



THE SPRING
INSTITUTE

POLICY PROPOSALS FOR EU COMPETITION IN GENAI AND VIRTUAL WORLDS

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THE SPRING GROUP

Prepared for the European Commission

POLICY PROPOSALS FOR EU COMPETITION IN GENERATIVE AI & VIRTUAL WORLDS

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1. Executive Summary

As virtual worlds become more immersive and integrated into our daily lives, concerns over data privacy and protection are bound to arise. Virtual world platforms collect vast amounts of user data, including personal information, behavioral patterns, and biometric data. This data is not only valuable for improving user experiences and tailoring content but also poses significant risks if mishandled or exploited. The European Union's General Data Protection Regulation (GDPR) provides a robust framework for data protection and privacy rights. However, the unique nature of virtual worlds challenges traditional notions of personal data and consent. For instance, avatars in virtual worlds may not be considered personal data under current definitions, yet they can reveal intimate details about an individual's personality, preferences, and behaviors. To address these challenges, the EU may need to revisit and clarify the scope of personal data and consent mechanisms in the context of virtual worlds. This could involve expanding the definition of personal data to include virtual identities and avatars, as well as developing guidelines for obtaining meaningful consent from users regarding the collection and use of their data within these immersive environments.

2. Background

2.1 Introduction

There are many existing and potential stakeholders when discussing Virtual Worlds platforms, technologies, and services. That said, there are certain stakeholders who have leads over others and have the potential to make significant contributions towards the technology for decades in the future. While each stakeholder has something different to offer in the market, all should be considered when deciding future plans regarding Virtual Worlds.

As virtual worlds become more immersive and integrated into our daily lives, concerns over data privacy and protection are bound to arise. Virtual world platforms collect vast amounts of user data, including personal information, behavioral patterns, and biometric data. This data is not only valuable for improving user experiences and tailoring content but also poses significant risks if mishandled or exploited. The European Union's General Data Protection Regulation (GDPR) provides a robust framework for data protection and privacy rights. However, the unique nature of virtual worlds challenges traditional notions of personal data and consent. For instance, avatars in virtual worlds may not be considered personal data under current definitions, yet they can reveal intimate details about an individual's personality, preferences, and behaviors. To address these challenges, the EU may need to revisit and clarify the scope of personal data and consent mechanisms in the context of virtual worlds. This could involve expanding the definition of personal data to include virtual identities and avatars, as well as developing guidelines for obtaining meaningful consent from users regarding the collection and use of their data within these immersive environments.

2.2 Countries

"A recent study indicated that the metaverse was the next generation of the internet."¹ Thus, it comes as no surprise that several stakeholders on a country to country basis are interested in pursuing the opportunities presented by such technology.

Among such countries is Saudi Arabia, who has, "key infrastructure for the metaverse, with 98 percent of individuals using the internet." Hence, Saudi Arabia, who has a history of investing heavily in technology, is particularly invested in, "seeking to attract substantial global investments in advanced technologies," especially with important

¹ [Yousif, 2022](#)

technology like Virtual Worlds. Financial cooperation with Saudi Arabia is certainly possible, and should be considered given the country's willingness to pursue such technology.²

That being said, Saudi Arabia isn't the only country interested. On a global scale, "...countries such as India, Peru and Mexico love the metaverse, whereas developed countries such as the USA, Germany and the Netherlands are more likely to question it."³ Developing countries are more eager to tap into the stores of potential given that hosts of opportunities. Indeed, the University of Maryland reports that, "people remember information better if it is presented to them in a virtual environment."⁴

2.3 Companies

Companies have critical roles to play in Virtual Worlds, as many industries have a variety of interests in the technology for their own business. Such industries include, "IT, education, finance, marketing, and healthcare industries."⁵

That being said, the biggest driver of growth in the technology comes from, "e-commerce, as the metaverse is expected to combine conventional shopping in real stores with online commerce."⁶ Thus, it comes as no surprise that companies are showing renewed interest especially regarding the intersection between technology and the services that their respective industries offer to potential consumers.

But that's not all. Virtual worlds are also being utilized by companies to, "engage with their customers. Many have already invested in its development and are experimenting there to engage customers as well as employees. They market themselves there, train employees, hold meetings, host conferences, and develop products in virtual collaborations."⁷ This enables companies to not only save money in the long term, but also enhance cooperation throughout the company on a global scale, where collaboration is often hampered by the long distance and time zone difference.

² ibid

³ [Deutsche Bank, n.d.](#)

⁴ [University of Maryland, 2018](#)

⁵ [Deutsche Bank, n.d.](#)

⁶ ibid

⁷ ibid

2.4 Technologies

There are a variety of technologies that have the potential to play critical roles in the development of Virtual Worlds, and that's especially true in the fields of standard education and training for the workforce.⁸ Such technology can also see intersections with life saving services like disaster management and data measuring.⁹

In terms of saving lives, there are many intersections with existing technology and data. Indeed, "The difference between hearing or reading numerical data versus seeing it depicted visually in a relatable and accessible way is immense."¹⁰ The quicker authorities can understand situations, the faster they can respond effectively to ensure that lives aren't lost due to disasters because it took too long to go through the data and create a strategy for effective management.

