Response to the European Commission's call for contributions on competition in generative AI and virtual worlds

ICC

The International Chamber of Commerce (**ICC**) – as the institutional representative of more than 45 million companies in over 100 countries – welcomes the opportunity to participate in the European Commission's (**"Commission"**) call for contributions.

ICC expresses its appreciation for the Commission's interest in understanding the potential impact of generative AI on competition and innovation in the digital economy. Generative AI is a rapidly evolving and promising field of artificial intelligence that can produce novel and realistic content, such as text, images, audio or video, based on existing data or models. Generative AI has a vast range of applications across numerous sectors and domains, such as education, entertainment, health, finance, manufacturing, and public services.

European competition rules are flexible and adaptable so as to address any potential anticompetitive conduct or market distortions arising from generative AI, without the need for new regulations or guidelines. Competition law is nevertheless not an appropriate tool to address wider societal or ethical concerns that may arise from the use of generative AI, such as misleading or biased content, intellectual property rights, or democratic values. These issues are the realm of other policy instruments (see, e.g. the AI Act), such as sector-specific regulation, self-regulation, or codes of conduct, taking into account the views and interests of all relevant stakeholders. ICC also considers that premature or disproportionate regulatory interventions could impede the innovation and competition in this evolving field, and ultimately the development and adoption of generative AI technologies by European and global businesses and consumers, which will hinder European competitiveness.

ICC invites the Commission to apply a balanced and evidence-based approach to the assessment of generative AI, taking into account both the benefits and potential risks of these technologies, as well as the diversity, dynamism and individual characteristics of the markets and industries where they are deployed. In this context, ICC believes that the Commission is going in the right direction with this call for contributions, which will allow the EC to gather important market information so as to be able to react quickly with its existing tools in case competition issues materialise. Finally, we encourage the Commission to foster dialogue and cooperation with other jurisdictions and international organisations to ensure a coherent global framework for generative AI that supports innovation and competition, while respecting human rights and fundamental values.

Generative AI

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**

ICC considers that the main components necessary to build, train and distribute generative AI (including Foundation Models ("**FMs**")[1]) are data, compute capacity, capital and technical expertise.

[1] FMs can be defined as a type of AI model that are typically trained on large amounts of data and can be adapted to a wide range of operations.

- **Data** is needed at both stages of training: (i) pre-training, where data is used to build the FM's knowledge; and (ii) fine-tuning, where the FM's accuracy is improved through tailored training.

- **Compute capacity and affordable energy** are required to build and train FMs.

    - FMs require a significant number of AI accelerator chips (such as graphic processing units – "**GPUs**") installed in large data centers. NVIDIA is currently the leader in the production and supply of such high-performance GPUs. Some FM developers have developed, or are developing, their own AI accelerator chips. Others are developing own GPUs (e.g. AWS Trainium, Meta Training and Inference accelerator, IBM Telum and Microsoft Maia), or have supported other silicon suppliers to enter the market (e.g. Microsoft, Meta, Databricks, Essential AI and Lamini, among others, are working on deploying new AMD accelerators for AI workloads).

    - FM developers can turn to a wide variety of providers to access the type and scale of compute capacity required. These providers need access to enough GPUs or other AI accelerators to be able to service their FM customers. Alternatives such as publicly owned supercomputers are also emerging.

- **FM development** also requires a combination of talent and technical expertise. This includes data scientists and engineers, machine learning skills, programming, mathematics and statistics and domain know-how. The skills and expertise needed may vary depending on the type and complexity of the FM (e.g. expertise or knowledge of image data, natural language processing, or music generation).

- **Capital** is essential to develop FM models at scale beyond niche markets, to leverage computing power, data, talent and technical expertise.

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.

There are no material barriers to sourcing any of the main components mentioned above, even though access to data and computing capacity are more concentrated. On the upstream market of GPUs and cloud compute, financial resources and specific know-how could be barriers for new entries. However, there is quite a healthy competition ongoing already.

