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Nexa Center for Internet & Society

Public Consultation on Competition in Virtual Worlds and Generative AI

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Name: NEXA CENTER FOR INTERNET & SOCIETY
at Department of Control and Computer Engineering (DAUIN)
at POLYTECHNIC UNIVERSITY of Turin (Italy).

Via Pier Carlo Boggio 65/A, 10129 Torino, Italia

http://nexa.polito.it

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1. Competition in Virtual Worlds

Innovation in digital experiences and digital worlds has proceeded at a staggering pace since the 1990s. This ever-expanding market, which is directly influenced primarily by videogames and digital entertainment, has suffered and still suffers from the absence of precise doctrine and the lack of standardized definitions. This affects discussions and regulations about virtual worlds.

It is therefore important to firstly clarify that while it is usual to refer to experiences enjoyed through a digital medium as “virtual”, they should instead be defined as “digital”, as the word “virtual” can refer to anything that is not physical, but is not limited to digital manifestations. Therefore, all digital worlds are virtual, but not all virtual experiences are digital. In this semantic sense, it would be advisable to talk about “digital” experiences or “digital” worlds. The general public is often unaware of this precise distinction, and tends to believe that “virtual worlds” are basically computer-simulated environments in which users can interact with each other and with the digital environment around them. This definition is for the most part correct – if we assume that “virtual” means “digital”.

Secondly, the highly talked about “metaverse”, which still does not properly exist and whose general conceptualization and realization has been a severe challenge for software developers of any size and budget, is but a subclass of the digital worlds category, which in return is a subclass of the virtual worlds category.

The public's unawareness of the intricacies of video games and digital experiences is not merely accidental but a consequence of the medium's rapid evolution. Unlike other media, such as cinema, which has enjoyed a longer period of development and a slower pace of change, allowing for a robust theoretical foundation, video games and digital experiences have only begun to spread widely through society in the last two decades. This rapid growth and constant innovation, while driving the medium forward, have also led to a significant lack of clarity in defining key concepts. This confusion may even be partly intentional, as a strategy employed by software developers and distributors interested in maintaining a certain level of ambiguity to better market their titles.

This lack of clarity has far-reaching implications beyond consumer understanding, particularly affecting the legal and economic analysis of the market. In the realm of cinema, terms like 'set design,' 'shot,' and the roles of the director or production manager are well-defined, allowing for clear legal and economic frameworks to apply. These frameworks facilitate the management of intellectual property rights, the structuring of contracts, and the understanding of market dynamics, such as competition and collaboration among creators.

In contrast, the video game industry's varied definitions of even fundamental concepts like “gameplay” create a complex landscape for legal and economic analysis. The ambiguity surrounding these definitions complicates the establishment of copyright and patents, affects licensing agreements, hampers the freedom of market competition, and increases the potential for monopolistic or oligopolistic behavior.

Addressing these challenges requires a concerted effort to develop a clearer theoretical framework for understanding video games and digital experiences. This involves standardizing terminology, establishing clear legal guidelines for intellectual property and user rights, and developing economic models that accurately reflect the market's dynamics. Only then can the legal and economic analysis of the video game market keep pace with its rapid development, ensuring that competition remains fair and innovation continues to thrive.

This is in contrast with the current state of the market, exemplified by the latest craze about the “metaverse”, which, while initially hyped as a digital revolution, remained largely conceptual, limited by technological hurdles, aggressive monetization practices, and a lack of compelling use cases beyond gaming. The vision was further fragmented by the emergence of numerous isolated platforms, hindering

a unified experience, turned out to be nothing more than a sort of buzzword over-used in order to cater to a bigger market and to demonstrate a kind of innovation which in the end didn't materialize,[1] but nonetheless attracted a lot of attention and free advertising. The same can be said for other categories in the videogame industry, such as MMOs or MMORPGs (Massively Multiplayer Online Role Playing Games), which, while extremely successful videogame genres and inspiration for the notion of the "metaverse", are designated by expressions which all too often are used interchangeably without a precise meaning apart from what appears from time to time is more convenient for marketing purposed based on the current state of the market.

Legislation which aims to regulate virtual experiences, digital experiences and metaverses in general cannot however ignore the profound differences between these concepts if the aim is to build a compatible, effective and knowledgeable set of rules.

Think for example about the level of user interaction and immersion, which varies significantly across digital experiences. Legislation must consider the psychological and social impacts of these interactions, especially in immersive environments where the lines between reality and virtuality blur, raising concerns about mental health, privacy, and digital addiction.