Simulations can also train people to learn how to survive and help others during such disasters. Indeed, "Park et al. demonstrated an AR-based emergency management system for fire safety route guidance. Hu et al. developed a high scene-rendering frame rate to achieve better immersion in disaster scene simulation."¹¹ Overall, Virtual Worlds technology has a critical role to play in enhancing current technology, introducing another critical stakeholder to the bigger picture of how Virtual Worlds can and should be used.

2.5 Current Initiatives

Many of the experiences and interactions within virtual worlds are governed by complex algorithms and AI systems. These algorithms may determine everything from content recommendations and targeted advertising to avatar behavior and virtual world physics. While these algorithms can enhance user experiences, they also raise concerns about transparency, bias, and accountability. The EU has been at the forefront of promoting algorithmic transparency and accountability through initiatives such as the AI Act and the Digital Services Act (DSA). However, the unique nature of virtual worlds and the convergence of multiple technologies may require additional measures to ensure algorithmic fairness and accountability. One approach could be to mandate algorithmic audits and impact assessments for virtual world platforms, similar to the provisions in the AI Act for high-risk AI systems. These audits could evaluate algorithms for potential

⁸ *ibid*

⁹ [Atkins. 2021](#)

¹⁰ *ibid*

¹¹ [Zhu & Li, 2021](#)

biases, discriminatory outcomes, and adherence to ethical principles. Additionally, the EU could encourage the development of open-source algorithms and transparent decision-making processes within virtual worlds, fostering trust and accountability.

Interoperability and data portability are crucial factors in promoting competition and preventing vendor lock-in within virtual world markets. As virtual worlds become more integrated into various aspects of our lives, users may find themselves increasingly tied to specific platforms, making it difficult to switch providers or move their data and digital assets. The EU's Digital Markets Act (DMA) aims to address these concerns by introducing rules for gatekeeper platforms and ensuring interoperability and data portability. However, the complex and rapidly evolving nature of virtual worlds may require additional measures to ensure seamless interoperability and data portability. One approach could be to mandate the adoption of open standards and protocols for virtual world platforms, enabling users to move their avatars, digital assets, and data across different platforms without barriers. The EU could also explore the creation of a centralized data repository or trusted intermediary, allowing users to securely store and transfer their virtual world data and assets between different providers. Additionally, the EU could encourage the development of decentralized virtual world platforms built on blockchain technology or other distributed ledger technologies. These decentralized platforms could inherently promote interoperability and data portability while reducing the risk of vendor lock-in and monopolistic practices.

Virtual worlds raise complex questions regarding intellectual property rights and ownership. From user-generated content and digital assets to virtual world designs and underlying technologies, intellectual property rights play a crucial role in shaping the competitive landscape and enabling innovation. The EU has a well-established legal framework for intellectual property protection, including patents, copyrights, and trademarks. However, the unique nature of virtual worlds may necessitate clarifications or adaptations to existing laws and regulations. One area of concern is the ownership and rights associated with user-generated content within virtual worlds. Clear guidelines and policies should be established to ensure that users retain appropriate rights over their creations while also enabling platform providers to monetize and distribute content within reasonable bounds. Additionally, the EU could explore the potential of decentralized virtual world platforms and blockchain technologies to facilitate more transparent and secure ownership and licensing of digital assets and intellectual property within virtual environments.

3. Scientific and Economic Trends

As the digital age grows and the internet grows, so has a large portion of the market for those items. As traditional markets become suited to traditional needs, new modern markets have become suited to modern needs. Now, through the concept of Virtual Worlds, a completely new sector of the industry and market has opened up to the world, however, the problem of regulating these markets poses a very serious harm. As technology evolves, there can be huge obstacles to the development of these Virtual World platforms, and the EU should look towards developing and transitioning towards this modern era.

3.1 Scientific Trends

There is no doubt that Virtual Worlds and Web 4.0 is a completely revolutionary design and tool that has almost infinite applications. Whether it be large companies, universities, or students doing a passion project, Virtual world environments are all able to accommodate these circumstances. Thus, it is expected that these technologies will continue to be developed for at least the rest of this decade, where it is projected to grow at the fastest rate.