There has been a growth in the downstream layer of FM models and applications, and the number and diversity of players[2] in the generative AI space, at all layers of supply and development, including many start-ups, evidence that, thus far, there are no significant barriers to entry or expansion. Adept, Inflection and Mistral, among many others, for example, were all founded less

[2] FM developers and providers currently include (in alphabetical order):e.g.: AI21 Labs, Amazon, Aleph Alpha, Alibaba, Anthropic, Anyscale, Baidu, Cohere, Databricks, Deci, Eleven Labs, Fireworks AI, Google, Gretel AI, Hugging Face, Huawei, IBM, Inflection, Intel, Kakao Brain, Meta, Microsoft, Mistral, Naver, Nixtla, NVIDIA, OpenAI, Oracle, Perplexity AI, Replicate, Stability AI, Tencent, Technology Institute Abu Dhabi, Together AI, Writer, Yandex and more.

than two years ago and are already very promising players in the AI space. In addition, the availability of FMs through APIs and open-source licenses enables new entrants to enter and scale quickly provided they have the funding and access to essential inputs or partner with relevant players, beyond initial niche markets.

It is crucial to ensure that, going forward, new downstream players, in particular Small- and Medium-sized Enterprises ("SMEs") benefit from non-discriminatory and affordable access to all components listed in our response to Question 1.

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?**

ICC considers that competition occurs across all levels of the AI technology stack:

- **AI accelerator chips**. Because of the size of the model and the amount of data used to train the model, training FMs requires a significant number of GPUs or other AI accelerators installed in data centers. NVIDIA is currently the leader in the production and supply of GPUs. Some FM developers have their own AI accelerator chips (e.g. Google manufactures TPUs), while others are developing them (e.g. Meta Training and Inference accelerator, IBM Telum, AWS Trainium, and Microsoft Maia), or have supported other silicon suppliers to enter the market (e.g. Microsoft, Meta, Databricks, Essential AI and Lamini, among others, are working on deploying new AMD accelerators for AI workloads). In addition, because of the increasingly competitive downstream space, there is increased opportunity in upstream GPU supply, and more companies are entering and expanding in the silicon space (including start-up manufacturers SambaNova, Cerebras, Graphcore, Groq and Mythic).

- **Compute infrastructure and access to affordable energy**. There are many providers of compute resources, including Alibaba (Alicloud) Amazon Web Services (AWS), Baidu, Bytedance, Google Cloud Platform (GCP), Dell, Huawei, IBM Cloud, Microsoft Azure, Oracle Cloud Infrastructure, and Tencent, as well as smaller providers such as Aligned, Arkon Energy, Cirrascale, Crusoe, Denvr Dataworks, and TensorWave. An increasing number of specialised AI cloud providers, such as CoreWeave, Hewlett Packard Enterprise, Lambda Labs, NVIDIA and Scaleway, have also been emerging in response to the increased demand for compute capacity.

  In addition, there are emerging alternatives, such as publicly owned supercomputers (e.g. the supercomputing center of the French National Center for Scientific Research, and Leonardo, a high-performance computing cluster based in Italy which is open and available free of charge for industrial and scientific computing), as well as EU-level efforts to make European supercomputers available to innovative European AI start-ups to train their FMs (e.g. the launch of the European Commission's AI innovation package to support AI start-ups and SMEs in January 2024). Whether these publicly funded initiatives will deliver the desired results remains to be seen but they could be an important element of a competitive European AI ecosystem.

Competition to attract FM developers is intense between compute providers, and the growing demand for placing AI workloads is increasing competition and innovation at the compute level. Entry for newcomers might, however, be challenging and sustainability trends suggest that such infrastructure should ideally be running on renewable energy to prevent growing carbon footprints (which is increasing infrastructure costs even further). This requires extensive financial resources and specific know-how.

- **Data**. FM developers need data to train the models they are developing. The most important factors typically include the scale and quality of the data, however this will depend entirely on the type of model being developed. Data (e.g. academic journals, image repositories, coding companies, search data, social media, industrial, healthcare or content websites) can either be proprietary or open source (including other FMs).
  In the pre-training phase, where data is used to build the model's knowledge, training can be successfully carried out with publicly available datasets (e.g. C4, The Pile, Project Gutenberg Corpus and Starcoder). For example, LlaMA (Meta), GPT-3 (OpenAI) and Stable Diffusion (StabilityAI) have been pre-trained entirely on open-source data.
  In the fine-tuning phase, where the model's accuracy is improved through dedicated training, data is often human-generated in-house or sourced from specialist third-party data providers such as Scale AI, Prolific, Surge AI, Super Annotate or Dataloop.

