

# Competition in Virtual Worlds and Generative AI

## Calls for contributions



## OVER's Contribution on Competition in Virtual Worlds

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## 1. Entry Barriers and Obstacles to Growth:

Developing a virtual world platform requires **significant technological expertise and resources**, acting as a barrier to entry for new players.

In addition, from the perspective of a European player, I see two main obstacles to growth: **the presence of powerful incumbents from overseas** (such as Meta) and the **difficulty in attracting risk capital**.

**Incumbents** like Meta and Google already have billions of **captive users**, and their **cost to migrate** them or introduce them to a Virtual World offering is extremely low compared to that of any new entrant in the digital market space. Moreover, captive users of incumbent platforms perceive an additional risk (data exposure or hacking) in exploring or joining a new digital platform (Virtual Worlds) not endorsed by the platforms they are already using. Consequently, any new entrant must not only develop an exceptional product to overcome the lock-in forces I just mentioned but also will face a higher cost compared to incumbents to onboard new users.

Lastly, there is the issue of **access to risk capital**: the amount of capital available for European startups is significantly smaller compared to the capital available to US startups. This is particularly true in some parts of the EU; in Italy, for example, it's nearly impossible to raise a sizable amount of capital (comparable to what US startups raise) for a tech startup, as there are only a few operators and there is no deal flow.

## 2. Drivers of Competition:

In general, both VR and spatial computing platforms heavily rely on the **existence of broadband connectivity and hardware infrastructure/hardware devices**. The availability of accessible and widespread broadband and hardware devices capable of delivering AR and VR experiences are necessary conditions for the blossoming of Virtual Worlds. It is quite unusual for a VR/AR hardware device manufacturer to also try to create a closed Virtual World ecosystem. It is very challenging to cover both the hardware manufacturing and distribution process and the creation of the Virtual World platform. Moreover, the success of third-party apps on both iOS and Android over the last 10 years is a strong demonstration of how separating the hardware platform from the App layer is the winning strategy. Because of that, controlling the hardware manufacturing and distribution for AR/VR devices offers a limited advantage in terms of competition in the creation of a virtual world.

Regarding other drivers of competition, we need to make a distinction between two types of virtual worlds: the purely VR Worlds (like Second Life and Decentraland) and the **Spatial Computing platforms** that heavily use Augmented Reality.

Specifically, for the latter, Spatial Computing (Geo-localized AR), **spatial data** is the key driver of competition. The main difference between the traditional and the spatial computing paradigm is spatial awareness. In spatial computing, the location and the environment where the user is located become part of the computation: information is delivered taking into account the user's location, and data is projected and merged with the physical space surrounding the user. The system performing spatial computation (Smart Glasses or Smartphones) needs to be aware of the 3D space where the user is located. Because of that, having access to a rich database of the 3D structure of locations is a key element of success for every spatial computing platform. Companies that will control this data will be

gatekeepers of the "Spatial Web", just like today Google, thanks to its first-mover advantage in mapping with Google Maps, controls most of the navigation market and extracts billions selling services connected to the availability of 2D Maps. **Data on the 3D structure of locations enables both the creation of remotely explorable digital twins of physical locations and also precise AR experiences in the physical location.**

### 3. Key Players:

Virtual worlds are the result of the combination of a **vast array of technologies**: broadband connectivity, hardware (HW) devices for visualization, software (SW) real-time rendering pipelines, platform/worlds creators, AI, and content creators. Skipping the broadband connectivity providers, I'll go through each one of the operators:

- **HW Device manufacturers**: the most relevant manufacturers at the moment are **Meta** with the Quest III, **Apple** with its Vision Pro that also launched the "Spatial Computing" paradigm bringing AR to the center of its devices. Other important players in the manufacturing of XR devices include **HTC** and **Samsung**. Finally, going to a lower level with the chip manufacturers, **Qualcomm** is one of the most important players with its Snapdragon chipsets with a specific focus on XR applications.
- **SW real-time rendering pipeline**: The most important players are **Unity** and **Unreal**, which together control almost 100% of the market.
- **Platforms/Worlds creators**: In this category, we have companies like **Niantic**, which is leading in the sector of AR and 3D mapping, companies like Meta building Virtual Worlds, and gaming platforms like **Roblox**, **Minecraft**, **Fortnite**, and **Sandbox** that are not only gaming platforms but also virtual locations for aggregation and socialization for younger generations. On social VR platforms, it's also worth mentioning **Avakin**, **Decentraland**, and the old but still active **Second Life**.
- **Content creation**: Currently, many of the most successful virtual worlds do not only rely on centrally developed content but also on community creation. Success stories of this business model are represented by Roblox, Sandbox, and Decentraland. The ability to attract skilled 3D creators to these virtual worlds is a critical factor for success.

The **advent of generative AI capable of generating 3D models** will be a powerful disrupting force in the current landscape. Generative AI models still struggle in creating convincing 3D models yet, considering the pace of improvement, in the next year, we will probably start seeing fully AI-generated virtual worlds. **The capability to easily create 3D content will probably disrupt many of the current market equilibriums that we observe today, especially at the level of platform/world creators and content creators.**

### 4. Translation of Market Power:

We do expect existing market power to be translated into market power in Virtual World markets.

As I argued in point 1, incumbents have important advantages in terms of access to users and trust. It's unlikely that such a structure will be totally disrupted by the adoption of Virtual Worlds. Yet, there will be space for new entrants with new business models - Web3 business models, for example - that are more attractive to end users and are difficult for large incumbents to adopt because of what is called

"the curse of success": the difficulty in changing long-established profitable models for existing large organizations. The classic example is Kodak inventing digital photography yet not being able to embrace it.

## 5. Potential New Entrants:

In our vision, the future of virtual worlds is "**Spatial Computing**," a seamless blend of AR and VR, with 3D spatial data at its center. It will be possible to remotely visit a location through its digital twin and locally experience an enhanced version of the physical world through geolocalized AR. This version of a "Virtual World" has not yet been fully implemented by any player. As with all technological paradigm shifts, the Spatial Computing era will open up opportunities for new entrants despite the presence of large incumbents. Finally, we should not forget the disruption that generative AI will bring to the space. Once AI models are good enough to generate high-quality 3D environments and objects, fully virtual worlds (imaginative worlds with no direct connection to the real one) that underpin their success on the quality of their contents will be totally disrupted by the democratization of 3D content creation introduced by AI.

## 6. Technology Standards:

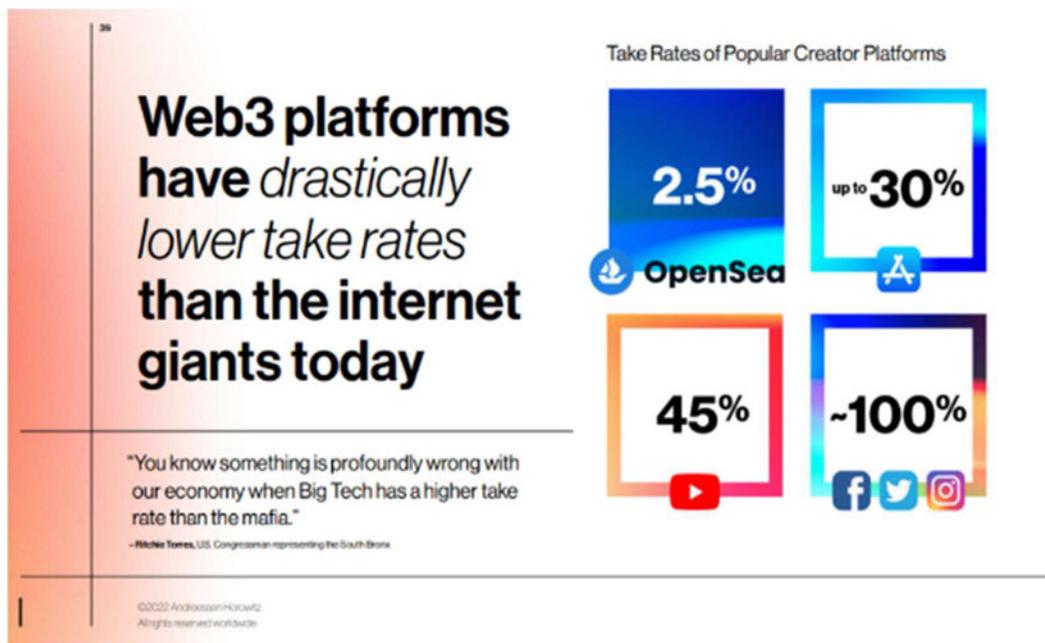
I expect open standards, enforced by product-market fit selection mechanics, to be adopted, especially in the lower part of the technological stack. Just like we saw with **Python**, which became the de-facto standard for AI and machine learning despite academia and companies pushing R and MATLAB. Examples for this lower-level tech stack in virtual worlds include NFTs as a standard (ERC-721) to represent ownership of digital assets, IPFS for data storage, and the various 3D file extensions. Moving to a higher level in the tech stack, with real-time rendering pipelines, for example, I expect big incumbents like **Unity** and **Unreal** to be the standard setters using proprietary technology.

