



DT FEEDBACK ON THE EU CONSULTATION ON 'COMPETITION IN VIRTUAL WORLDS AND GENERATIVE AI'

I) Artificial Intelligence

- 1) *What are the main components (i.e., inputs) necessary to build, train, deploy and distribute generative AI systems? Please explain the importance of these components*

We consider the following elements to be of critical importance:

- Data processing capacity
- Investment capacity
- Availability of best-in-class open-source baseline models for fine tuning to a specific domain (from a deployer perspective)
- Skills & experts
- Access to vast amount of quality data

To build and train generative AI systems, a huge amount of data (incl. personal data) is generally required. The availability of data sets that can be used for the purpose of building, training, deploying and distributing generative AI systems is important from a quantitative (i.e. whether sufficient amount of data is available) and from a qualitative perspective (i.e. whether data sets that are suitable for the given purposes are available).

Various types of data are crucial for training Large Language Models (LLMs) to achieve high performance and versatility. The quality and diversity of training data are crucial for the model's ability to generate accurate, relevant, and nuanced responses while adhering to ethical standards and ensuring fairness and impartiality. The most important categories of data include:

- **Extensive Text Data:** This forms the foundation for LLM training, encompassing books, articles, websites, blogs, news sources, and other written content. The diversity and quality of text data are critical for imparting a comprehensive understanding of human language to the model.
- **Balanced & Diverse Data Sources:** To minimize biases and ensure fairness, it's important that training data come from a wide range of sources, covering different perspectives, cultures, languages, and dialects.
- **Structured Data:** This includes tables, lists, and other formally structured content, which help the model understand relationships, categorizations, and the organization of information.
- **Annotated Data:** For certain training tasks, particularly supervised learning, annotated data are necessary, where specific parts of the text are manually tagged or labeled to teach the model specific concepts, entities, or relationships.
- **Dialogue and Conversational Data:** Chats, dialogues, and transcripts of conversations aid the model in understanding natural language patterns, colloquialisms, and the context of conversations.
- **Multimodal Data (MLLM):** For advanced LLMs that can also process other modalities like images (e.g., OpenAI's DALL-E), training data that link text with images or other media are required.
- **Feedback and Interaction Data:** Information about how users interact with the model and respond to its outputs can also be used for further development and fine-tuning of the model.
- **Fine-Tuning Data Specific to Use Cases:** For the fine-tuning of LLMs, specialized data relevant to specific use cases are required. This process involves adjusting the model's parameters to perform well on particular tasks or understand specific domains, such as legal texts, medical literature, or technical manuals. These datasets are often smaller and more focused than the broad data used for initial training, tailored to enhance the model's performance and accuracy in the desired application area.

2) What are the main barriers to entry and expansion for the provision, distribution or integration of generative AI systems and/or components, including AI models? Please indicate to which components they relate.

Data

- Availability of data, especially high-quality data sets or use case specific data can be a barrier. This mainly relates to the first phases of building/training the models. Exclusive rights to access certain data may pose serious barriers to developers of GenAI models/systems.

Copyright

- Transparency is key to help recognize whether models have used unlicensed or copyrighted data
- But this is hard to enforce – it is therefore important to establish measures to verify and check that copyright is being complied with.

Interoperability

- Another barrier to entry or expansion could be the lack of interoperability, which may hinder or slow down the distribution and the integration of generative AI systems and/or its various components.

Bundling

- Integration of generative AI systems and/or components with other existing products (e.g. with cloud services or certain devices) can be regarded as a barrier for third-party providers to distribute or integrate their generative AI systems/components.

