



Competition in Virtual Worlds and Generative AI

Calls for contributions

Digital markets have become one of the main areas of attention for competition law enforcers, as well as for regulatory authorities and legislators, in recent years, as European citizens increasingly build their daily lives around digital products and services.

The concept of “metaverse” or “Virtual Worlds” has come to the fore as a term to describe the next stage in this digital transformation. A “Virtual World” seems to be widely regarded as a simulated, immersive environment – in its ultimate form amounting to a persistent, always-on world that operates in real time and is accessible everywhere. In these Virtual Worlds, people would also be represented in digital form, often referred to as an “avatar”. However, there are many different views on the future shape of Virtual Worlds, including whether there will be a single Virtual World platform or, rather, a collection of multiple Virtual Worlds.

On 11 July 2023 the Commission published a [Communication on Virtual Worlds and Web 4.0](#), setting out a vision, strategy and proposed actions to lay the foundations for the long-term transition towards Web 4.0 and the development of Virtual Worlds.

The concept of generative artificial intelligence (“Generative AI”) has equally attracted considerable public interest. A generative AI system is an AI system that is able to produce new content, such as texts, images or other media.

The EU’s approach to artificial intelligence centers on excellence and trust, aiming to boost research and industrial capacity while ensuring safety and fundamental rights. In April 2021, the Commission presented its AI package, including [its Communication on fostering a European approach to AI](#), a [review of the Coordinated Plan on AI](#) and its [proposal for a regulation laying down harmonised rules on AI \(AI Act\)](#). On 9 December 2023, the European Parliament and the Council achieved a political agreement on the AI Act.

While Virtual Worlds and generative AI systems are still taking shape, it has become clear that the potential impacts of this new phase of digital transformation could be wide-ranging with new technologies, business models and markets.

It has become clear in the past that digital markets can be fast moving and innovative, but they may also present certain characteristics (network effects, lack of multi-homing, “tipping”), which can result in entrenched market positions and potential harmful competition behaviour that is difficult to address afterwards.

Therefore, it appears opportune for the Commission as a competition law enforcer to engage in a forward-looking analysis of technology and market trends to identify potential competition issues that may arise in these fields.

The Communication and accompanying staff working document on Virtual Worlds and Web 4.0 already identify the main characteristics of Virtual Worlds platforms, enabling technologies, and services based on Virtual Worlds.

The purpose of these calls for contributions is to gather specific information and views in relation to competition aspects from regulatory experts, academia, industry and consumer organisations. The Commission may organise a workshop with relevant stakeholders to discuss these issues further building on the responses to the consultation.

Contributors are invited to submit their input either on the topic of Virtual Worlds or generative AI systems, or both, with a clear focus on competition. As input to the debate, please consider the two lists below, which contain questions separately for Virtual Worlds and Generative AI. These questions are for orientation only, and you are free to choose on what aspects of the chosen topic(s) you may wish to focus.

In case your contribution exceeds 20 pages, please add an executive summary. Please send your respective contributions to COMP-VIRTUAL-WORLDS@ec.europa.eu and [COMP- GENERATIVE-AI@ec.europa.eu](mailto:COMP-GENERATIVE-AI@ec.europa.eu) by 11 March 2024 in pdf format.

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Virtual Worlds

1) What entry barriers or obstacles to growth do you observe or expect to materialise in Virtual World markets? Do they differ based on the maturity of the various markets?

Answer:

In our view, it is crucial to differentiate the Industrial B2B Virtual Worlds from the B2C Virtual Worlds. While B2C is consumer-focused (e.g. gaming, social media) and has its own dynamics and challenges (e.g. asymmetric negotiation power, protection of personal data), the B2B Virtual World for industrial applications is an emerging, dynamic area where a large number of players are active to experience and interact with a digital twin.

Industrial Virtual Worlds intend to help companies to optimize their real-world assets and applications. Industrial Virtual Worlds are an evolution that builds on an increasing technology convergence, which together with other developments such as the growth of computing capacities and communication infrastructure, access to machine data etc leads to huge opportunities and possibilities to test, control, change and improve industrial processes and products by using photo-realistic, real-time industrial digital twins. Thus the value propositions are completely different from the ones in B2C; it is also not about personal but about machine data and the customers/users have typically a rather good negotiation power and appreciate the value of their data.

From our perspective, potential entry barriers are – if at all – very low in this market environment. The Industrial Virtual World is an emerging area with a significant number of different players, many of which are new entrants. Important characteristics of this industry are openness, interoperability, and innovation.

Obstacles to growth do not play any relevant role. Instead, we see a huge opportunity for European industry including small and medium-sized companies to participate and grow with their domain know-how and innovation power in this very dynamic field and increase its competitiveness significantly. Investments and complementary knowledge are required which is why new forms of partnerships and (digital) ecosystems play an important role (please see answer to question 3 below).

2) What are the main drivers of competition for Virtual World platforms, enabling technologies of Virtual Worlds and/or services based on Virtual Worlds (e.g. access to data, own hardware or infrastructure, IP rights, control over connectivity, vertical integration, platform and payment fees)?

Answer:

Access to data: Of medium to high relevance, however, it is not only the access to data but also the ability to use and interpret the data through domain know-how that creates value for

customers, for example by increasing efficiency or lower resource consumption. As laid down in the EU Data Act, customers will have data sovereignty and thus have control over their data.

Own hardware or infrastructure: Of rather low relevance with increasingly diverse interoperable asset portfolios and implementation of SaaS solutions. It is absolutely not necessary to have own IT infrastructure.

