benefits of Virtual Worlds for Mental Health' JMIR Serious Games (07.02.2023) <https://shorturl.at/zILO5>

²⁶ Ben Thompson, 'An Interview with Matthew Ball About the Vision Pro and the State of Gaming' (Stratechery, 22.02.2024)

²⁷ Taylor B Bartholomew, 'The Death of Fair Use in Cyberspace: YouTube and the Problem With Content ID' (2015) 13 Duke Law & Technology Review 66.

While education, social interaction, medical (or other) training are being presented as separate AR use cases of virtual worlds, we do not see any relevant or noteworthy competition materializing between these use cases. This mirrors the lack of competition among such use cases in existing digital markets, where, for instance educational websites do not compete with social interaction services such as Facebook (apart from the fact that each service competes for the scarce resources of time and attention).

Virtual world layers (Questions 1 & 2)

It has become commonplace to describe virtual worlds within a layered structure. Many examples exist²⁸ and they essentially boil down to five layers, which we map on the three definitional elements discussed in Section 1. Different layers come with distinct challenges in development and deployment, and they must be clearly differentiated as opposed to approaching ‘virtual worlds’ as a whole.

Table 1: Virtual worlds value chain

	Infrastructure	Hardware and software infrastructure that virtual worlds are built on, such as telecommunication infrastructure, chips and processors, and cloud. ²⁹
<i>Access</i>	Hardware	‘physical technologies and devices for private users, enterprise users and developers of [virtual worlds]. Desktop computers, AR/VR headsets, mobile devices, haptic wearables, 3D cameras fall into this category.’ ³⁰
<i>Platform</i>	Engine	Software dedicated to the creation of virtual worlds and experiences, such as Unity and Amazon Sumerian.
	Virtual world	This is the core layer, ie the ‘meta, persistent, immersive, interactive, and interconnected’ environment. ³¹ App stores are not in themselves virtual worlds, but they might be integrated into specific virtual worlds for distribution of experiences, or they might be used as to distribute virtual worlds in future.
<i>Purpose</i>	Experience	This layer includes virtual experiences for end users, which might range from video games, live concerts and sports events to simulation of real-life or complex virtual experiences that do not have a real-life component, like time travel.

²⁸ Jon Radoff, ‘The Metaverse Value-Chain’ (07.04.2021, Medium) <https://shorturl.at/qsBW1>

²⁹ Payment systems are sometimes described as a sixth layer, due to the necessity to integrate them into digital environments where monetary transactions take place. They could be considered within the infrastructure layer.

³⁰ Ayşe Gizem Yaşar, Amy Thomas, Kenny Barr, Magali Eben, ‘Gaming without Frontiers: Copyright and Competition in the Changing Video Game Sector’ CREATE Working Paper 2023/10 <https://www.create.ac.uk/blog/2023/10/03/new-create-working-paper-gaming-without-frontiers-copyright-and-competition-in-the-changing-video-game-sector/> 30.

³¹ ibid 27.

At the infrastructure and hardware layers, **access to finance** is a major challenge for potential entrants. While funding is a necessary component for any venture, it is especially difficult to raise for hardware projects, which is likely to tilt the balance in favour of established players sitting on cash reserves such as Meta. Currently, Nvidia is spearheading chip development for virtual reality applications, building on its expertise in games. While Intel signalled its own entry into the ‘metaverse’ in 2021³², it is unclear whether the project is still live. Apple has succeeded in developing its own silicon for Mac, and its new headset Vision Pro is also powered by its new R1 chip. Other than these established players, there are no new players in sight, with the possible exception of a chip venture by Sam Altman.³³ In terms of hardware, entry by new companies remains rare, with established players providing the most popular hardware. For example, in VR/spatial computing headsets (which we collectively refer to as VR headsets), the main players are Meta (Quest), PlayStation (Pulse) and HTC (Vive). ByteDance had entered the VR space with Pico, but the future of ByteDance’s VR operations is currently uncertain.³⁴ The latest entrant is, as is well known, Apple.