Also, the nature of content creation, distribution and ownership may be very different between products. In some kinds of digital environments, such as metaverses, users often contribute to the content, uploading their own on a given product's servers, leading to complex issues around intellectual property rights (and often times around downright illegal content). Legislators must navigate these complexities to protect creators' rights without stifling innovation and user-generated content. Directly related to this is the current revolution of digital economies, which now allow for the exchange of virtual goods, services, and even real money, sometimes through dubious or premature technologies, such as NFTs or the blockchain. Regulating these transactions requires a detailed understanding and a consequent definition of virtual economies, including issues of taxation, fraud prevention, and the use of cryptocurrencies or other digital currencies.

Having said so, and starting from question **3), What are the current key players for Virtual World platforms, which we consider or expect to have significant influence on the competitive dynamics of these markets?** It can be said that in the last few years, already-established software houses from all around the world tried to capitalize on the success of previous kinds of digital experiences by specifically trying to develop the perfect "metaverse", working on its conception, creation, and publishing. This is an unconcealed goal of many of the largest digital companies currently on the market: Meta[2], and Microsoft[3] in response; Epic Games, which raised a billion dollars[4] for

[1] This has been due to a number of reasons. Firstly, there were technical limitations: the vision of a seamless, highly immersive metaverse requires cutting-edge technology which in turn needed high-end hardware and presented issues with interoperability. This lead to a very poor general user experience, which was found by users to be much less engaging and intuitive than what was marketed. The amount of available content was also generally very low. Many metaverses still struggle to offer content that is both diverse and engaging enough to sustain long-term interest, slowly walking towards insignificance. Also, monetization and economic models in metaverses have been found to often be predatory and unappealing for a broad audience: issues deriving from their virtual economy, including the use of cryptocurrencies and NFTs, have also raised concerns about security, accessibility, and regulatory compliance.

[2] Meta.com, *What is the metaverse*, https://about.meta.com/what-is-the-metaverse/

[3] C. Bell, *Metaverse is coming. Here are the cornerstones for securing it,* Official Microsoft Blog, https://blogs.microsoft.com/blog/2022/03/28/the-metaverse-is-coming-here-are-the-cornerstones-for-securing-it/, 28 March 2022

[4] Lorenzo Plini, *Epic Games raccoglie un miliardo di dollari per la creazione del metaverse: che cos'è un metaverso?,*MMO.it, 19 April 2021, https://www.mmo.it/index.php/2021/04/19/epic-games-raccoglie-un-miliardo-di-dollari-per-la-creazione-del-metaverse-che-cose-un-metaverso/

its metaverse[5], and Ubisoft, that entered largely into *The Sandbox*[6], Pixowl's already established metaverse[7].

It is precisely this seemingly unstoppable and varied amount of "metaverses" (some count as many as 40[8]) that undermines the meaning itself of the term and causes it to fall into contradiction. Indeed in principle "the" metaverse should be a precise and unique place: it is the prefix itself that states this. According to its original meaning coined by Neal Stephenson in his science fiction novel “Snow Crash” in 1992, "the" metaverse should be a single virtual (better: “digital”) world that connects every possible iteration of the Internet and allows for interaction among users.

The above short list of software houses working on a metaverse also shows that for the most part companies which are interested in capitalizing the current interest on digital worlds and metaverses are big players of the market, able to invest enormous amounts of money into these projects. Developing a digital world, or a metaverse, is indeed a very costly endeavor: other than a primary set of expenses related to the manufacturing of the product in itself (conceptualizing, developing, bug testing, releasing, distributing…) there is a second, constant, set of expenses related to the ongoing continuous nature of the digital experience. Servers have to be kept online, maintained and made secure. Also, constant updates (*“patches”)* must be delivered, to avoid what is usually defined as “content drought” and which has caused the death of many of these digital experiences, due to users growing tired and leaving. These requirements in short cause a heavy amount of recurring financial burden for any company which aims to create an experience of this kind. Therefore, with all this in mind, we can try to summarize an answer to the first question of the consultation:

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

The first obstacle is represented by economies of scale. In most cases, only large companies with considerable economic means can afford to create digital experiences that spread over a large number of users. These large numbers are necessary to cope with the enormous costs of developing and maintaining the systems, in a kind of self-reinforcing process. The higher the quality of the experience and the cost of the updates and constant maintenance of the digital world, the more there will usually be playing and paying users, and in turn the more successful the project will be. This formula has been the basis for the success of the greatest examples of MMORPGs of the past, the best example being *World of Warcraft*, by Blizzard Entertainment, and, later, of the digital experiences of *League of Legends*, by Riot Games, *Minecraft* (now owned by Microsoft) and *Fortnite*, by Epic Games.

Various characteristics of these projects have been the basis of the modern conception of the “metaverse”, which, as we’ve already seen, is in the end but a sub-category of the MMORPG genre, which in itself is a sub-category of the wider “digital worlds” set.