These next-generation virtual worlds are a key part of digital research in recent years, with tons of benefits to be seen after research and development. The fast development of virtual worlds can be attributed to a few factors, including high technology readiness levels of key enabling technologies, new and immersed human-machine interfaces, availability of large and highly performant computing and data storage infrastructures, a huge community of engaged adopters, and investments from an interested public sector and governments.¹²

The European Commission has already launched a few programs as its first steps in developing this revolutionary tool. Programs such as the Virtual and Augmented Reality Industrial Coalition united industry experts and policymakers to collaborate and the Commission has also held a panel that gathered insights from 150 random EU citizens to help guide their strategy for virtual worlds.¹³ The Commission's main strategy essentially is 4-fold. First, it encourages citizens and reinforces their skills through online pools of virtual world specialists to ensure safe and trusted information. Second, supporting the community and its subsequent research and collaboration. Third,

¹² [European Commission, 2024](#)

¹³ [Digital Future Society, 2023](#)

governments can develop their sectors and advance their societies. Fourth, openness and a global government of Web 4.0 allow for fair standards for everyone.

While the future of Virtual Worlds may be uncertain, the EU and the European Commission certainly want to lead the way for a future where these tools become regularly used for growth and research. Through the 4 steps that the European Commission is following, it seems as though they have a plan to develop and grow Virtual Worlds into a very powerful tool for the future.

However, the development and operation of virtual worlds and generative AI systems can have significant environmental impacts. The training and deployment of large AI models, as well as the infrastructure required for virtual world platforms, consume vast amounts of energy and contribute to carbon emissions. As part of its commitment to the European Green Deal and the goal of achieving climate neutrality by 2050, the EU should consider the environmental implications of virtual worlds and generative AI technologies. This could involve implementing regulations and incentives to encourage the use of renewable energy sources, energy-efficient computing, and sustainable data center practices within these industries. The EU could support research and development into more energy-efficient AI models and virtual world technologies, as well as explore the potential of decentralized and distributed computing architectures to reduce the environmental footprint of these systems.

3.2 Economic Trends

Virtual Worlds is a technological advancement that looks to change the world that we live in for the better. Web 4.0 is also a huge advancement and should be focused on progress as civilizations. The EU also believes in this, with their vision for Web 4.0 to be a transformative transition for society that offers opportunities at both social, industrial, and public levels. With huge technological progress at the moment, the stage is set for virtual worlds to shape Europe's Digital Decade.

At the industrial level, many different sectors are already using virtual environments to improve their products. In the automobile industry, virtual environments are used for product design, testing, and process optimization.¹⁴ Furthermore, more and more applications in industries for virtual environments are becoming a reality day by day, which boosts many market growth forecasts. In fact, according to the EU's data, the global market for virtual worlds is expected to grow from 27 billion euros to over 800 billion euros by 2030. Automobile industries that have used virtual worlds to develop

¹⁴ [Coelho, 2023](#)

their products are also expected to grow from 1.9 billion euros to over 16.5 billion Euros in 2030.

Digital reality technologies are also a major component in the development of the potential growth of virtual worlds. Different kinds of reality technologies such as Virtual reality, Augmented reality, Extended Reality, and Mixed Reality are all projected by the EU to create over 860,000 new European jobs by just the year 2025. However, for this to occur, the European Commission has recognized that users must accept virtual worlds and Web 4.0 and that there must be some level of awareness, reliable information, and digital skills for workers, developers, and the general public.

Furthermore, other parts of the economy such as small and medium-sized enterprises (SMEs) also benefited from the virtual environments. These businesses are especially important as they are the main drivers of innovation and the EU greatly supports them to create middleware, software and creativity, and investments in digital reality technologies. The European Commission has aimed to provide an SME relief package that will cover their needs and aim to improve collaboration between virtual world hubs. This is mainly to help them adjust to a completely new tool that will be revolutionary in innovation. Other organizations such as the European Digital Innovations Hubs and the Enterprise Europe Network are also contributors to this plan by the European Commission.

Currently, only about 3700 firms, research institutions, and governments in the EU operate in virtual worlds and only about 2065 players in virtual worlds are from EU-funded projects.¹⁵ Due to this many companies and businesses will need to work and take advantage of the virtual world opportunities. While industries such as the automobile industry have already taken advantage of the virtual world environment, many other sectors are yet to catch up, however, if they manage to do so then they will be able to ride the wave of huge expected growth for the next decade, greatly improving the economic scene.

4. Analysis of Current EU Strategy

The European Union's approach towards Artificial Intelligence (AI) and Web 4.0 is encapsulated within two pivotal strategies that aim to position the EU at the vanguard of the next technological frontier. These strategies are crafted to ensure an open, secure, trustworthy, and inclusive digital environment that mirrors the foundational EU values

¹⁵ [European Commission, 2023](#)

and principles, fostering a conducive system for citizens, businesses, and public administrations to thrive in the imminent era of Web 4.0.

4.1 Goals 1 & 2: Excellence in AI Development & Supporting Businesses

"The global leadership of Europe in adopting the latest technologies, seizing the benefits, and promoting the development of human-centric, sustainable, secure, inclusive, and trustworthy artificial intelligence (AI) depends on the ability of the European Union (EU) to accelerate, act, and align AI policy priorities and investments."