Compliance

- Ensuring compliance requires well established internal governance. But fulfilling regulatory obligations will be more easily achieved by big players than by SMEs and start-ups, as smaller players typically don't have the same financial and human resources as well as the experience as big players and may therefore struggle to provide the same standards.
- Example: Legal uncertainty on how the existing framework for data protection (with special regard to the compliance with the basic principles of data protection, such as data minimization, purpose limitation, etc. and having a proper legal basis for the processing) can be properly applied in connection with activities concerning the development and deployment of generative AI systems and/or components can hinder innovation. Especially for SMEs and start-ups, legal uncertainty can cause high barriers as those players typically lack the financial and human resources of bigger players to deal with the risks and potential consequences of legal uncertainty (e.g. fines etc.). Therefore, existing legal uncertainties (including those that relate to the requirements around anonymization) risk preventing the industry from exploiting the full potential of AI applications in the future.
- Differing interpretations of the applicable rules from data protection authorities and the European Data Protection Board may also be relevant in connection with the barriers to enter the markets of generative AI systems. It is a question whether former opinions can be revisited or "fine-tuned" regarding the use cases concerning the use of generative AI systems/component: for example, the EDPB decided regarding the use of machine learning techniques in connection with the training of voice assistants that "*performance of a contract can be a legal basis for processing personal data using machine learning (ML) when it is necessary for the provision of the service. **Processing personal data using ML for other purposes which are not necessary such as service improvement should not rely on that legal basis.***" (, Point 76.) The recent discussion paper of LfDI Baden-Württemberg seems to confirm such position in the context of the use of AI in general: "*However, the use of the speech data provided to further improve a basic AI model would at best be useful for the performance of the contract **and will therefore not be covered by Article 6 para. 1 point (b) GDPR.***" (LfDI Baden-Württemberg: "*Legal bases in data protection for the use of artificial intelligence*", [Discussion paper](#). Version 1.0, 07.11.2023) Such aspects might also be considered again in the light of technological developments, including the developments concerning generative AI.

3) What are the main drivers of competition (i.e., the elements that make a company a successful player) for the provision, distribution or integration of generative AI systems and/or components, including AI models?

- **Diversified Data Access:** Access to diverse datasets is crucial for training and enhancing AI models. Companies that secure a wide range of quality data can develop more effective and adaptable AI solutions, giving them a competitive edge. Therefore, diversified access to relevant data sets that can be used for the provision, distribution or integration of generative AI systems and/or components, including AI models might promote competition.
- **Interoperability and Standards:** Ensuring AI systems can easily integrate with existing technologies and conform to industry standards helps avoid vendor lock-in and reduces transition costs, facilitating broader adoption.
- **Data Quality:** High-quality data, free from misinformation, is essential for the reliability of AI-generated outputs. Ensuring data integrity is crucial for maintaining the credibility of AI applications.
- **Qualified AI Experts:** Having a team of skilled AI professionals is vital for innovation and the effective deployment of AI systems. Expertise in AI development and implementation can significantly enhance a company's offerings.
- **Networking and Partnerships:** Establishing strong connections with partners, including research institutions and other technology firms, can provide access to new technologies, insights, and markets, boosting competitive advantage.
- **Open Source Integration:** Leveraging open-source AI technologies allows for greater flexibility and innovation, enabling companies to adapt and enhance their AI systems more efficiently.
- **Technology and Innovation:** Continuous investment in the latest AI technologies and innovative approaches is key. Companies that lead in innovation can set new standards and capture market interest.
- **Efficiency:** The ability to process and deliver AI solutions efficiently is crucial for meeting customer demands and ensuring scalability. Operational efficiency in AI deployments is a significant competitive factor.
- **Customized Solutions and Support:** Offering bespoke AI solutions and providing expert guidance for integrating AI into existing processes add significant value for customers, fostering loyalty and long-term relationships.

4) Which competition issues will likely emerge for the provision, distribution or integration of generative AI systems and/or components, including AI models? Please indicate to which components they relate.

Provision:

- **AI Governance:** Challenges in implementing effective governance structures for real-time risk management benefitting bigger players more than smaller players.
- **Exclusive Data Access:** Competitive disadvantages due to exclusive acquisition of high-quality datasets, limiting access to essential resources.

Distribution:

- **Early Technology Access:** Unfair advantages for companies with early or privileged access to new technologies or resources (e.g. GPUs).
- **Market Entry Barriers:** Exclusive agreements and proprietary standards make it difficult for new players to enter the market.
- **Walled Gardens:** Companies that opt not to offer their AI systems on the market but instead use them to provide their own services.

Integration:

- **Resource Access:** Advantages for companies with extensive access to computing resources, hardware, and AI server nodes.
- **Interoperability:** Lack of interoperability due to reliance on proprietary solutions hampers flexible integration into existing systems and therefore helps big players to remain/strengthen their position in the market.