Capabilities and frontiers of the virtual world layer will be defined by computing power and hardware capabilities. Hardware capabilities at the point of end user access is not a barrier to growth as such on this particular layer. Video games have thrived on a variety of hardware, in particular consoles, PCs and mobile devices, and virtual worlds will also be accessed through different types of hardware. That said, **access to computing power (infrastructure)** is both an enabler and a barrier to entry at the virtual world layer. Developers of virtual worlds need to maintain and consistently update the backbone, be it proprietary or licensed/purchased on-demand from third parties. For example, Roblox runs ‘a custom-built and hybrid private cloud infrastructure that runs primarily on premises.’³⁵

At the engine, virtual world and experience layers, **IP rights** are both an enabler and a barrier to entry. Each virtual world and each experience will likely integrate hundreds or thousands of IP-protected elements. Asset stores like Unity and Unreal asset stores have enabled developers to overcome IP rights conflicts to some extent in the video game sector, and a similar approach might be expected in virtual worlds, with the danger that existing market power could be translated to these layers, enabling incumbents to become the de-facto standard-setters, e.g., large IPR licensees like Alphabet might hold an advantage over entrants.

³² Raja Koduri, ‘Powering the Metaverse: Intel is working on the plumbing for a persistent and immersive internet.’ (14.12.2021) <https://www.intel.com/content/www/us/en/newsroom/opinion/powering-metaverse.html>

³³ Beatrice Nolan, ‘Sam Altman wants Washington's backing for his \$7 trillion AI chip venture’ (16.02.2024, Business Insider) <https://www.businessinsider.com/sam-altman-wants-government-backing-7-trillion-ai-chip-venture-2024-2>

³⁴ Qianer Liu, Wenjie Ding in Beijing, Tim Bradshaw ‘ByteDance’s virtual reality division announces restructuring and staff cuts’ (07.11.2023, Financial Times) <https://www.ft.com/content/2b812a27-4cd1-4b85-862a-5da05cd1650a>

³⁵ Daniel Sturman, ‘How We’re Making Roblox’s Infrastructure More Efficient and Resilient’ (07.12.23, Roblox Blog) <https://blog.roblox.com/2023/12/making-robloxs-infrastructure-efficient-resilient/>

If an undertaking is integrated across multiple layers, **vertical integration** will give rise to foreclosure concerns.³⁶ The competition between hardware OEMs is most analogous to the competition between Apple and Google in the smartphone market, assuming however, that each offers an appstore, a device and an operating system. The only question in this context is whether the competition between hardware OEMs is seen as competition to become the dominant *means of access* to a third-party *platform*, or whether each has a closed ecosystem (in terms of *platform*) and seeks to retain users within that ecosystem without facilitating interoperability. In any event, both Apple and Meta, the two notable competitors in this landscape, have the necessary financial resources to enjoy a first-shaper advantage by translating their business model (Apple) or adopting another successful business model (Meta) to the virtual world market.³⁷ If Apple or Meta were to succeed in establishing a VR-driven virtual world, they would ultimately control the bottleneck (VR headsets) and thus could dictate what the other elements of the ecosystem look like.

This is also the case for *platform* providers like Fortnite or Roblox, in terms of what technology they want to grant access to or how they want to design their ecosystem, i.e., controlling the *platform* bottleneck. The biggest concern is that one undertaking (or a few) would control the dominant *platform* and the *means of access*, as this would create two layers or bottlenecks to control the ecosystem. For example, if Meta Quest and Fortnite prevail, we are likely to find ourselves in a world where exclusivity agreements such as those currently in place between Google and Apple regarding search browser defaults, could become the new standard for virtual worlds, albeit on a different subject matter. It is however unlikely that players not providing *access* or *platforms* could create anticompetitive bottlenecks, due to the limited or complementary importance of other layers.

What is new about virtual worlds? (Question 5)

While virtual worlds are currently developed on existing ecosystems, we also expect to see new actors and business models across different layers of virtual worlds. The greatest flow of entry will likely take place at the experience layer. There is a probability that the experience layer will have a bottom-up effect on the development of higher layers, which is why the virtual world value chain has been described as a ‘supply chain of content’.³⁸ In particular, **events with physical capacity** like concerts and sports games will likely flourish in virtual worlds. In a similar vein, virtual worlds can allow such experiences to happen with a close-up, e.g., as if the spectator is standing right in front of the singer at a concert. Both established and novel platforms are already providing such services. Concerts already happen on Fornite and

³⁶ If key players control multiple layers, this may give rise to foreclosure concerns, see Dwayne Bach and Fabian Ziermann, ‘Conglomerate foreclosure in the metaverse’ (D’Kart, 22.06.2022) <https://shorturl.at/rHPT4>

³⁷ Comparable to first-mover, however, with the distinction that moving first in itself does not provide the competitive advantage but shaping the emerging market so that competition is automatically reduced, e.g., by controlling or setting up a bottleneck in the new market early on and thus dictating other standards.