- **FM development**. Development and supply of FMs is still in its early stage and FM developers face increasing and strong competition from new entrants[3]. There is strong demand for new and different models and especially for models that work in industrial applications, that require a high level of security and trustworthiness. Models are selected by customers to provide specific capabilities, balancing various characteristics, including performance and cost. The most important factor is the performance of any FM on the customer's particular task, rather than which company offers the model, how many parameters the model has or how the model is made available. The pool of FM developers is constantly increasing, with a large variety of end products (large language models, but also smaller, more cost-effective language models, as well as models specialised in video or image generation). The integration of SMEs and their requirements into this evolving landscape will be crucial for European competitiveness. The more AI enabled customers, the bigger the incentive for FM and application developers to increase innovation, choice, and quality.

- **Downstream FM applications**. The application layer encompasses applications that incorporate FMs. Customers can interact with FMs in many ways. Some FMs are deployed as standalone services such as chatbots (e.g. Inflection's Pi, OpenAI's ChatGPT or Google's Gemini) and virtual assistants (e.g. Otter, Fireflies, Google Assistant, Amazon Alexa or Microsoft's Copilot), others are integrated with existing services or are add-ons to existing applications and services.

  The development of downstream FM applications has been growing rapidly across a variety of industries including education (e.g. Khanmigo), hospitality (e.g. OpenTable AI), productivity (e.g. Geppettochat), marketing (e.g. Jasper AI) and many others. Industrial

[3] See, e.g., https://app.dealroom.co/lists/33530.

applications for European SMEs should be fostered. While these downstream FM services make use of similar technological inputs, competition occurs at the level of the individual application. There is strong competition between suppliers to innovate and differentiate their offerings.

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**

It is difficult for ICC to predict what kind of competition issues may emerge in this dynamic and fast-evolving field. Some national competition authorities have identified various possible areas of concern. For example, access to key inputs like data or computing capacity could become a challenge in case companies with market power refuse to provide access or supply such elements which could prevent new entrants developing their business.

It is unclear at this stage how forthcoming regulation, like the Data Act (e.g. on data access), the AI Act or the DMA (e.g. on interoperability, portability and self-preferencing) will affect competition in this space. In ICC's view, existing competition instruments are in any case already sufficiently flexible and adaptable to address any potential competition concerns.

Given the dynamic and fast-evolving nature of this space, ICC considers that the Commission is going in the right direction with the present consultation, which will allow the Commission to gather important market information so as to be able to react quickly with its existing tools in the event that competition issues materialise.

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

There is potential for monetisation across the various layers of the AI technology stack:

- **AI accelerator chips**. Suppliers of GPUs and other AI accelerators sell their products to cloud providers or to FM developers directly.

- **Compute resources**. Compute providers sell compute capacity (*i.e.* access to GPUs or other AI accelerator chips installed in data centers) to FM developers and other AI customers.

- **Data**. Datasets can be proprietary and may be licensed to FM developers for the purposes of training a model. Other data sets are open-source and are publicly available for download.

- **FMs and FM applications**. FMs can be accessed through downloading the model or via APIs, either directly, through a third-party distribution channel (e.g. Azure AI Studio, Google Vertex AI, Amazon Bedrock, Alibaba Cloud and Oracle Generative AI) and/or through open model registries (e.g. Hugging Face). This can include both pre-trained models and models that are fine-tuned for specific use cases. Each of these methods of accessing FMs allows the customer to fine-tune the FM to their own needs, integrate the FM into their own

products or services, and/or deploy it in their businesses directly. Equally, FM developers can develop and sell products or services that are powered by their models. This can include chatbots, virtual assistants, and other AI-powered tools. FM applications can be accessed through download from an app store (e.g. Inflection's Pi is available on Android and iOS).