– Coordinated Plan on Artificial Intelligence 2021 Review

The foundational pillars of the EU's AI strategy articulate a comprehensive blueprint aiming to increase investments, streamline the application of AI across sectors, and establish an integrated policy framework conducive to nurturing trust in AI technologies. A significant facet of this strategy is the mobilization of substantial funding for AI research and development in infrastructural advancement and the adoption by both the public and private sectors.

4.1.1 Mission for Technological Development

The European Union's commitment to advancing Artificial Intelligence (AI) and Web 4.0 technologies is underscored by a well-planned funding allocation. The EU's investment strategy will support the development and deployment of cutting-edge technologies while ensuring advancements are in alignment with the union's core values of human-centricity, security, and ethical governance.

4.1.2 EU's Funding Allocation for AI and Web 4.0

The European Union has used substantial resources to drive progress in AI and Web 4.0, reflecting a strategic approach towards incentivizing business innovation, supporting research and development, and facilitating infrastructure enhancements. Notably, the EU envisions ramping up public and private investments in AI, setting an ambitious target to achieve a total investment of EUR 20 billion annually throughout this decade.

To breakdown the current use of funds:

- €100 million Investment in AI/Blockchain Investment Scheme

- An initial allocation of €100 million from the Horizon 2020 program has been designated to enhance access to equity finance for innovative startups and SMEs across the EU, focusing on AI and blockchain technologies. This initiative is expected to trigger a total investment volume of €700 million, showcasing the EU's dedication to nurturing a dynamic ecosystem for emerging technologies.
- Over €1 billion from the European Innovation Council (EIC)
 - During its pilot phase, the EIC allocated €160 million in grants and €91 million through direct equity investments to AI-centric startups and projects. In 2021, the EIC amplified its support, disbursing over €1 billion in grants and equity to startups and SMEs engaged in deep tech, underpinning the EU's commitment to fostering innovation and securing its position as a leader in AI technologies.
- Leveraging the Recovery and Resilience Facility
 - The Recovery and Resilience Facility (RRF) is strategically utilized to modernize and invest in AI, propelling the EU towards becoming a global leader in the development and adoption of human-centric, trustworthy, secure, and sustainable AI technologies. By September 2023, the RRF had already invested €4.4 billion into AI, emphasizing the EU's proactive approach in capitalizing on AI for enhancing societal and economic well-being.

4.1.3 Collaboration & Infrastructural Investment in Web 4.0

The EU's funding strategy extends beyond financial investment to include a comprehensive plan for collaboration and infrastructural development, essential for the thriving of AI and Web 4.0 systems. The strategic investment in infrastructure enhancements and collaborative efforts aims to solidify the EU's foundation for research and innovation in these domains.

4.1.4 Current Investments in Major Initiatives

The European Union is funding projects including Local Digital Twins, which will help scientists progress in their areas and let policymakers make well-informed judgments about public policy.

The Commission plans to create two flagships for the public:

1. Citiverse: an interactive platform for urban planning
2. European Virtual Human Twin: can help with therapeutic therapy by simulating the human body.

To design an economic and technological roadmap for virtual worlds, the Commission proposed a Partnership on Virtual Worlds under Horizon Europe in March 2023. Furthermore, the Commission intends to aid media businesses and creators in the EU in testing new tools for creation and collaborating with Member States to create Web 4.0 regulatory sandboxes.

Shaping global standards for open and interoperable virtual worlds and Web 4.0, ensuring that they will not be dominated by a few big players. The Commission will engage with internet governance stakeholders worldwide and promote Web 4.0 standards in line with the EU's vision and values.

4.1.5 Developing Research Hubs and Innovation Clusters

A cornerstone of the EU's strategy involves bolstering Digital Innovation Hubs (DIHs) across the member states. These hubs serve as catalysts for technological diffusion, providing businesses, especially SMEs, with access to technical expertise and experimentation facilities. The EU has allocated over EUR 200 million through Horizon 2020 projects for networking DIHs, emphasizing innovations in AI-relevant domains like robotics and big data.

4.1.6 Strengthening Digital Infrastructure

To support the needs of AI and Web 4.0 technologies, the EU is committed to strengthening its digital infrastructure, including advancements in high-performance computing, data storage, and network capabilities. These enhancements are crucial for enabling sophisticated AI applications and immersive virtual worlds, thereby attracting business and fostering innovation within the EU.

To enhance the operational capacity of DIHs, the EU introduces the concept of European Digital Innovation Hubs (EDIHs), marking a strategic evolution from the previous funding approach under Horizon 2020.