³⁸ Ben Thompson, ‘An Interview with Matthew Ball About the Vision Pro and the State of Gaming’ (Stratechery, 22.02.2024) <https://shorturl.at/kGL28>

Roblox.³⁹ There are platforms dedicated to virtual events, like AmazeVR.⁴⁰ Apple pitched Vision Pro to consumers with ‘an intimate rehearsal with Alicia Keys’.⁴¹

Complex virtual experiences that do not have a real-life component are also likely to flourish in virtual worlds. Once again, this is not a novelty: space and time travel experiences, science fiction experiences, for example, have existed for as long as video games have – stories have existed for even longer. NASA offered its free virtual reality program for Oculus Rift.⁴² Increased complexity might mean that, at least to a certain extent, such experiences will be provided in specialised environments for full immersion in a way reminiscent of game arcades.

Generative AI-based creativity tools are expected to simplify the creation of virtual worlds and experiences. Such tools can go a long way in decreasing costs associated with the experience design process in terms of graphics, coding, and storytelling.⁴³ Generative AI use cases for virtual worlds/metaverse are already proliferating.⁴⁴ For example, OpenAI’s new tool Sora creates video from text instructions⁴⁵ and it will likely be used for virtual world development.⁴⁶ Nvidia is developing generative AI for virtual world assets and other use cases in virtual worlds, both leveraging its own capabilities but also in partnership with other companies.⁴⁷ Generative AI companies catering specially to video games and virtual worlds include Promethean AI⁴⁸, Convai⁴⁹, Inworld⁵⁰ and Atlas.⁵¹

The level and speed of entry at the experience level will likely depend on what the platforms permit. Engine and virtual world terms and conditions, including end-user licensing agreements (EULAs), might act as obstacles to the development of experiences. The most appropriate case study for this are complementary markets in eSports and gaming ecosystems, in particular streaming and content creation. While it has long been recognized that contemporary video games, due to free-to-play business models and microtransactions, instead of upfront

³⁹ David Pierce, ‘The concert of the future is already happening in the metaverse’ (03.10. 2022, The Verge) <https://www.theverge.com/2022/10/3/23384883/concerts- metaverse-travis-scott-charlie-puth-iheartland>

⁴⁰ <https://www.amazevr.com>

⁴¹ Apple Music, ‘Experience Alicia Keys: Rehearsal Room on Apple Vision Pro’ (02.02.2024) <https://youtu.be/d555q5vaYns?si=hWBlot5i8wRnKOfd>

⁴² ‘Free Virtual Reality Program: NASA SLS VR Experience’ <https://www.nasa.gov/stem-content/free-virtual-reality-program-nasa-sls-vr-experience/> This page does not provide any information on whether the program was migrated to Meta Quest after Oculus was discontinued.

⁴³ BCG, ‘This Is How GenAI Could Accelerate the Metaverse’ (16.08.2023) <https://www.bcg.com/publications/2023/how-gen-ai-could-accelerate-metaverse>

⁴⁴ Jon Radoff, ‘Generative AI x Automation for Virtual Worlds’ (13.03.2023, Metavert Meditations) <https://meditations.metavert.io/p/generative-ai-x-automation-for-virtual>; GPTPlus, ‘AI-Powered Virtual Worlds’ (08.11.2023) <https://medium.com/@GPTPlus/ai-powered-virtual-worlds-ed2f581b7969>

⁴⁵ <https://openai.com/sora>

⁴⁶ Ben Thompson, ‘Sora, Groq, and Virtual Reality’ (Stratechery, 20.02.2024) <https://stratechery.com/2024/sora-groq-and-virtual-reality/>