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.**

Open-source generative AI systems and components, including AI models, when adapted and maintained, are capable of effectively competing with proprietary AI generative systems and components. Developers of downstream FM services, such as chatbots and other AI assistants, can capitalise on the availability of multiple open-source models, including via API-based offerings within the industry. These models are provided by various FM suppliers including Amazon, Anthropic, Azure, Cohere, Databricks, Google Cloud Platform, Hugging Face, Meta, Mistral, NVIDIA, OpenAI, Salesforce, Stability AI. Delivering these models as a service at scale also requires access to data, computing power, and capital.

Many developers are utilising open-source models to create their own customised downstream FM services. Additionally, developers can leverage existing FM applications to build use-case-specific applications on top of existing foundation model-based services, such as ChatGPT. This allows for the development of numerous foundation model-based applications across various industries, including education (e.g. Khanmigo), hospitality (e.g. OpenTable AI), productivity (e.g. Geppettochat), marketing (e.g. Jasper AI).

While these downstream FM services utilise similar technological inputs, competition occurs at the level of individual applications.

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?**

Please refer to our responses to Questions 1 and 3 above.

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?**

To ICC's knowledge, FMs are generally interoperable. Those developing generative AI solutions can use multiple FMs. For example, chatbots and virtual assistants are often created by combining different FMs from different developers - Perplexity runs on OpenAI's GPT-3.5 model along with Perplexity's own FM, which in turn is a variant of Meta's open source LlaMa2 model. Similarly, Perplexity's Pro version runs on OpenAI's GPT-4 model and Anthropic's Claude.

Interoperability also typically exists at the component level, as FM developers can use services. The use of open standards, access to data and well-defined APIs could facilitate scalability and

switching between computing or AI platforms, reducing the scale and scope barriers for new players.

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.**

Each component of the AI stack (please refer to our response to Question 3) plays an important role in the seamless development, deployment, and optimisation of AI systems. To ICC's knowledge, there are very few players that are highly integrated across the different levels of the AI stack and no company controls all or indeed any of these components.

While many technology companies in the generative AI field may operate at different levels of the AI stack providing customers with more choice, their presence at each level varies. In addition, they still need to collaborate with other players for key inputs such that vertically integrated companies cannot determine market dynamics.

Vertical integration generally provides substantial scope for efficiencies along the value chain. However, it can also give companies a hard-to-replicate competitive advantage under certain circumstances. Competition authorities should ensure that such companies do not use their position to restrain competition, e.g. by limiting or denying access to key inputs to competitors or granting access under unfair or disproportionate conditions— for instance, by degrading the access conditions to FMs or upstream services needed for the deployment of generative AI services.

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?**

Larger technology companies as well as venture capital are providing funding to start-ups in various forms: for example, by direct investments, convertible debt, or by forming commercial or strategic partnerships. Many start-ups' entry has been enabled or accelerated by investments or partnerships, such as Adept, AI21 Labs, Aleph Alpha, Anthropic, Cohere, Databricks, Deci, EvolutionaryScale, Inflection, Mistral, OpenAI and Stability AI.

These investments and partnerships generally drive competition and lead to benefits and efficiencies. They enable start-ups to quickly enter and expand into AI by providing them with access to funding and/or computing resources. This accelerates the overall pace at which entry and expansion occur in AI, inevitably resulting in more innovation and choice:

- The investments and partnerships enable start-ups to develop, train and commercialise their products and services much faster.

- FM technology is general-purpose in nature and improvements in FM technology facilitate complementary innovation across the myriad of different applications that can make use of this technology. There can be an important "knowledge-spillover" effect from start-ups' innovation efforts onto companies which are implementing this technology. Innovations in

FMs spur further innovation within the implementers' solutions. When the implementers are also the partners of/investors in the FM start-up, the expected innovation benefits are likely to be a lot larger.

- Similarly, the general-purpose nature of FM technology means that it is optimal for start-ups' technology to be built upon by third parties using open APIs. Third parties can combine the underlying FMs with their own expertise in, for example, product development. This complementarity is likely to increase incentives to innovate.