4.2 Goals 3 & 4: Spearheading the Web 4.0 Revolution & Fortifying Virtual Worlds

"We are at the onset of a major technological transition, Web 4.0. Virtual worlds are an important enabler of Web 4.0 that can significantly revolutionize the daily lives of people and open a wide range of opportunities in many business and industrial ecosystems. The European Commission wants to make sure that EU society, businesses, and public bodies are prepared to grasp the new opportunities but also address the challenges that come along."

– Web 4.0 Strategy Section, EU Digital Strategy Q&A

The EU's strategic blueprint for Web 4.0 and virtual worlds envisions a future where digital and physical realms are seamlessly intertwined, facilitated by advancements in AI, the Internet of Things (IoT), and extended reality (XR). This paradigm shift offers unparalleled opportunities for innovation, necessitating a comprehensive strategy that addresses potential risks while maximizing benefits. The strategy underscores the EU's intent to lead by example, ensuring that Web 4.0 is shaped by open technologies, interoperability, and adherence to EU standards and values.

4.2.1 Empowering Citizens and Reinforcing Digital Sovereignty

In the context of the European Union's evolving digital strategy, the pivot towards Web 4.0 and virtual worlds marks a significant transition toward more immersive, interconnected digital experiences. Central to this shift is the EU's commitment to ensuring that these advancements serve its citizens, businesses, and public administrations optimally, fostering an inclusive digital environment that reflects EU values such as privacy, security, and human-centric technology.

4.2.2 Empowering Citizens through Digital Literacy

The EU recognizes that the successful integration of Web 4.0 technologies necessitates a citizenry that is not only aware of but also proficient in engaging with these new digital realms. To this end, the strategy places a strong emphasis on digital literacy programs

designed to equip EU citizens with the necessary skills and knowledge to navigate virtual worlds confidently and safely. This initiative seeks to bridge the digital divide, ensuring that all citizens, regardless of their background or technical expertise, can participate fully in the digital future.

4.2.3 Development of a Talent Pool for Web 4.0

Understanding that the backbone of any technological advancement is its workforce, the EU strategy highlights the critical need for a talent pool skilled in Web 4.0 technologies. This includes not just programmers and developers, but also creatives, designers, and professionals across various sectors who can contribute to and shape the evolution of virtual worlds. The EU plans to foster this talent through education initiatives, training programs, and partnerships with academic institutions and industry leaders, aiming to secure a leading position in the global digital economy.

4.2.4 Reinforcement of Digital Sovereignty

The EU's strategy towards Web 4.0 and virtual worlds emphasizes bolstering digital sovereignty as a fundamental principle. This entails ensuring that European data standards, privacy regulations, and ethical guidelines are upheld within these new digital spaces. The strategy advocates for the development of secure, transparent, and accountable platforms and technologies that empower users while protecting their rights. By prioritizing digital sovereignty, the EU aims to create a digital system that respects individual freedoms and promotes trust in Web 4.0 technologies.

4.2.5 Creation of the 'Citizen Toolbox'

A tangible outcome of the EU's strategy is the development of the 'Citizen Toolbox,' a suite of tools and resources designed to facilitate safe and confident engagement with virtual worlds. This initiative represents a practical step towards democratizing access to digital technologies, providing citizens with the means to understand, navigate, and leverage virtual worlds for education, work, and social interaction. The Toolbox aims to serve as a comprehensive guide for users, covering aspects such as privacy protection, online security, and ethical engagement in digital spaces.

4.2.6 Addressing Global Standards and Governance

The EU's proactive engagement in shaping global standards for Web 4.0 and virtual worlds is a testament to its commitment to fostering a system that is open, interoperable, and aligned with European principles. By spearheading initiatives that ensure Web 4.0 technologies are developed and deployed responsibly and inclusively, the EU aspires to establish a benchmark for digital excellence that resonates globally.

5. Policy Proposals

5.1 Adoption of Open Standards vs. Proprietary Technology

5.1.1 Why an Open Standards-Based System?

An open standards-based system ensures interoperability between different platforms and systems across the industry, ensuring seamless communication and data exchange.¹⁶ Like any new digital frontier, virtual worlds may emerge with dominant platforms controlling significant market share. This dominance could lead to anticompetitive behavior such as exclusivity agreements and restrictive practices. However, open standards foster innovation by providing an even playing field for new developers and players to enter the market. Moreover, independent organizations typically maintain open standards that maintain longevity and long-term support even if companies or platforms cease operations.¹⁷ Currently, The Open Group, OASIS, and Khronos Group are spearheading the initiative for open standards in an increasingly digital age. More specifically, the Metaverse Standards Forum, hosted by the Khronos Group, operates under a similar principle, coordinating resources and requirements across organizations, including the World Wide Web Consortium (W3C), Open Geospatial Consortium, OpenAR Cloud, and others.