Yet, this economies of scale related obstacle is not the only one. Consider for example the current reputation of the various metaverses opened to the public: after a superficial and widespread

[5] GlobalData Thematic Research, *Epic Games is strengthening its metaverse ambition*, Verdict.co.uk, 20 April 2022, https://www.verdict.co.uk/epic-games-metaverse/

[6] Ledger Insights, *Ubisoft to bring Rabbids to The Sandbox’s metaverse,* 9 February 2022, https://www.ledgerinsights.com/ubisoft-to-bring-rabbids-to-the-sandbox-metaverse-blockchain-game/

[7] https://www.sandbox.game/en/

[8] Andrea Daniele Signorelli, *Perché le aziende (ma non solo loro) sprecano soldi nel metaverso*, La Repubblica, https://www.repubblica.it/tecnologia/2022/12/11/news/perche_le_aziende_ma_non_solo_loro_sprecano_soldi_nel_metaverso-377700212/, 11 December 2022

interest, especially among those most uninformed, the metaverse is now one of the most unpopular topics in many prominent and experienced Internet communities[9], with a consensus that seems almost unanimous. This happened because of its actual, practical and fragmented implementation, which has been very different from what was expected and generally very poor, qualitatively speaking.

Meta's metaverse, which in theory is supposed to be the largest of the metaverses and the most important as well as the most costly (an investment of about $36 billion is mentioned)[10], has been in the news following a well-known video posted on Youtube*, I played Facebook's VR Metaverse so you never have to*[11], which shows the actual underwhelming workings of Zuckerberg's metaverse, from avatar creation to player interactions, and was followed by a live streaming curated by the same content creator, RTGame Daniel. The quality of the two multimedia contents, combined with an already undermined confidence in Meta, led alone to a loss of 25 percent of Meta's stock value on the market over a single day[12].

Thus, the second obstacle is all about quality. Simply trying to imitate genres of the past by proposing some minimal innovations in a social key (as the metaverse does) is not enough to gain space in a hyper-competitive market where there are already successful titles (usually, as we've said, MMORPGs) that allow players to share digital experiences. If the development of these experiments is moreover perceived by users (as it was the case of Meta's metaverse) as mainly or entirely based on interests of financial return, then failure is guaranteed.

On the flip side, there are virtuous examples of digital worlds created by small software houses but with very good ideas and a precise target audience: this is the case, for instance, of *Albion Online,* a low budget but highly successful MMORPG by Sandbox Interactive, or even *Minecraft*, which started out as a zero-budget project of a single person, the Swedish developer Markus Persson (also known by his alias *Notch*), and which has also had an impressive spread.

In this context, the market appears to be self-regulating with considerable success, while increasingly demanding more from these digital experiences. On one hand, this seems to necessitate developers to invest more money to produce higher quality products that appeal to an ever-expanding audience. On the other hand, this audience seems to be becoming increasingly immune to the grandiose promises of major development companies, which have exploited the lack of precise definitions in the world of video games and virtual experiences by

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[9] For example, the consensus on the very popular online forum reddit.com is unanimous: the metaverse doesn't work.
https://www.reddit.com/r/gamedev/comments/yj9yjb/what_is_the_metaverse_and_why_do_people_seem_to/
https://www.reddit.com/r/virtualreality/comments/u446ba/metaverse_alignment_chart/
https://www.reddit.com/r/NoStupidQuestions/comments/yvepsg/why_is_there_so_much_hate_towards_the_metaverse/
https://www.reddit.com/r/OculusQuest/comments/qpqwh2/i_hate_the_idea_of_facebooks_metaverse_does/

[10] Jyoti Mann, *Meta has spent $36 billion building the metaverse but still has little to show for it, while tech sensations such as the iPhone, Xbox, and Amazon Echo cost way less,* BusinessInsider, 29 October 2022.
Keep in mind that $36 billion for a digital project is an unprecedented amount of money in the history of video games and software in general: the most expensive online game is currently *Star Citizen*, a controversial project that will probably never be completed, whose budget runs just over $400 million.

[11] RTGame, https://www.youtube.com/watch?v=UdqrFa6pWLA

[12] Mary Yang, *Facebook parent Meta is having a no-good, horrible day after dismal earnings report*, 27 October 2022 https://www.npr.org/2022/10/27/1131705422/facebook-meta-earnings-stock-price-fall-metaverse

using terms like "virtual world," "digital world," and "metaverse" interchangeably, primarily to achieve the best possible marketing advantage. Today's audience demands more, but this is accompanied by the realization that a well-made product does not necessarily need to have a sensational budget to be appealing: having good ideas at its disposal seems sufficient.