- Large companies may be interested in acquiring small niche players, for example, to extend or diversify their portfolio. They can also look for synergies between their existing products and the niche player's products. However, for potential acquisitions in innovative sectors like generative AI, some existing merger control rules such as Article 22 of the EU Merger Regulation, create legal uncertainty for business which may discourage certain investments. More predictable rules and enforcement would be welcome.

- It should be kept in mind that SMEs play a crucial role in Europe's digital economy. That is why they need special attention and have to be enabled to be part of the evolving generative AI ecosystem. That means that their requirements for secure, trustworthy and economically affordable compute infrastructure and data usage and offering have to be taken into account.

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?

The current antitrust framework and legislation seem sufficient. Among others, Articles 101 and 102 TFEU, the EU Merger Regulation, and Regulation 1/2003 are potent tools to address any potential concerns. Where needed, the development of new informed theories of harm seems sufficient to "adapt" EU's existing framework to generative AI and its various components.

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

As generative AI continues to evolve, it will introduce novel challenges and opportunities. Therefore, vigilant monitoring of the generative AI landscape by competition authorities is essential. While some specific areas may warrant closer scrutiny, ICC does not think that the Commission needs new investigation tools or practices as the current tools, like DG COMP's Data Analysis and Technology unit as well as the formal complaints process under Regulation 1/2003, are sufficiently effective to detect potential concerns.

It being said, competition authorities should update their tools on a regular basis. For instance, they may use their own AI-powered tools to better understand the complexities of this space and better detect potential harmful behavior. It is key that enforcers have a deep knowledge of how AI products and services work, including from a technical perspective, to be able to conduct investigations and deal with the challenges brought about new technologies in an appropriate and informed manner.

Virtual Worlds

Virtual Worlds may be described as immersive digital environments that simulate physical or imaginary worlds and allow users to interact with them. Virtual Worlds can have different purposes, such as entertainment, education, social networking, or business. They can target different audiences, such as consumers (B2C) or enterprises (B2B). As a general comment, ICC considers that it is key to understand the competitive dynamics of the market to differentiate the Industrial B2B Virtual Worlds from the B2C Virtual Worlds.

The B2C segment is consumer-focused (e.g. gaming, social media) and has its own dynamics and challenges like asymmetric negotiation power and the need to protect personal data. Industrial Virtual Worlds (B2B) intend to help companies to optimise 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, and access to machine data 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. The B2B segment is more recent and dynamic and involves many players which offer solutions to experience and interact with a digital twin (*i.e.* a virtual representation of a physical asset, process, or system).

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?**

Entry barriers and obstacles to growth in Virtual World markets can vary based on a variety of factors, including the maturity of the markets:

- **Entry cost**: Establishing a Virtual World platform involves costs. In particular, infrastructure (servers or cloud resources), development, and marketing expenses can be substantial.

- **Expertise**: Developing Virtual World technology requires expertise in technologies like 3D graphics or physics simulations. This expertise and the development effort can be outsourced to third parties.

- **Intellectual Property**: Openness and interoperability are very important factors to attract third-party providers in a virtual world which in turn can be key to reduce own development time and to create an attractive, more comprehensive offering for the customers. In some instances, openness can lead to conflicts over intellectual property rights protection and monetisation models. Companies investing in Virtual Worlds development may seek to protect and or amortise their investments through IP rights.

Overall, while some barriers may be more important in either mature or emerging markets, many of these challenges are universal and require careful consideration and strategic planning by companies looking to enter or expand in the Virtual World market. Adaptability, innovation, and a deep understanding of local market dynamics are essential for overcoming these obstacles and driving growth in both mature and emerging markets.

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?**

The main drivers of competition for Virtual World platforms, enabling technologies, and services based on Virtual Worlds can be categorised into several key factors:

- **Access to Data**: Virtual World platforms compete based on their ability to gather, process, and utilise user data to enhance user experiences, improve content creation, and provide targeted advertising. With the strengthening of data privacy and protection regulations such as GDPR, how businesses effectively utilise data while respecting user privacy will probably become a key aspect of competition.

- **Own Hardware or Infrastructure**: Companies may compete based on the quality, scalability, and efficiency of their hardware infrastructure to support Virtual World experiences, such as servers, cloud resources and networking equipment. Many virtual world operators outsource this component to third parties.