5.1.2 Virtual World Standards Incentive Program

A government-backed incentive-based program should provide grants or tax incentives to virtual world developers who adopt open standards for critical functionalities such as avatar interactions and asset management. Financial incentives must be implemented to incentivize developers to adopt an open-based system rather than proprietary technology, which may yield more significant returns and market control in the long run. Government agencies must collaborate with industry associations, standard-setting organizations, and virtual world developers to establish criteria for financial incentives. Grants and incentives will be awarded to projects that adhere to these standards, prioritizing projects demonstrating significant interoperability with the existing platforms.¹⁸

5.1.3 Interoperability Mandates

Compared to incentive-based programs, interoperability mandates are far more intrusive and may hinder market innovation in virtual worlds. Essentially, interoperability mandates require new virtual world platforms to support interoperability standards for core features such as cross-world communication and asset exchange. The mandates

¹⁶ [Center on Regulation in Europe, 2023](#)

¹⁷ [Shen et al., 2020](#)

¹⁸ [Cosgrove Jr., 2023](#)

must be enforced through industry-wide consultations and collaboration between industry developers and standards organizations. Maintaining transparency between those involved in the process is critical to ensure standards are in place while keeping virtual worlds' forward movement and growth. Mandates can be established through protocols, regulatory frameworks, or legislation, with enforcement mechanisms to ensure compliance.¹⁹ Interoperability and data portability are crucial factors in promoting competition and preventing vendor lock-in within virtual world markets. As virtual worlds become more integrated into various aspects of our lives, users may find themselves increasingly tied to specific platforms, making it difficult to switch providers or move their data and digital assets. The EU's Digital Markets Act (DMA) aims to address these concerns by introducing rules for gatekeeper platforms and ensuring interoperability and data portability. However, the complex and rapidly evolving nature of virtual worlds may require additional measures to ensure seamless interoperability and data portability. One approach could be to mandate the adoption of open standards and protocols for virtual world platforms, enabling users to move their avatars, digital assets, and data across different platforms without barriers. The EU could also explore the creation of a centralized data repository or trusted intermediary, allowing users to securely store and transfer their virtual world data and assets between different providers. Additionally, the EU could encourage the development of decentralized virtual world platforms built on blockchain technology or other distributed ledger technologies. These decentralized platforms could inherently promote interoperability and data portability while reducing the risk of vendor lock-in and monopolistic practices.

5.1.4 Support for Virtual World Standards Organizations

Virtual worlds raise complex questions regarding intellectual property rights and ownership. From user-generated content and digital assets to virtual world designs and underlying technologies, intellectual property rights play a crucial role in shaping the competitive landscape and enabling innovation. The EU has a well-established legal framework for intellectual property protection, including patents, copyrights, and trademarks. However, the unique nature of virtual worlds may necessitate clarifications or adaptations to existing laws and regulations. One area of concern is the ownership and rights associated with user-generated content within virtual worlds. Clear guidelines and policies should be established to ensure that users retain appropriate rights over their creations while also enabling platform providers to monetize and distribute content within reasonable bounds. Additionally, the EU could explore the potential of decentralized virtual world platforms and blockchain technologies to facilitate more transparent and secure ownership and licensing of digital assets and intellectual

¹⁹ [World Economic Forum, 2023](#)

property within virtual environments. Support for virtual world standards organizations involves providing funding, resources, and expertise to support the activities of standards bodies and consortia involved in developing and promoting industry standards for virtual worlds. This directly supports programs that ensure participation in international standards development efforts and the establishment of certification programs for compliant platforms. Collaboration between government agencies and standards organizations, including but not limited to financial support for research projects and capacity-building initiatives, fosters a collaborative and inclusive approach between all parties involved.

5.2 Virtual World Monetization Regulation

With the rapid expansion of virtual environments, it is imperative to establish clear guidelines and regulations to ensure protection against overly aggressive monetization practices. Many users opt into monetizing their data while maintaining control over its usage; however, this reality rarely materializes. In many instances, user data is shared with third party advertisers to encourage the purchase of virtual goods and assets in virtual worlds. Users must agree to new codes of conduct or community standards in a new virtual world environment. Additionally, due to its data intensity and immersive nature, virtual worlds require greater accountability and enforcement mechanisms of user data.²⁰ Additional transparency requirements must be put in place, requiring platforms to disclose all sources of revenue, including subscription fees, advertising revenue, and data monetization income, in a clear and accessible manner. Users must be able to view, edit, and delete their information and to opt out of data collection and sharing arrangements.

5.3 Ethical Virtual Worlds & Generative AI Development

The emergence of virtual worlds and generative AI technologies raises critical ethical and human rights considerations that must be addressed proactively. Issues such as virtual identity, privacy, freedom of expression, and non-discrimination take on new dimensions within the context of immersive virtual environments. Additionally, the potential for AI-driven manipulation, disinformation, and algorithmic bias within virtual worlds poses significant risks to individual autonomy and human rights. The EU should integrate ethical and human rights considerations into its regulatory frameworks and governance structures for virtual worlds and generative AI. This could involve establishing ethical guidelines, conducting human rights impact assessments, and promoting the principles of transparency, accountability, and non-discrimination.