This nuanced shift reflects a growing sophistication among consumers, who are now looking for meaningful, innovative, and genuine experiences rather than being swayed by mere marketing hype. It highlights a transition towards a more discerning market where value is placed on creativity, originality, and the authentic engagement of the user experience. This evolution poses a challenge for developers to balance between innovation and financial investment, suggesting that the future of digital experiences lies not just in their technological advancements but in their ability to resonate with users on a deeper level.

Furthermore, the use of vague terminologies like "virtual world," "digital world," and "metaverse" by corporations for promotional gains has led to a more critical audience that seeks clarity and substance over superficial branding. This skepticism towards marketing tactics emphasizes the importance of transparency and genuine quality in the development of digital experiences. It indicates a shift in consumer expectations, where the emphasis is increasingly on the content and quality of the experience rather than the budget or the buzzwords used in its promotion. Therefore, if asked whether **4) we expect existing market power to be translated into market power in Virtual World markets,** the answer is certainly yes, although this does not mean that there is no more space for new competitors to arise – although they will certainly have to work harder to bring cutting-edge experiences to the public, even if that means sacrificing on technical quality, therefore reducing expenses as much as possible but compensating with innovative ideas and engaging digital worlds.

Regulation of digital experiences should therefore aim to avoid concentrating explicitly on “metaverses”, primarily taking into account the concept of “digital worlds” instead, and being as broad as possible. It should first and foremost define certain concepts with clarity to avoid misinformation, preventing commercial interest to skew the correct information of the public. An effective regulatory framework should also aim to avoid overly constraining the rules within these virtual environments. For example, imposing overly strict obligations for moderation, control, and standardization could stifle creativity and innovation. Instead, regulatory efforts should focus on addressing criminally relevant issues, and on introducing new legal paradigms like identity theft through avatars, while allowing for as much freedom as possible in the expression of art and communication in digital worlds. This approach would benefit competition and enable smaller software houses to have a voice in a market that, when overly regulated, tends to favor the interests of those already in a dominant position, setting up barriers to access which often prove too cumbersome for small scale software developers.

Speaking of players in a dominant position, **3) the current key players for Virtual World platforms which will probably have significant influence on the competitive dynamics of these markets** can be divided into two categories: those who have particular technologies for the development of digital experiences, and those who have particular services needed for the maintenance and distribution of digital experiences.

1) Particular Technologies: This category primarily includes companies that develop game engines, which are essential tools for creating digital worlds. Prominent examples include Epic Games, known for the Unreal Engine, and Unity Technologies, the creator of the Unity Engine. These game engines have become industry standards due to their advanced features, versatility, and the extensive ecosystems they support. However, this dominance poses risks of monopoly and a potential diminishing in the overall creativity of products, as the widespread adoption of these engines might limit the exploration of alternative development methods. Moreover, developers tend to become specialized in these engines, and even when they change companies, these often prefer to let them continue using the same engine to avoid the costs and time associated with re-training employees.

2) Particular Services: This group involves companies that provide critical infrastructure services, such as game servers and cloud computing resources, necessary for the operation, maintenance, and distribution of digital experiences. Microsoft's Azure and Amazon's AWS are leading providers in this space, offering robust, scalable solutions that support the backend of digital worlds. These services are integral to the online functionality of games and virtual environments, enabling real-time data processing, multiplayer interactions, and access to powerful computing resources without the need for substantial upfront investment by developers.

The interplay between these two categories of key players significantly shapes the landscape of digital experiences. On one hand, the availability of sophisticated game engines and robust services democratizes the creation and distribution of virtual worlds, allowing developers to focus on creativity and innovation, and generally lowers development costs. On the other hand, the reliance on a few dominant providers for both categories raises concerns about market concentration, potential barriers to entry for new innovators, and the risk of stifling diversity in digital content creation.

3) Then, there is a third category of key players: the distribution platforms. Distribution platforms like *Steam*, developed by Valve Corporation, and *GOG* (Good Old Games), by CD Projekt RED, focus on the distribution of these experiences to end-users. These platforms serve as essential gateways for developers to reach a global audience, offering a centralized marketplace for a wide range of digital experiences, from blockbuster games to niche indie projects.

   Steam stands out as the most prominent digital distribution platform for PC gaming. It provides developers with a robust set of tools for publishing and updating their games, along with features that enhance user engagement, such as community forums, achievements, and in-game item trading systems. Steam's extensive user base and comprehensive feature set make by far the most attractive option for developers seeking wide visibility and access to a large community of gamers.

   These platforms play a pivotal role in the lifecycle of digital experiences. They not only provide the infrastructure for distributing and monetizing games but also contribute to the community and culture around gaming. Through features like user reviews, forums,

and curated lists, these platforms facilitate interaction between developers and the gaming community, enabling feedback loops that can inform game development and marketing strategies. Although the exact number of their users is not known, distribution platforms such as *Steam* are perhaps the main candidates between all of these companies for becoming "gatekeepers" according to the DMA, as they clearly have a significant impact on the market, providing a core service which is paramount to reach end users for producers, and enjoy "an entrenched and durable position" (*Steam*, for example, exists since 2004 and has always been *the* distribution platform for PC users). According to the latest data, however, they still don't possess the annual EU turnover of 7,5 billion euros required for DMA relevance.