5) *How will generative AI systems and/or components, including AI models likely be monetised, and which components will likely capture most of this monetization?*

- **AI-Model-as-a-Service (MaaS):** Developers provide their AI models via APIs, enabling third parties to build their services on top of these models. This approach allows customers to access powerful AI functionalities without the need to host or manage the models themselves, typically with payment based on usage similar to cloud-based Software-as-a-Service solutions (SaaS).
- **Custom Model Tuning:** Developers fine-tune base models according to a client's specific requirements. These personalized models offer added value for clients with unique needs that standard models can't fulfill, often targeting enterprise clients at a premium.
- **Direct Provisioning by Developers:** Developers offer direct access to generative AI models through user interfaces, such as web applications, desktop software, or mobile apps, enabling end-users to leverage AI's power directly. This direct access facilitates widespread market adoption and user engagement.
- **Access to Licensed or Exclusive Data:** Providing access to specialized data necessary for training or fine-tuning AI models represents a significant revenue stream. Such data are crucial for developing highly specialized models aimed at niche markets or specific application areas.
- **GenAI Model Store:** An online marketplace where developers offer pre-trained models and implementations. Customers can purchase these models for integration into their applications, lowering barriers to AI adoption and creating revenue opportunities for model developers.
- **Consultation and Integration:** Expert consultation services for integrating generative AI systems into existing business processes, including needs analysis, model selection, and implementation support. Consultation services are especially valuable for companies new to AI, requiring tailored solutions.
- **Full-Service Offerings:** Provision of all necessary infrastructure, data, models, legal support, and process integration. Package solutions are attractive for large clients seeking turnkey solutions.
- **API Services:** Offering specific functionalities of generative AI models via APIs, allowing customers to integrate AI capabilities into their applications. These services are often billed based on actual usage, offering high flexibility.
- **Software-as-a-Service (SaaS):** Providing AI functionalities as part of a subscription-based cloud service, enabling companies to access advanced AI tools without the need for in-house infrastructure.
- **Training and Fine-Tuning:** Services that involve training or adjusting AI models to a client's specific needs and data. Such services are essential for ensuring maximum performance and relevance of AI models for specific use cases.
- **Intelligent Search Systems:** Development of search systems based on generative AI that take into account the specific context of a client. These systems enhance the relevance and accuracy of search results, offering a personalized user experience.
- **Customer-Specific AI Assistants:** Provision of digital assistants based on generative AI capable of understanding the user's context and needs. These assistants can be configured for a wide range of tasks, offering highly personalized interaction.
- **Central Data Management:** A service that allows customers to centrally manage their data, ensuring full control over who can access it. This fosters trust and data security by allowing customers to set their own privacy preferences.

6) Do open-source generative AI systems and/or components, including AI models compete effectively with proprietary AI generative systems and/or components? Please elaborate on your answer.

Specialization and Adaptation

- **Fine-tuning and Specialization:** Open-source systems offer the advantage of being relatively easy to adapt to specific needs. In sectors like telecommunications, where specialized requirements exist, developers and companies can take open-source models and fine-tune them for their particular applications. This adaptability makes them very competitive in such niche areas.

Accessibility and Community

- **Community and Collaboration:** The strength of the open-source community cannot be underestimated. An active and engaged community can accelerate the development and improvement of a model, leading to powerful and efficient solutions. This collaborative approach can even lead to more innovative and effective solutions in certain areas than proprietary systems.

Costs and Resources

- **Cost and Resource Access:** The main drawback of open-source models compared to proprietary systems lies in resources, especially when it comes to very large models. Training large generative AI models requires significant computational power and financial resources, which can be challenging for open-source projects to secure. Here, proprietary systems, especially those backed by large companies with substantial resources, have a clear advantage.

Innovation through Variation

- **Variation and Optimization:** Releasing a large generative AI model as open-source can lead to a variety of derived models optimized for specific applications. These variations can lead to innovations that might not emerge as quickly in proprietary systems. The possibility of fine-tuning with less effort can make open-source models very effective in specialized areas.

7) What is the role of data and what are its relevant characteristics for the provision of generative AI systems and/or components, including AI models?

The role and characteristics of data in generative AI systems significantly differ depending on whether the data is used for training the models or as input for an already trained model.

7.1) Data for Training

Role:

- **Foundation for Learning:** Training data serve as the basis on which an AI model learns to recognize patterns, understand relationships, and ultimately generate outputs or make decisions.
- **Determinant of Model Performance:** The quality, diversity, and volume of training data directly impact the effectiveness, accuracy, and applicability of the model.