- **IP Rights**: Securing intellectual property rights over unique Virtual World content, including characters, environments, and interactive elements, can be a competitive advantage for platforms and content creators but at the same time could make the Virtual World less attractive for third-party developers or third-party vendors on this particular Virtual World.

- **Control over Connectivity**: Ensuring reliable and low-latency connectivity is crucial for delivering immersive Virtual World experiences. In the industrial space, **real-time connectivity** including cybersecurity will be key for the high demands of industrial applications (5G/6G).

- **Open APIs** that allow to connect assets, products and software from different vendors to the Virtual World and enable a seamless communication within the Virtual World.

- **Ability to use and interpret the data** through domain know-how that creates value for customers.

- **Vertical Integration**: Integration of various components of the Virtual World ecosystem, including hardware, software, content creation tools, know-how, can provide advantages in terms of efficiency, innovation, and user experience.

- **Platform and Payment Fees**: The cost structure of Virtual World platforms, including fees for accessing the platform, purchasing virtual goods and services, or conducting transactions within the virtual environment, can influence competition by affecting both users and content creators.

- **New technologies:** For example, the use of AI technology can enable platforms to meet user needs in a smarter way.

These drivers of competition are likely to evolve over time due to technological advancements, changes in user preferences, regulatory developments, and competitive dynamics within the industry. In the B2B segment, investments and complementary knowledge are required in the Industrial Virtual World which is why new forms of partnerships and ecosystems are likely to play an important role in the sector.

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?**

Several key players operate on the Virtual World platforms and enabling technologies space (the below is a list of selected key players in the B2C space):

- **Meta**: Meta is a major player in the Virtual World space through its Oculus brand. Oculus Rift and Oculus Quest are leading VR headsets, and Meta has been investing heavily in virtual reality technologies and platforms. Its social B2C VR platform, Horizon, aims to create immersive virtual environments for social interaction.

- **Apple:** Apple recently released its Vision Pros.

- **Roblox Corporation**: Roblox is a user-generated content platform where users can create and play games created by other users. It has gained immense popularity, especially among younger audiences, and has a significant presence in Virtual Worlds. Roblox allows developers to monetise their creations and has become a hub for virtual experiences.

- **Unity Technologies**: Unity is a leading game development platform that also supports the creation of Virtual Worlds. Its engine powers a significant portion of virtual reality experiences, enabling developers to create immersive environments and simulations across various platforms.

- **Epic Games**: Epic Games, the company behind the Unreal Engine, has a significant influence on Virtual Worlds through its technology and platforms. Fortnite, one of Epic Games' flagship titles, has evolved into a Virtual World platform beyond just a battle royale game, hosting concerts, events, and social spaces.

- **Sony**: Sony, through its PlayStation VR platform, is a key player in the virtual reality space, particularly in the gaming sector. With its PlayStation console ecosystem and VR hardware, Sony has established a significant presence in the market.

- **HTC**: HTC's Vive VR headsets have been popular choices for high-end virtual reality experiences. HTC has been actively involved in developing VR technologies and collaborating with developers to create immersive content.

- **Microsoft**: Microsoft has been investing in virtual reality and augmented reality through its HoloLens devices and Mixed Reality platform.

- **Snap Inc.**: Snap Inc., known for its Snapchat app, has been exploring augmented reality technologies through its Spectacles and AR filters.

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

It depends on which layer of the Virtual World one is looking. In the Industrial Virtual World, existing market players seeking to transition into virtual realms may require significant investments in workforce and resources for model construction and technological transformation. Enterprises possessing vast customer data and computational resources may have a competitive edge in this transition. On the customer-facing side of a Virtual World we do not think that market power in the real world will automatically translate into market power in Industrial Virtual Worlds. We expect the emergence of numerous Industrial Virtual Worlds and each Virtual World will function as an ecosystem where a multitude of players can add value. This is an opportunity for European industrial players (including SMEs as well as new entrants) to play a role in this space.
To ensure fair opportunities for various enterprises to enter this space, greater and non-discriminatory access to data for model training purposes for EU citizens would be important.