Addressing these challenges requires a nuanced approach that encourages competition, supports the entry of new players into the market, and fosters innovation across both technology and service domains. This could involve encouraging the development of open-source alternatives, promoting interoperability standards to reduce dependency on specific platforms, and ensuring fair access to critical infrastructure services. Such a legislative approach, however, should be light and careful, as the ultimate choice of what game engine, server infrastructure and distribution service to use is of course a prerogative of the developers' freedom of enterprise. Having specified all this, we can answer the question regarding on whether **6) the technology incorporated into Virtual Worlds platforms will be based mostly on open standards or industry standards pointing to** the latter alternative.

The search for profit is unquestionably the main driver behind the current renewed interest in virtual worlds and in the /as of now) unfortunate conceptualization of metaverses. MMORPGs, and virtual worlds in general, have always been a risky but potentially very profitable market – and with the widespread adoption of the internet and the rise of high bandwidth connectivity this potential for profit has only increased.

There are three main strategies, or formulae, which software houses use to earn ("monetize") through their virtual worlds projects: the free-to-play formula, the buy-to-play formula, and the pay-to-play formula.

Free-to-play (FTP) monetization systems involve offering in-game items, character upgrades or virtual currency that players can purchase with real money. A popular method of FTP monetization is the use of in-app purchases, (IAPs), which allow players to purchase virtual goods or services within the game. In-app purchases are extremely common: they accounted, for example, for 72% of global app store consumer spending in 2019. Another popular method of earning money in such products is the use of advertising, which involves displaying often intrusive ads within the game and earning money from impressions or clicks on those ads[13] . This method is particularly common in mobile games.

An admittedly not very popular subcategory of the free-to-play model is the 'freemium' system: a combination of the words 'free' and 'premium'. In this model, players can download and play the game for free, but have to pay real money to unlock advanced features or content. This

[13] Ted Varani, *The Most important IAP Statistics for Mobile Game Publishers in 2020*, Wappier, 27 March 2020, https://wappier.com/iap-statistics/

model has become increasingly popular in recent years and is used by many successful mobile games. In virtual worlds, MMOs and metaverses, the freemium model could be used to offer users access to unique experiences, such as visiting a virtual theme park or attending a virtual concert[14] .

Unfavored because it is limiting and elitist, 'freemium' is not to be confused with the similar but different concept of 'pay-to-win' (PTW). This refers to a type of game or application where players can use real money to purchase items or game bonuses that give them a competitive advantage over players who do not spend any money. The concepts of pay-to-win and freemium are usually frowned upon by Western online communities[15] , because they believe it creates an unequal playing field and can be a form of exploitation. Some also argue that it can be addictive and lead to overspending[16] .

Despite these reservations, one of the main advantages of FTP monetization models is that they allow players to access and experience the virtual world, MMO or metaverse for free. This can lead to a larger player base and more opportunities for developers to generate revenue through in-game purchases or advertising.

The second monetization system is buy-to-play (BTP), a business model in which players pay a one-off fee to purchase the game and have full access to all its features and content.

One of the main reasons why BTP games are popular with many players is that they offer a level playing field, at least at the start, to all. In FTP and PTW games, players who spend money on in-game items or perks have a significant advantage over those who do not, which can lead to feelings of frustration and of lack of fairness in the game. BTP games eliminate this problem by guaranteeing all players the same access to the game's content and features, regardless of how much they have spent.

Finally, there is the most historical and once widespread of the earning methods for this kind of products: the pay-to-play, or monthly subscription system. This economic model based on the expenditure of a fixed amount of money on a monthly basis by the user was once the main form of income for virtual worlds, but is now a residual earning method following the increased economic potential that free-to-play has proven to bring. Despite this, this model is still used in the most successful and long-lasting MMORPGs, such as *World of Warcraft* and *Final Fantasy XIV*.

One of the main reasons for the historical popularity of the subscription model in MMORPGs is that it provides a steady revenue stream for game developers and publishers. With the

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[14] An example of a 'hybrid' metaverse in this regard is *Fortnite*, the famous Epic Games game that marked the previous video game generation and also became popular far beyond the confines of screens. In 2020, at the height of the lockdown, American artist Travis Scott partnered with Epic Games and held a concert in a virtual room of the game. *Fortnite*, normally a competitive game belonging to the 'shooter' genre, was for a few hours populated by all kinds of players, represented by their avatars, united in their interest to listen to the concert. The event was a worldwide success. See also Diego Barbera, *12 million people watched Travis Scott's virtual concert on Frontite,* 24 April 2020, https://www.wired.it/gadget/videogiochi/2020/04/24/concerto-travis-scott-fortnite/

[15] Unlike Eastern communities, which usually, due to culture and tradition, tolerate gaining advantages in a virtual place from the socio-economic status in the real world of their players.