⁴⁷ <https://developer.nvidia.com/blog/rapidly-generate-3d-assets-for-virtual-worlds-with-generative-ai/>

⁴⁸ <https://www.prometheanai.com>

⁴⁹ <https://inworld.ai>

⁵⁰ <https://inworld.ai>

⁵¹ <https://atlas.design>

purchases,⁵² require increased lifespans to monetize users, and that streaming and content creation provide such boosts,⁵³ publishers differ in their approaches thereto. Most facilitate streaming and content creation to boost the experience surrounding their game, Nintendo requires the sharing of advertisement revenues from content creators, whilst prohibiting streams that display game content.⁵⁴ In other words, Nintendo, through the use of EULAs constrains the development of experiences, representing a more closed ecosystem.

At the engine and virtual world layers, we expect to see new players with/without proprietary technology that create *bespoke virtual environments* for clients. For example, Improbable uses its own technology to ‘design, build, operate and service metaverse experiences.’⁵⁵

On a final note, the EC focuses on ‘virtual world markets’ in the questionnaire and beyond in the various EU publications. Despite clear links to established ecosystems, virtual world systems have the potential to reach a point of pervasiveness hitherto unknown in digital ecosystems. While we commend the EC’s plans to introduce a public interest project (European CitiVerse), the EU must contribute directly and indirectly to increase the number of public projects in virtual worlds, and not leave the development of virtual worlds predominantly in the hands of private entities.

Interoperability and open standards (Question 6)

We do not expect true interoperability, backed by open standards, to emerge anytime soon in virtual world development.⁵⁶ EC’s emphasis on interoperability and open standards in various publications on virtual worlds and Web 4.0 is commendable, but we caution against an over-reliance on interoperability to ensure virtual world markets remain open. This is due to technical barriers, developer incentives, and user incentives.

Our informal conversations with industry participants have shown, thus far, that at least at the experience level, a degree of seamless integration and movement across virtual worlds seems to be the desired outcome. Efforts to build spaces where open standards can be developed, such as the *Metaverse Standards Forum* or the *Metaverse Society* attest to this willingness. However, technical barriers remain: some of our contacts have highlighted the uncertainties around achieving interoperability in the (much) simpler context of messaging apps under the Digital Markets Act’s Article 7.

⁵² Alexander Bernevega and Alex Gekker, ‘The Industry of Landlords: Exploring the Assetization of the Triple-A Game’ (2021) 17(1) *Games and Culture* 47.

⁵³ Mark R Johnson and Jamie Woodcock, ‘The impacts of live streaming and Twitch.tv on the video game industry’ (2019) 41(5) *Media, Culture & Society* 670.

⁵⁴ Nan Li, ‘Essays on Demand Spillovers in the Video-Game Industry’ (The University of Rochester, 2019) <https://bit.ly/41L26I2> 2.

⁵⁵ <https://www.improbable.io/ventures>

⁵⁶ Another (lengthy) discussion on this point may also be found at Dimita et al, ‘IP and Metaverse(s) – an externally commissioned research report’ (07.03.2024) <https://www.gov.uk/government/publications/ip-and-metaverses-an-externally-commissioned-research-report/ip-and-metaverses-an-externally-commissioned-research-report#references>

There are also signs that closed ecosystems are emerging, especially from Apple and Meta, as discussed above. When it comes to business users of such ecosystems, particularly developers of experiences, we may once again not find clear incentives for interoperability. First, interoperability means ceding control over proprietary technology, at least to some extent. Furthermore, proprietary systems and walled gardens have some clear benefits in the video game industry, as they fund independent games.⁵⁷ Indie game developers face relatively large upfront costs and commissions from proprietary platforms help overcome these cost barriers.⁵⁸

Informal conversations with industry participants have also signalled to us that end users may not necessarily demand interoperability, as users of digital services today are either used to multi-homing or locked into specific ecosystems. Retail brands who have entered proto-metaverses like Nike or Gucci through Nikeland or Guccigarden in Roblox or Timberland's experience in Fortnite have so far largely limited their operations to a limited number of platforms, or even a single platform.