Characteristics:

- **Quality:** High-quality, accurate, and relevant data are crucial to minimize biases and errors in the trained model.
- **Diversity:** A comprehensive representation of different scenarios, contexts, and variables in the training data contributes to the robustness and generalizability of the model.
- **Volume:** Generative models, especially those based on deep learning methods, often require extensive datasets for effective training.
- **Balance:** A balanced distribution of different classes or features in the data prevents biased learning outcomes and promotes fair and balanced model performance.

7.2) Data as Input for the Model

Role:

- **Trigger for Generation Processes:** Input data trigger specific actions or generations by the AI model based on what it has learned during training.

- **Context and Information Source:** The provided data give the model the necessary context or specific information required for performing the desired task.

Characteristics:

- **Relevance:** The data must be relevant to the query or task the model is supposed to perform to yield meaningful and useful results.
- **Clarity:** Clearly and unambiguously presented input data help the model to better understand the request and deliver the desired outcomes.
- **Format and Structure:** The data should be in a format and structure compatible with the model to ensure efficient processing.
- **Timeliness:** Especially for time-sensitive applications, the timeliness of the input data is crucial for relevant and accurate results.

8) *What is the role of interoperability in the provision of generative AI systems and/or components, including AI models? Is the lack of interoperability between components a risk to effective competition?*

- Interoperability is crucial for the effective deployment and use of generative AI systems, as it facilitates the integration of various systems and services and smooth data exchange. However, a lack of interoperability can cause integration issues and limit competition, especially when proprietary systems dominate and promote market concentration.
- The integration of generative AI systems and/or components with other existing products or ecosystems (e.g. with cloud services or certain devices) allows to leverage existing market power and can be regarded as a barrier for third-party providers to distribute or integrate their generative AI systems/components.
- The importance of Personal Digital Assistants will likely grow substantially in the years to come, starting with companion devices like the AI Pin (Humane) and the r1 (Rabbit), followed by solutions from the big GenAI players based on their powerful LLMs.
- With this, the collection of user data will gain new dimensions, both in breadth and depth, ultimately building the essence of digital personal assistants. This will comprise data like:
 - GenAI usage history
 - Episodic data, captured by all kind of sensors, like audio, photo, and video footage
 - Procedural data, like recordings of how to bake a favorite cake.
- Consequently, the dependency of humans on the enterprises holding their digital biographies, will be enormous, potentially making the change of assistant providers effectively impossible, thus forestalling any entry of new players into the market.
- To avoid this lock-in effect into new silos, users must be granted true ownership of and the right to freely move their data, which must also be facilitated by interoperability.
- Promoting interoperability standards and open interfaces is therefore essential to ensure a healthy ecosystem and vibrant competition in the generative AI field:
 - **Facilitating Innovation:** Interoperability promotes innovation by enabling developers to use and build upon existing components and services from various providers. This can shorten development time and accelerate the emergence of new, innovative solutions.
 - **Expanding Functionality:** Through interoperability, developers and businesses can create AI systems that have a wider range of functions by integrating specialized components from different providers. This can lead to more powerful and versatile solutions.
 - **Promoting an Open Ecosystem:** An interoperable environment encourages an open ecosystem where developers and businesses from different parts of the world can collaborate. This can speed up the global development and spread of AI technologies.
 - **Reducing Dependency:** Interoperability can reduce dependency on individual providers by giving businesses and developers more freedom in choosing the components that best suit their specific needs.

9) Do the vertically integrated companies, which provide several components along the value chain of generative AI systems (including user facing applications and plug-ins), enjoy an advantage compared to other companies? Please elaborate on your answer.

- Vertical integration is an advantage in the generative AI markets as those companies may control the development, distribution, and integration of generative AI systems and/or components. It also facilitates the leveraging of market power from one component to another as well as lock-in of consumers.
- The extent of this advantage and the respective harm for competitors depends on the relevance and set-up particularly of the Foundation Model. If the Foundation Model is interoperable and may be used by other market players at reasonable cost, the competitive harm may be rather limited, whereas a proprietary and closed stack will limit competition and innovation.

10) What is the rationale of the investments and/or acquisitions of large companies in small providers of generative AI systems and/or components, including AI models? How will they affect competition?