IP rights: Of rather low relevance as we expect Industrial Virtual Worlds to work as open ecosystems with open APIs. To drive further innovation, R&D costs need to be sufficiently rewarded by protection of IP rights and the ability to amortize expenses by monetization of own developments.

Control over connectivity: It is not so much about control over connectivity but about real-time connectivity. Essential for real-time connectivity are: Cybersecurity, communication infrastructure and computing capabilities with latency and jitter that are fit for purpose for the high demands of industrial applications (5G/6G). Immersive applications require compute power, based on the necessary microelectronic components that enable high resolution (GPUs) and ideally running on renewable energy to prevent growing carbon footprints.

Vertical integration: Of rather low relevance as we expect Industrial Virtual Worlds to function as an ecosystem with a variety of contributing stakeholders. Open APIs should allow for enhanced user experience, e.g. through plug-and-play solutions that enable physics-based simulation as well as data aggregation, visualization and usage in cross-domain applications.

Platform and payment fees: Financial components are typically of medium to high relevance to customers.

Do you expect that to change and, if so, how?

Answer:

Over time, the main drivers of competition might change as the digital readiness of European industries is developing step by step and the foundation for Industry 4.0 (compute and communication infrastructure) needs to be implemented on a broader scale first.

3) What are the current key players for Virtual World platforms, enabling technologies of Virtual Worlds and/or services based on Virtual Worlds, which you consider or expect to have significant influence on the competitive dynamics of these markets?

Answer:

Industrial Virtual World platforms are emerging. There is a multitude of different players, and more market entrants are expected as this dynamic market develops: (i) digital players (contributing mainly IT infrastructure), (ii) industrial companies (contributing mainly domain

know-how and smart analytics), (iii) new players such as start-ups with a variety of mainly digital offerings, (iv) companies that offer system integration, visualization engines or cloud services as relevant components, etc. Cooperation between these different types of companies in ecosystems seems crucial, as no one can build industrial Virtual Worlds alone. This is another significant difference to B2C platforms. Many industrial players come from Europe. In addition to these players, there are large tech companies in the USA and China coming from the cloud/network infrastructure part which now are also expanding into other industrial applications. This will further enhance competition.

4) Do you expect existing market power to be translated into market power in Virtual World markets?

Answer:

No, market power in the real world will not automatically translate into market power in Industrial Virtual Worlds. We expect the emergence of Industrial Virtual Worlds and their functioning as ecosystems where a multitude of players can add value. This is a chance for European industrial players (incl. small and medium-sized companies as well as new entrants) to play a role in new digital trends. Having said this, we do expect that the existing digital hyperscalers will play an important role also in the Industrial Virtual World as their compute power and cloud infrastructure offerings will be required.

5) Do you expect potential new entrants in any Virtual World platforms, enabling technologies of Virtual Worlds and/or services based on Virtual Worlds in the next five to ten years and if yes, what products and services do you expect to be launched?

Answer:

We already see the emergence of new players that complement offerings of more established industrial and digital companies. They are mostly software companies or start-ups, which often build on new technologies like AI and complement the offerings of traditional industrial players. Other new entrants are system integrators, consulting companies and special service providers like visualization engines.

6) Do you expect the technology incorporated into Virtual World platforms, enabling technologies of Virtual Worlds and services based on Virtual Worlds to be based mostly on open standards and/or protocols agreed through standard-setting organisations, industry associations or groups of companies, or rather the use of proprietary technology?

Answer:

We expect a clear trend towards open standards, see e.g. different ongoing activities on industrial standards for Digital Twins, CAD/CAE/CAM, for ontologies and industrial semantics. Another source for relevant interoperability activities will be the Metaverse Standards Forum.

7) Which data monetisation models do you expect to be most relevant for the development of Virtual World markets in the next five to ten years?

Answer:

This might vary between different application scenarios and might depend on the different customer benefits that data usage enables in Industrial Virtual Worlds. As a service (aaS)-models with a consumption-based remuneration might play a role as well as subscription models.

8) What potential competition issues are most likely to emerge in Virtual World markets?

Answer:

The Industrial Virtual World business is only just emerging in Europe. We do not see particular competition issues arising in Industrial Virtual World markets as it is a highly competitive, innovative, and dynamic market environment.

9) Do you expect the emergence of new business models and technologies to trigger the need to adapt certain EU legal antitrust concepts?

Answer:

We do not see a need to adapt the current EU legal antitrust concepts. We believe the current antitrust rules, in particular as only recently amended for digital markets by the DMA, are sufficient to effectively ensure competition in the market.

On the contrary, restrictive rules would be more likely to hinder development and have a chilling effect on innovation and European competitiveness. The Industrial Virtual World business with its high dynamism and innovative strength should be kept open and not unnecessarily limited by restrictive rules.

10) Do you expect the emergence of new business models and technologies to trigger the need to adapt EU antitrust investigation tools and practices?

Answer:

In line with the above, from our perspective, there is also no need for the adaptation of additional EU antitrust investigation tools and practices. The current competition law rules grant the European Commission far-reaching investigation powers. In addition, just recently this tool set has been even more broadened by the DMA to address particular concerns of digital markets. We believe the EU antitrust investigation tools and practices are fully sufficient to ensure competition in a highly innovative, dynamic, and competitive market environment of the Industrial Virtual Worlds.

Please send your contributions to COMP-VIRTUAL-WORLDS@ec.europa.eu by 11 March 2024