[16] Eddie Kim, *Video Games are getting kids hgooked on pay-to-win mechanics,* melmagazine.com, 2020, https://melmagazine.com/en-us/story/video-games-are-getting-kids-hooked-on-pay-to-win-mechanics

subscription model, developers can count on a predictable and steady income from players, which allows them to invest in the ongoing development and maintenance of the game. This, in turn, leads to a better experience for players, who can expect regular updates, new content and bug fixes.

The last ten years have witnessed a hybridisation of these same models as well.

In particular, the system of so-called 'microtransactions' has spread far beyond its original free-to-play product boundaries, eroding and hybridizing formulas, both of monetization and of the game itself, that had remained granitic for many years.

Microtransactions are in fact a form of in-game purchase (a sub-category, one might say, of In-App-Purchases[17]) in which players can purchase virtual objects or currency using real money. Theoretically, they originally differed from normal IAPs due to their extremely limited cost, often less than $5. In virtual worlds and metaverses, microtransactions are now used to sell virtual objects such as clothing, accessories and furniture for avatars, or to sell land or property in the virtual world. In some cases, virtual objects may be offered for free, but players have the option of purchasing additional items or currency to enhance their experience.

Microtransactions have become an important source of revenue for game developers and publishers, as they allow players to purchase items or currency without necessarily having to pay for the game itself (although this is not excluded, for instance in buy-to-play products, which may indeed contain microtransactions whose cost is added on top of the cost of the product itself). However, they have also been the subject of criticism and controversy, as they can be seen as a form of exploitation and can lead to overspending. Some players may feel compelled to purchase items or currency to keep up with other players or to advance in the game, which may lead to addiction and financial problems[18] .

For now and the foreseeable future, hybridization seems to be the most common earning method for software companies, although many still prefer to publish their games and virtual experience through a buy-to-play or free-to-play system, while the monthly subscription fee is becoming more and more a relic of the past. As there are no indications that any new business models are rising, we can argue that **9) and 10) there is no expectation that any new business models or technologies will emerge that will directly need to trigger the need to adapt EU legal antitrust concepts, tools nor practices.**

[17] All microtransactions are In-App-Purchases, but not all In-App-Purchases are microtransactions.

[18] Philip C Raneri, Christian Montag, Dimitri Rozgunjuk, Jason Satel, Halley M. Pontes, *The role of microtransactions in Internet Gaming Disorder and Gambling Disorder: A preregistered systematic review*, ScienceDirect, volume 15, June 2022, https://www.sciencedirect.com/science/article/pii/S2352853222000104

2. Competition in Generative AI

1) **What are the main components necessary to build, train, deploy and distribute generative AI systems;**
2) **What are the main barriers to entry and expansion for the provision, distribution or integration of Generative AI systems or components.**

Building, training, developing, distributing and maintaining Generative AI systems involve a series of complex, multidisciplinary and interconnected steps which take into account both hardware and software.

It is possible to divide the creation and distribution of such systems into three different parts:

1) The first is all about data collection and processing. All generative AI models require large amounts of data whose quality and volume significantly affect their performance. Data diversity should be a primary objective in order to avoid biases, as navigating the ethical and legal implications of data use to avoid legal consequences. This includes attention to appropriate working conditions and protection of rights for data workers, as the current industrial practices lag behind this aspect. Following this, the focus shifts to training and model development, a phase that demands substantial computational resources.
2) The second is about training and model-development. Large amounts of data are used to train AI systems through machine learning. In order to do so, a huge computational power is required. Externalities to the environment needs to be accounted.
3) The third is about distribution and monetization. After the AI system is developed, profit must be made from it. Therefore, it has to be distributed and shared to the public. The deployment strategies often leverage cloud services and APIs, with monetization models varying from subscriptions to pay-per-use schemes.

Each of these steps gives rise to critical considerations and involves specific challenges, each of which is paramount for the success of the newly born generative AI system.

Although as the field of Generative AI will progress and so will the hardware on which it runs, only a handful of players on the market are at the moment able to create a complete AI model from scratch, as the steps necessary often involve prohibitive costs, data availability, or know-how requirements.