- There can be various reasons, though the main reasons are (i) to buy up potentially competing innovation or (ii) get top talents & IPR. Such nascent acquisitions make it more difficult to find the talent to start new generative AI companies and grow competition in the market. More precisely:
 - **Access to Top Talents and Expertise:** By acquiring small, specialized companies, larger corporations secure access to highly qualified professionals and specific know-how in the field of generative AI. These experts often bring innovative approaches and fresh perspectives that can be crucial for the further development and differentiation of the acquiring company's AI offerings.
 - **Acquisition of Intellectual Property:** The acquisitions enable large companies to acquire valuable intellectual property, such as patents, copyrights, and trade secrets. This can expand the company's technology base and enable it to develop new products and services or improve existing ones.
 - **Exclusive Technology Tie-in:** By integrating the technology and experts of the acquired company into their structures, the acquiring corporation may tie these resources to themselves. This removes these resources from the market and, potentially, from competitors, which can strengthen the innovation capability and competitive position of the acquiring company.
 - **Restriction of Competition:** This strategy can also serve to control or reduce competition by integrating innovative startups and their technologies at an early stage. This can solidify the market dominance of large companies and make it more difficult for new players to enter or grow in the market.
 - **Diversification and Innovation:** Large companies strive to diversify their offerings and constantly innovate to remain competitive. By acquiring smaller providers, they can quickly expand into new technology areas or complement their existing offerings with innovative features.

11) Do you expect the emergence of generative AI systems and/or components, including AI models to trigger the need to adapt EU legal antitrust concepts?

- Yes, generative AI systems could introduce new forms of market behavior and structures that challenge or extend existing antitrust frameworks. There are several reasons why adjustments might be required:
 - **Growing importance of key inputs, like data:** AI systems heavily rely on computing power, skills and access to and control over data, which can lead to new competitive advantages. Antitrust concepts might need to be adjusted to ensure that competition is not undermined by unfair access to or use for key inputs, such as data. Beyond that, advancements in deep learning have led to the emergence of foundation models that

serve as the basis for numerous generative AI applications. The nature of these foundation models, combined with increasing returns, has the potential to centralize the entire landscape around a select few strategic players, even if they aren't necessarily the most innovative.

- **More exploitative abuses, such as dynamic pricing:** AI-driven dynamic pricing mechanisms could necessitate new considerations regarding consumer pricing and market transparency, especially if they could lead to discrimination or exploitation. This could be addressed in the revision of the Art. 102 guidance.
- **Innovation and nascent acquisitions:** While AI can promote innovation, the concentration of AI technologies among a few dominant players could hinder competition. In that context a clear-cut notification obligation to catch nascent acquisitions is required, especially regarding small companies that introduce disruptive technologies.
- **Dynamic Markets & Expedited Proceedings:** Faster and more efficient proceedings are needed for antitrust investigations and legal processes, as they frequently extend for prolonged periods. In dynamic markets, there is a risk that by the time the proceedings conclude, the specific case could be outdated due to rapidly changing market conditions.

12) Do you expect the emergence of generative AI systems to trigger the need to adapt EU antitrust investigation tools and practices?

- **Higher barriers to entry & network effects:** The integration of advanced AI models into existing products can lead to significant network effects that make it challenging for smaller competitors to compete with these large companies. For instance, in the case of integrating Chat-GPT into Microsoft products, this could mean that the more people use these integrated services, the better they become, which in turn attracts more users and disadvantages smaller competitors who are unable to achieve a similarly deep and seamless integration of their services into widely used operating systems and application software.
- **Exclusive Licenses and Access to Training Data:** Other crucial aspects are exclusive licenses and access to the vast amounts of data required for training such models. Large companies might acquire exclusive rights to key training datasets or possess proprietary data used for training their AI models, denying smaller competitors access to these resources. This could significantly limit the ability of smaller companies to develop competitive AI models, leading to a consolidation of market dominance by large players.
- **Market power and leveraging:** With generative AI systems that are developed and controlled by large technology companies, which are vertically integrated, there comes the potential strengthening and leveraging of their market power. Here different forms of leveraging will be the most relevant concept, such as self-preferencing, which may even harm competition also in markets that are not dominated. EU antitrust authorities might need to investigate how such vertically integrated technologies influence access to markets and whether they lead to higher barriers to entry and foreclosure.
- **Adaptive Regulation:** In today's rapidly evolving digital landscape, the traditional notion of crafting regulations gradually and leaving them unchanged for extended periods has been overturned. Adaptive regulatory approaches lean towards trial and error, coupled with the collaborative design of regulations and standards, fostering faster feedback loops. These accelerated feedback mechanisms enable regulators to assess policies against established standards, providing valuable insights for refining regulations.
- **International Cooperation:** Since AI technologies are developed and deployed globally, EU antitrust investigations might require greater international cooperation to be effective.