²⁰ [Cosgrove Jr., 2023](#)

Furthermore, the EU could encourage the development of ethical AI systems and responsible virtual world platforms, fostering collaboration between technology companies, civil society organizations, and human rights advocates. By prioritizing ethical and human rights considerations, the EU can ensure that the development and deployment of these technologies align with its fundamental values and principles, safeguarding the rights and well-being of its citizens.

Virtual worlds and generative AI technologies have the potential to disrupt various industries and transform the way we work, learn, and interact with each other. While these advancements offer significant opportunities, they also pose risks of exacerbating existing socio-economic inequalities and creating new forms of exclusion. The EU should proactively address the potential socio-economic impacts of virtual worlds and generative AI, ensuring that the benefits of these technologies are distributed equitably and that no one is left behind. This could involve supporting research and impact assessments to understand the potential effects on employment, education, and social cohesion. Additionally, the EU could prioritize initiatives aimed at promoting digital inclusion and access to virtual worlds and AI technologies for marginalized and underrepresented communities. By fostering an inclusive and equitable approach to the development and deployment of these technologies, the EU can harness their potential to drive economic growth, create new employment opportunities, and enhance social well-being for all citizens.

The global nature of virtual worlds and generative AI technologies necessitates international cooperation and the development of common standards and protocols. The EU should actively engage with international organizations, industry associations, and other stakeholders to promote the adoption of open standards and interoperability frameworks for virtual world platforms and AI systems. This could involve participating in standard-setting initiatives, facilitating knowledge-sharing, and encouraging the development of best practices and guidelines. Additionally, the EU could foster collaboration with international partners to address cross-border challenges such as data governance, cybersecurity, and intellectual property rights within the context of virtual worlds and generative AI. By promoting international cooperation and standardization, the EU can contribute to the creation of a level playing field, enabling fair competition and ensuring the responsible and ethical development of these technologies on a global scale.

While virtual worlds and generative AI technologies present numerous challenges and risks, they also offer significant opportunities for innovation and entrepreneurship within the European Union. The EU should actively support and incentivize research and development efforts in these domains, fostering an environment that encourages

creativity, risk-taking, and the exploration of new use cases and applications. This could involve providing funding and resources for startups, small and medium enterprises (SMEs), and research institutions working on virtual world and generative AI technologies. Additionally, the EU could explore the creation of dedicated innovation hubs or accelerators focused on these emerging fields. Furthermore, the EU should aim to attract and retain top talent in these areas by offering competitive incentives and fostering a supportive ecosystem for entrepreneurs and innovators. By nurturing a thriving innovation landscape, the EU can position itself as a global leader in the development and commercialization of virtual world and generative AI technologies, driving economic growth and creating new opportunities for its citizens.

The interconnected and immersive nature of virtual worlds, combined with the reliance on complex AI systems, raises significant cybersecurity concerns. Vulnerabilities within these systems could potentially expose users to various threats, including data breaches, identity theft, and malicious manipulation. The EU should prioritize the development of robust cybersecurity measures and resilience strategies to protect virtual world platforms, AI systems, and their users from cyber threats. This could involve implementing stringent security standards and best practices, fostering collaboration between cybersecurity experts and virtual world providers, and promoting the adoption of advanced technologies such as blockchain and distributed ledger systems for secure data management and identity verification. Additionally, the EU should support research and development efforts focused on enhancing the security and resilience of AI systems, addressing issues such as adversarial attacks, model robustness, and secure training pipelines. By investing in cybersecurity and resilience, the EU can ensure the safe and reliable operation of virtual worlds and generative AI technologies, protecting its citizens and businesses from potential threats while fostering trust and confidence in these emerging ecosystems.

The virtual world sector represents an important emerging technology frontier that EU policymakers and antitrust regulators will likely need to monitor carefully as the market evolves. Given the high stakes around fostering innovation while also protecting against anti-competitive behavior, the European Commission and other relevant EU bodies may need to adapt certain policies, legal frameworks, and investigative practices. From an antitrust oversight standpoint, the European Commission's competition regulators and Directorate-General for Competition (DG COMP) will likely play a key role in policing virtual world markets as they mature. They will need to scrutinize any attempts by big technology incumbents to potentially leverage existing market power from adjacent domains like mobile operating systems, social media, and consumer hardware into gaining anti-competitive advantages in virtual worlds. DG COMP has already been

aggressive in investigating potential anti-competitive practices by large tech gatekeepers.