Small and medium-sized companies are clearly on the backfoot in this new market, and some proposed solutions may cause their position to become even more precarious, such as the limiting of web scraping, which would harm small and medium enterprises, that may not have the resources to access large datasets in other ways. In a context where content production is massive, web scraping becomes an even more crucial tool to remain competitive, allowing even smaller companies to access the necessary information to train their AI models or to inform their market strategies. At the same time, those who do not adapt to the new widespread use of AI will inevitably fall behind.

Falling behind is not just a risk derived from the inability to concretely create a model from scratch. On the contrary, the risk is also due to the astonishing speed and quality of content production generated by AI, such as code or texts, which, for business enterprises, lay the foundation for a new era of efficiency. However, this also raises questions about the

expectations on the volume of work that can be produced in a given timeframe. There is a risk of creating unrealistic expectations about the amount of work an individual should be able to perform, not taking into account the uniqueness and creativity that characterize human contribution. At the same time, adopting these technologies is not just a matter of maintaining competitiveness but can also become a critical factor for survival in the market.

For these small and medium enterprises, integrating AI technologies like Copilot or ChatGPT into their workflows is often no longer an option but a necessity. Businesses that adopt these technologies early will have a significant competitive advantage over those that are slow to adapt. AI can automate repetitive tasks, accelerate the development of products and services, and provide data-driven insights that can guide business decisions.

From these considerations it can be inferred that access to advanced AI technologies could be seen as a new form of collective essential facility, where access to at least one of these technologies becomes crucial to operate competitively in many sectors. This raises important questions about regulation and fairness of access to such technologies, ensuring that small and medium companies are not excluded from the market due to insurmountable entry barriers.

There are, however, potential solutions or at least methodologies that are able to heavily assist small and medium enterprises in obtaining effective AI systems.
Firstly, **regarding 7) the role of data and its relevant characteristics for the provision of generative AI systems,** the emergence of data brokers offering clean, ready-to-use datasets can significantly impact how companies obtain and utilize data. This emergence has created an entire ecosystem of entities that facilitate the training of AI models with data that might not have been accessed otherwise, due to legal or technical constraints, raising both opportunities and ethical considerations. This new “competition inside the competition” of data brokers extends beyond the sheer volume of data they offer. Quality, relevance, consistency, and the legal compliance of data play equally critical roles in differentiating their services in the market. Legitimacy of data acquisition will remain an important topic for the foreseeable future. The landscape also suggests a shift in how companies approach data acquisition for AI training and other analytical purposes. Instead of investing heavily in collecting raw data and undergoing the arduous process of cleaning and structuring it, companies can now leverage these brokers to access high-quality data more efficiently.

Another potential scenario which is looking more and more relevant is that of data generated by AI is used to train other Ais. This trend could potentially amplify the influence of big players in the market of AI, creating an even more brutal vicious cycle that will pose another barrier to the entry of new enterprises. Indeed, large companies often have the resources, infrastructure, and data to train sophisticated AI models, which in turn can generate new data or insights that feed into further training. In this scenario, the speed of training becomes exponentially faster, due to the correspondingly higher availability of data. However, risks increase exponentially as well, and are mainly related to the amplification of biases. A dataset which originally contained biases, incorrect information or downright bad quality data can amplify its defects when used to train other models, which in turn contain vices they will spread to newer models still and so on and on.

Secondly, there already are methods through which the astonishing computational power requirements to train a Generative AI system can be avoided or at least made less important. While it is true that computational power is the definitive limit in the birth of a quality AI model, there are two phases which need to be strictly separated and defined: a training phase from scratch, and a subsequent inference phase. The training phase was already described at the beginning of this document. Following the training phase, the model enters the inference stage, which is markedly less resource-intensive. During this phase, the trained model is applied to new data to make predictions or decisions. It's at this point that the model's practical utility for small and medium companies is realized, as the same are able to acquire a pre-trained model which needs to be inferred with only a small quantity of data relevant to the specific use that the AI will serve. At this point, the computational requirements are significantly reduced compared to the training phase.

Fine-tuning represents a critical step for optimizing the AI model for specific use cases. This process involves adjusting the model's parameters by introducing new data sets, typically from the end user, to a single "layer" or a very limited part of the model. This approach allows for the customization of the model to better meet the particular needs of its application. Again, as it was the case with data broker companies, there are already many market players who offer fine-tuning services as their primary monetization strategy.

Technological advancement can further reduce the computational and economic costs of the training phase. This is especially true if the inference process can be optimized, or if techniques like pruning (which reduces model complexity) or quantization (which reduces the precision of calculations) are employed. Additionally, advancements in hardware technology have made it possible to deploy advanced AI on devices with limited computational capacities. Examples include Nvidia’s "Chat with RTX" and Stable Diffusion for generating images from text, which can be used by the end user locally on their own PCs, provided they have at least a mid-range graphics card (GPU).