Suitability of regulatory strategies (Question 8)

To conclude, we believe that the single most important competition problem in virtual world development today is rising concentration and cross-ownership. In this context, video games and virtual worlds cannot be separated, as market power in existing video game ecosystems will translate into market power in virtual worlds as discussed in Section 1 above. Current regulatory strategy for both games and virtual worlds needs to be reconsidered, as it appears inadequate for both, with lax merger control and the acquisition of significant stakes in competing game publishers having contributed to the current concentration in the gaming industry and virtual worlds. Treating concentration issues in virtual worlds as swiftly as possible is all the more important considering the level of pervasiveness virtual worlds are likely to attain in our lives.

With regard to virtual worlds, the EC Communication 'sets out the strategy and proposed actions on virtual worlds', and in terms of competition, it 'aims for a Web 4.0 that is powered by open and highly distributed technologies and standards that enable interoperability between platforms and networks and freedom of choice for users'.⁵⁹ In our opinion, this statement **invites the application of the Digital Markets Act (DMA) to video games and virtual worlds.**

⁵⁷ Or Creators, e.g., Roblox's approach as discussed by Ball: Matthew Ball, *The Metaverse: And How It Will Revolutionize Everything* (2022, Norton & Company) 284.

⁵⁸ This point was raised in the CREATE roundtable of 17 February 2023 on 'Copyright, Competition and Business Models in App Stores and Gaming'. Event highlights available at <https://www.create.ac.uk/blog/2023/03/14/copyright-competition-and-business-models-in-app-stores-and-gaming-event-highlights/>

⁵⁹ Communication from the Commission, 'An EU initiative on Web 4.0 and virtual worlds' (EC, 11.07.2023), 4.

Unfortunately, games, virtual worlds or comparable platform elements of eSports and gaming ecosystems are not included as core platform services in the DMA.⁶⁰ Moreover, the DMA arguably codifies the problems (and thus the business models) of the past, limiting its relevance for the future. This is in part because the regulation of the development of platforms or business models is limited by the filtering system of the DMA (Art. 3 (1) and (2) DMA), triggering its application only once a platform has become entrenched.⁶¹ This approach only treats the symptoms rather than addressing the core problem of anticompetitive business models. Moreover, it should not be ignored that each platform, like many games, will try its best to form an ecosystem. The platforms that succeed will thus be dominant for related products and services,⁶² requiring *ex post* intervention for intra-ecosystem abuses. Direct application of the DMA in video games and virtual worlds would help ensure that virtual world markets remain open, as opposed to the much more difficult task of dealing *ex post* with entrenched positions.

In this context, it may be necessary to reconsider the list of core platform services and the benchmarks for a gatekeeper designation under the DMA. For example, given the discussions regarding the separation or aggregation of digital services under the DMA,⁶³ it is worth exploring whether it might be possible to apply the DMA not to individual games, but to publishers. In other words, if a single game is insufficient to qualify under the DMA's artificial filtering system, it may be worth treating multiple games (or game studios) as a single service to designate a publisher as a gatekeeper.

On a final note, in terms of intellectual property law, anything short of an impartial overhaul of the current legal framework that does not follow the preferences of the gaming or platform creator lobbies will do very little to balance the ownership structure of platforms. While this may be a substantial project, in the increasingly user-generated content-focused platforms, failure to do so may ultimately give platform operators the ownership of millions of user's creations for free.

⁶⁰ We however recognise the opening up of app stores with the DMA as a positive development.

⁶¹ Fabian Ziermann, 'eSports – regulating aspiring gatekeepers?' (D'Kart, 07.12.2021) <https://shorturl.at/loKSZ>

⁶² Matthew Ball, 'Esports and the Dangers of Serving at the Pleasure of a King' (MatthewBall.co, 17.04.2020) <https://shorturl.at/uCOQR>; J Remy Green, 'All Your Works Belong to Us: New Frontiers for the Derivative Work Right in Video Games' (2018) 19 NC JL & Tech 393; Fabian Ziermann, 'Kartellrecht' in Petschinka (ed), *eSport-Recht* (2023, Verlag Österreich) 87-109, 114-120.

⁶³ Tono Gil, 'Meta tried to get Facebook, Instagram designated as one DMA service, EU official says' (MLex, 29.09.2023) <https://shorturl.at/wPT18>