II) 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?*

- **Key inputs:** The main barriers to entry and obstacles to growth in the context of virtual worlds are technological challenges, high development costs, and the need for specialized skills, which currently mainly lie with the existing big platforms. The creation of realistic and immersive virtual environments requires significant resources and expertise, which may impede the successful entry of new players that do not have these inputs at their disposal. Additionally, issues related to interoperability, data privacy, and security pose challenges.
- **Distinction between B2B & B2C:** In general, with regard to virtual worlds it is important to distinguish between B2B and B2C, since the challenges arising may differ. While in the B2C context openness, interoperability and data privacy issues may be more important, regarding B2B the entry hurdle can be much higher since the owner/user of industrial virtual worlds needs more control. Therefore, we see higher hurdles to entry in B2B.

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

- **Enhanced experience:** One of the main drivers includes access to quality content / experiences which will in turn lead to a higher user base size, which then makes it again more attractive for quality content. Beyond that, technological innovation (e.g. haptics), and the ability to provide a seamless and immersive user experience play an important role in competition for the users. As technology evolves, new drivers such as advancements in AI, VR/AR hardware could become increasingly important.
- **Reach and integration:** Lastly the existing user base on the service itself or other vertically integrated services also drive competition. In particular, where the vertically integrated services allow for the leveraging of market power from one service to another.

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?*

- **Key players:** Major players include established tech giants like Meta (Horizon and Oculus VR) or game development companies like Roblox or Fortnite which focus on user-generated content that creates immersive virtual experiences.
- **Hardware developers:**
 - Meta, Pico, HTC, Lenovo, Varjo, Sony. (VR-Goggles); XReal, Microsoft, Magic Leap (MR and AR goggles); Manus and Senseglove for haptic gloves; CatVR and Virtuix for Treadmills; Sony (Mocopi) and HTC for full body tracking, fundamental in Social VR in platforms like VRChat
- **Enablers for the development of Virtual Worlds:**
 - Unity: game engine ; Epic (Unreal Engine + Fortnite); Roblox; Meta Horizon; Vircadia: Open Source Framework for the development of Virtual Worlds (JS-Based); Babylon.js: game engine that can be used with Vircadia for developing virtual worlds
- **Existing Virtual Worlds (Not enterprise focused, but social and for mass adoption):**
 - Meta Horizon; VRChat (allows world-creation); Engage; Spatial; Few decentralised platforms (reputation tainted by speculation on digital land and NTFTS): Decentraland and Sandbox
- In the B2B space there are significantly fewer actors. Major players include companies like Siemens and NVIDIA.

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

- **Leveraging:** Especially for vertically integrated companies with established user bases, technological infrastructure, and content libraries there is a high likelihood that we will see the leveraging of market power from existing services to virtual worlds (e.g. Meta).
- **Data:** For instance, data, incl. personal data, became a key element in providing services (especially in the digital economy) to users. It was also set out by the ECJ judgment in case no. C-252/21 (Meta vs. Bundeskartellamt) that “[...] access to and use of personal data are of great importance in the context of the digital economy” (Point 50) and “[...] access to personal data and the fact that it is possible to process such data have become a significant parameter of competition between undertakings in the digital economy” (Point 51). Undertakings with market power based on the ability to access vast amount of user data might use such power to become key players also in the virtual world markets, where the data collected in relation to other services might also be used to personalize services or provide tailor-made products and services.
- **Cloud services:** Other services, such as cloud services, where only a few undertakings are controlling large parts of the market might also be relevant for virtual world markets and such existing market power might also be “transferred” to the virtual world markets.
- **Disruption:** The dynamic nature of the technology sector may also allow for some new entrants to disrupt traditional players, if certain key inputs are accessible.

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?

- **New entrants:** Potential new entrants could include startups focusing on innovative technologies such as advanced AI-driven interactions, enhanced immersive experiences, or new forms of user interactions (e.g. haptics, omni-directional hardware). As stated above, for these startups to be successful this would require the accessibility of certain key inputs, such as data.