Also, different types of learning are becoming more widespread, such as federated learning. This is a new approach to training machine learning models that addresses some of the most pressing issues related to privacy, data security, and the efficient use of bandwidth. Instead of centralizing data on a single server or location, federated learning allows the model to be trained directly on the users' devices. This means that the raw data collected from individual devices is not shared or transmitted; instead, only model updates or gradients are sent to a central server. The server then aggregates these updates to improve the model, which is subsequently distributed back to the users' devices. This cycle continues, with the model progressively learning and improving over time. This should, in theory, be a much more efficient training system, requiring less bandwidth and less computing power, fostering decentralized innovation while at the same time being (at least on paper) more privacy-friendly.

Generative AI is a peculiar technology in the sense that it is predominantly under the control of the industrial sector, and, as we’ve seen, primarily in the hands of large tech companies rather than small enterprises; also academia seems to play a lesser role than in other research area. From this follows that there exists a significant asymmetry between the public and private sector rarely heard of in other technologies: public sector competitors and nonprofit players

lack the expertise to compete in this space. This imbalance affects all aspects of production dynamics and marks a departure from past practices where academia played a central role in sharing innovations early on. Today, sharing within the generative AI field is almost nonexistent, with models often residing within inherently private infrastructures.

From this consideration stems the problem of **6) open source generative AI system competition with proprietary AI generative systems.**

In general, the open/closed dichotomy in AI development is not clear cut. There exists a spectrum ranging from completely closed to entirely open systems. The reproducibility of a model serves as a good indicator of openness, and is particularly important in academia for models based on scientific studies that result in publishable scientific papers, where demonstrating the model's functionality in depth is necessary for replicability. However, the current reproducibility crisis in AI research clearly shows that the current level of openness does not yet guarantee a sufficient degree of reliability for many technical and scientific advancements in the fields. This jeopardizes transferability of research results to industrial applications.

A very important line of difference lies in the transparency and accessibility of information regarding how the models are trained. Closed source AI models present a significant challenge in this regard, as their training processes from inception are not disclosed, making it impossible to replicate their functionality or understand their inner workings from an external perspective. On the contrary, some models (including some open-source models), disclose all the data used, the procedures followed from the initial training phase, and any other relevant details, thereby improving reproducibility of the system by third parties.

However, the definitions of open and closed in relation to AI are fraught with ambiguities. Meta, for instance, claims to champion open-source but faces openness problems. It does not provide access to the data, and its license is not compliant with the open source definition; yet, it is labeled as open source because it allows users certain freedoms to use the models as they see fit, within specific limits. This practice can be criticized as a form of "false open" source or “open-source washing”.

The confusion about the definition of open and closed in the AI domain complicates the issue. Actually, activities are being performed, including by the Open Source Initiative, to clarify the definition. At this stage, it is not clear if the open source AI system definition will include and consider the availability of the training datasets. It’s a matter of fact that the lack of explainability makes difficult, among other, to identify and address biases. This is why it is strongly advisable, not only that the AI systems are made available with an open source license, but also to foster the availability of the training datasets of the AI systems. This is more difficult to obtain in closed source models.

Another topic which is becoming increasingly important as AI usage spreads more and more is that of interoperability. So to answer the question **7**) **What is the role of interoperability in the provision of generative AI systems or components?** we firstly need to define what is interoperability in the world of AI.

Generally, interoperability in AI systems refers to the ability of different AI models and platforms to work together seamlessly, exchanging and making use of information across various systems and applications. This concept is crucial for creating scalable and easy-to-use AI ecosystems that can leverage the strengths of diverse systems to better deliver their outputs. It is important to notice that while interoperability can exist between AI systems, it can also exist between AI systems and normal software programs, or between non-AI software, although this last case is not taken into account here.

The potential for interoperability should theoretically vary a lot between open and closed AI models. Open-source AI models should generally offer greater potential for interoperability, because their inner workings, data formats, and communication protocols are accessible to developers. This openness would allow for easier integration with other systems and easily permit customization to meet specific interoperability needs.

On the other hand, closed systems, such as those utilizing proprietary APIs like OpenAI, may appear to be less interoperable due to their controlled access. However, if these systems are designed with well-structured, robust APIs, (such as they often are) they can, in practice, offer significant interoperability advantages. OpenAI, for instance, provides a clear and comprehensive API that enables developers to integrate advanced AI capabilities into a wide range of applications easily. The quality, documentation, and support provided for these APIs can make proprietary systems surprisingly flexible and accessible, facilitating seamless interaction with other systems.

As it has been the case in many other fields of IT, interoperability of AI systems will cause the emergence of industry standards, which would simplify a lot the work required to make different systems communicating and interoperable. In general, standards such as those we're discussing provide a common framework and set of protocols for data exchange, model communication, and system integration.