As virtual worlds scale, there could be increased merger and acquisition activity whereby large companies acquire smaller but strategically important virtual world enablers and component providers. The European Commission would likely apply rigorous review of such deals that risk undermining competition in these nascent but critical technology layers. Monitoring the potential for tech giants to engage in exclusionary tactics related to key enabling IP, technical standards, and ecological lock-in around their virtual world ecosystems will also likely be a priority for antitrust enforcers. Adapting and refining the definition of relevant antitrust markets may be required as specialized virtual world categories and use cases continue emerging, rather than overly broad market definitions. Developing a deeper understanding of the unique multi-sided market dynamics, data-driven network effects, user switching costs, and virtual asset/property treatment within virtual worlds will be important for appropriate competition analysis.

5.4 Multi-Sector Investment

The widespread adoption of virtual worlds and generative AI technologies will require significant investment in capacity building and skill development across various sectors and demographics. To ensure that European citizens and businesses can fully participate and benefit from these technological advancements, the EU should prioritize initiatives aimed at promoting digital literacy, AI education, and upskilling programs. This could involve collaborating with educational institutions, industry partners, and civil society organizations to develop comprehensive curricula and training programs. Additionally, the EU could explore the potential of virtual worlds and generative AI technologies as tools for education and skill development. For instance, immersive virtual environments could be used for practical training simulations, while generative AI systems could assist in personalized learning experiences and content creation. By fostering a skilled and digitally literate workforce, the EU can position itself as a global leader in the development and responsible deployment of virtual worlds and generative AI technologies.

5.5 EU-Wide Audits & Regulatory Mechanisms

Many of the experiences and interactions within virtual worlds are governed by complex algorithms and AI systems. These algorithms may determine everything from content recommendations and targeted advertising to avatar behavior and virtual world physics. While these algorithms can enhance user experiences, they also raise concerns about transparency, bias, and accountability. The EU has been at the forefront of promoting

algorithmic transparency and accountability through initiatives such as the AI Act and the Digital Services Act (DSA). However, the unique nature of virtual worlds and the convergence of multiple technologies may require additional measures to ensure algorithmic fairness and accountability. One approach could be to mandate algorithmic audits and impact assessments for virtual world platforms, similar to the provisions in the AI Act for high-risk AI systems. These audits could evaluate algorithms for potential biases, discriminatory outcomes, and adherence to ethical principles. Additionally, the EU could encourage the development of open-source algorithms and transparent decision-making processes within virtual worlds, fostering trust and accountability.

The Commission and European Parliament may also need to assess whether certain regulatory adjustments or new legal frameworks are warranted. This could include guidelines or requirements around interoperability and data portability between virtual world platforms to reduce customer lock-in. Legal treatment of issues like virtual currencies, asset ownership rights, and "vaporware" pre-announcements around proprietary virtual world roadmaps may require revisiting current frameworks. There may also be an increased need to collaborate with computer science and virtual world technology experts, potentially via the Commission's Joint Research Centre or relations with European standards bodies. This could help build critical investigative capabilities around inspecting virtual world codebases, architectures, and datasets that antitrust regulators may require to effectively assess competition dynamics in these unique digital realms. More broadly, EU funding vehicles like Horizon Europe and Digital Europe programmes could prioritize R&D investment into key enabling technologies and open standards to counterbalance proprietary virtual world stacks from big tech giants. Fostering an open virtual world ecosystem and European champions in this domain may be a strategic priority.

Initiatives like the EU's Media Data Cloud and Data Spaces could intersect with virtual world infrastructure requirements. Enhancing computational and data analytic resources available to antitrust investigators will likely be required given the massive scale of virtual worlds and associated datasets involved. The European Commission's DIGIT Directorate-General may need to upskill staff with immersive virtual skillsets. Departments like the Joint Research Centre's Cyber and Digital Citizens' Security Unit could assist in probing novel security and privacy risks. The EU's push for digital sovereignty and curbing big tech's dominance in strategic technological areas could prompt particular scrutiny around virtual worlds given their societal importance. Ultimately, striking the right balance between promoting European innovation while policing anti-competitive dynamics in virtual world markets will likely require a cohesive, forward-looking strategy across EU institutions. But the core antitrust principles around

fostering competition and consumer welfare will still apply even in these futuristic digital realms.

6. Conclusion

The rise of virtual worlds and generative AI technologies presents both immense opportunities and complex challenges for the European Union. By taking a proactive and holistic approach, incorporating diverse perspectives, and fostering international cooperation, the EU can position itself as a global leader in shaping the responsible development and deployment of these transformative technologies. Through comprehensive regulatory frameworks, ethical guidelines, and a commitment to innovation, the EU can harness the potential of virtual worlds and generative AI to drive economic growth, enhance social well-being, and contribute to the achievement of its strategic goals and priorities. However, this journey requires continuous monitoring, adaptation, and collaboration among policymakers, industry stakeholders, civil society organizations, and citizens. By embracing these technologies while upholding its fundamental values and principles, the EU can forge a path towards a future where virtual worlds and generative AI serve as catalysts for progress, inclusion, and sustainable development.