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?

- **Technology mix:** It may involve a mix of open standards and proprietary technology. Standardization efforts may promote interoperability, but companies may also develop proprietary features to differentiate themselves and protect IP.

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?

- **Traditional monetization:** There can be traditional ways of monetization in the virtual world like collection of subscription fees, virtual goods & microtransactions, etc.
- **Ad-based and data monetization:** Advertisement-based data monetization models (i.e. targeted/personalized advertising) will most probably play an important role in the coming years as well. Companies may also explore creative ways to leverage user data while respecting privacy concerns. However, the constraints on certain techniques (such as limitation on profiling as set out in the Digital Services Act or prohibition of using “dark patterns”) might provide incentives for other data monetization models. In the future, partly due to legislative incentives or requirements, interoperability and avoidance of “lock-in” scenarios might also have a considerable impact on data monetization models as such developments may put constraints on the short-term maximalization of value to be gained from data and may support data monetization models that work on a longer term and provide more control on the use of data can also be more widely in use. The proliferation of different AI techniques and their integration into the virtual world can also bring new data monetization models.

- **Mixed monetization:** The current debates around the “Pay or OK” model regarding the use of personal data may also have an impact on the development of data monetization models as the association of direct financial value with the use of personal data might challenge the basis of data protection anchored in the protection of fundamental rights. Beyond that, Models that aim at combining direct payments and the use of (personal) data by the providers (e.g., as in the case of some discounted subscriptions of streaming providers that are combined with advertisements) can also be used in Virtual World markets.

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

- **Main issues:** In general, leveraging, foreclosure and nascent acquisitions are the main potential competition issues that we may see arising in the context of virtual worlds.
- **Foreclosure:** Dominant players may try to foreclose potential competitors by restricting interoperability, controlling access to key technologies or engaging in anti-competitive practices that slow down innovation. As a result of the ecosystem approach of e.g. hyperscalers, lock in effects are likely, if the respective ecosystem is supplemented by or integrated into a virtual world. To avoid this, openness and interoperability is key.
- **Leveraging:** With regards to the established ecosystems within the digital sector, anticompetitive leveraging seems to be particularly likely and must be under strict scrutiny of the competition authorities.
- **Nascent acquisitions:** In addition, nascent acquisitions of start-ups with products concerning virtual worlds must be considered. To avoid competitive harm from such acquisitions, new rules need to be implemented, e.g. in the EU Merger Regulation.

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

- Yes, virtual worlds could facilitate new forms of market behavior and structures that challenge or extend existing antitrust frameworks. There are several reasons why adjustments might be required:
 - **Growing importance of key inputs, like data:** Virtual worlds heavily rely on computing power, skills and access to and control over data, which can lead to new competitive advantages. Antitrust concepts might need to be adjusted to ensure that competition is not undermined by unfair access to or use for key inputs, such as data.
 - **Innovation & nascent acquisitions:** In these dynamic markets it is important to maintain the right environment for disruptive innovation and avoid killer acquisitions. Therefore, a new clear-cut merger control thresholds for nascent acquisitions is needed. Apart from that there is limited need for an adaptation of legal antitrust concepts.
 - **Expedited procedure:** Far more important is that new business models & technologies are tested against the established concepts at an early stage of the development of virtual worlds. Otherwise, antitrust authorities might not be able to keep up with the pace of development. To this end, enforcement in antitrust proceedings must speed up.

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

- **Higher barriers to entry & network effects:** The integration of virtual worlds into existing products can lead to significant network effects that make it challenging for smaller competitors to compete with these large companies. Such larger companies may try to foreclose potential competitors by restricting interoperability or controlling access to key technologies.
- **Market power and leveraging:** One new development, that is also relevant to the digital sector in general becomes even more important for the new developments in the virtual worlds markets. Theories of harm should be adapted to dominant ecosystems rather than dominance in a relevant

market. Here the different forms of leveraging will be the most relevant concept, such as self-preferencing, which may even harm competition also in markets where there is not a dominant player.

- **Expertise and international cooperation:** Regulators will need to develop expertise in assessing competition within virtual world markets and ensure that investigations remain effective in addressing potential anti-competitive behavior. This also requires new personnel with IT backgrounds. Also, since technologies are developed and deployed globally, EU antitrust investigations might require greater international cooperation to be effective.