## 7. Data Monetization Models:

I believe that freemium business models will prevail. The more time we spend inside of virtual worlds, the more valuable the digital objects that exist inside those will become to us. We saw the beginning of this phenomenon with the NFT craze, where the ownership of scarce and unique digital assets became social signaling symbols in the digital world, just like clothes, watches, and cars do in the physical world. You cannot "flex" your new Balenciaga shoes in the metaverse, but you can proudly showcase the ownership of a **Crypto Punk NFT** as a profile picture. Many dismiss this phenomenon as a pure speculative craze, yet I believe it tells us something very profound about how and why we assign value to objects in both the digital and physical worlds. I expect our transition to virtual worlds to enable and create new business models and an entirely new market that we could not imagine before. Just like 10 years ago, we could not imagine that being a "YouTuber" could become a job. Monetization will pass through the sale of unique digital assets that can exist across platforms. I believe that cross-platform existence will be made possible through the adoption of the NFT standard. Finally, my hope is that we will be able to go beyond the attention and content farming economies we observe today with the Web2 incumbents that extract all of the value from the users, moving towards a Web3 paradigm where users will be able to retain the value of their contribution to the virtual world platforms of the future. It has been argued that the "Original Sin" of the current web stack is its lack of a native ownership layer. In the Web2 paradigm, users cannot really own any digital asset if not through the intermediation of the incumbents (e.g., YouTubers do not own the content they create since it is hosted and created on the YouTube platform and hosted on YouTube's servers). This lack of an ownership layer allowed for FANG companies to establish extractive economies. The promise of Web3 is to add to the

READ and WRITE privileges enabled by Web2 companies the OWN privilege for users, who will become sovereign owners of their data and content, allowing for new and non-extractive economic equilibriums to establish.

Below are two charts exemplifying the difference in take rates of Web2 vs. Web3.



## 8. Potential Competition Issues:

- Dominance of a few major players leading to anti-competitive practices. Some incumbents may force the usage of their platform, just like Microsoft tried to do with Internet Explorer
- Barriers to entry hindering innovation and diversity in the market.
- Concerns over data privacy, security, and users protection.
- Potential for monopolistic behaviour in key segments of the virtual world ecosystem.

### 9. Legal Antitrust Concepts:

- The emergence of new business models and technologies may require revisiting antitrust concepts to address issues such as platform dominance, data monopolies, and market concentration.
- Regulations may need to adapt to ensure fair competition, protect consumer interests, and foster innovation in the virtual world market.

### 10. Antitrust Investigation Tools:

- Antitrust investigation tools and practices may need to evolve to address the unique challenges posed by the virtual world market.
- Authorities may need to develop specialized expertise in assessing competition dynamics, data privacy, and market power within virtual environments.

In conclusion, the virtual world market presents a dynamic landscape shaped by technological innovation, regulatory developments, and competitive forces. Understanding the entry barriers, key drivers of competition, and potential challenges is crucial for stakeholders to navigate this evolving ecosystem effectively. As the metaverse continues to expand, collaboration between industry players, regulators, and policymakers will be essential to promote healthy competition, innovation, and consumer welfare.