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?**

It seems very likely that we will see new entrants in the Virtual World platforms, as well as advancements in enabling technologies and services based on Virtual Worlds in the next five years. In particular, the B2B segment is an **emerging market** with a significant number of different players, many of which are **new entrants**. The continued growth of virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies, along with the increasing demand for immersive experiences, suggests a fertile ground for innovation in this space.

Potential new products and services could include e.g. next-generation Virtual World platforms, Industrial Virtual Worlds, advanced hardware, virtual events and experiences or virtual education and training.

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?**

There has been a noticeable trend towards incorporating open standards and protocols in Virtual World technology (see e.g. the Metaverse Standards Forum as an important source for interoperability activities).

Open standards and protocols offer several advantages, including interoperability between different platforms, increased flexibility, and greater accessibility for developers and users. Additionally, they can promote innovation by enabling collaboration and the sharing of ideas and resources across different organisations and industries.

Many companies and organisations within the Virtual World space recognise the benefits of open standards and actively participate in standard-setting organisations, industry associations, and collaborative efforts to develop and promote these standards.

That said, proprietary technology still plays a relevant role in Virtual World platforms, particularly when it comes to unique features. Companies may choose to develop proprietary technology protected by intellectual property to differentiate their platforms or amortise their investments.

Overall, while both open standards and proprietary technology are likely to continue coexisting in the Virtual World landscape, the adoption of open standards is expected to grow significantly as the industry matures and as more stakeholders recognise the benefits of interoperability and collaboration.

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?**

The development of Virtual Worlds is likely to see several data monetisation models becoming increasingly relevant in the next five to ten years, including:

- **Virtual Goods Sales**: This model involves selling virtual items within the Virtual World, such as clothing, accessories, virtual real estate, or digital pets. These items can be sold for real money or virtual currency, generating revenue for the platform.

- **Advertising and Sponsorship**: Virtual Worlds can offer advertising space and sponsored events to brands looking to reach a highly engaged audience. This model involves displaying ads or sponsoring in-world events, experiences, or products.

- **Data Analytics and Insights**: Virtual Worlds generate vast amounts of user data related to user behavior, preferences, and interactions. This data can be used to develop and subsequently monetise value-add offerings providing smart analytics and insights.

- **Subscription Services**: Offering premium subscriptions with access to exclusive content, features, or virtual goods can be a lucrative monetisation strategy for Virtual World platforms. Subscriptions can provide a steady stream of revenue.

- **User-Generated Content Marketplace**: Virtual World platforms can facilitate the creation and sale of user-generated content such as avatars, clothing, accessories, and virtual assets. They can take a commission from each transaction within the marketplace.

- **Licensing and Partnerships**: Virtual Worlds can enter into licensing agreements with brands, intellectual property owners, or entertainment companies to incorporate branded content, characters, or experiences within the virtual environment.

The successful monetisation of Virtual Worlds will likely involve a combination of these models, tailored to the specific characteristics of the platform and the preferences of its user base. Additionally, ensuring a balance between monetisation strategies and user experience will be crucial for sustained growth and profitability.

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

Overall, ICC sees an important opportunity for European industry including SMEs to participate and grow in the Virtual World space. It is difficult for ICC to predict whether and what kind of competition issues may emerge in this fast-evolving market. It is also unclear at this stage how forthcoming regulation will affect competition and to what extend potential concerns will be addressed, notably by the DMA or the Data Act.

It is important to differentiate between B2B and B2C (e.g. gaming, social media) segments. The B2C segment is potentially more static, 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 segment is more complex, industry-focused, and about to grow dynamically. Trying to regulate the B2B segment has an even higher risk of negative consequences including harm to competition, European competitiveness, and innovation.

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

The current antitrust framework and legislation seem sufficient. It is difficult to predict legal frameworks for technologies and business models that do not exist today. In view of the openness of the DMA to address new problems, there seems to be a sufficiently adaptable regulatory framework to react to new technologies and market dynamics.

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

ICC does not think that the Commission needs new investigation tools or practices. The Commission's current tools seem sufficiently effective to address potential concerns. In view of a large number of new tools in Europe and internationally, their interaction and impact on competition and competitiveness should be studied carefully before any further legislative action is taken.