The metaverse: updating the Internet (Web 3.0) or just a new development for immersive videogames?

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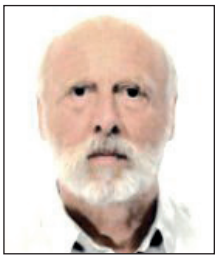

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Abstract

Are we witnessing the return of virtual worlds such as *Deuxième Monde* (1997) or *Second Life* (2003), boosted and enhanced by technologies? Or is it the coming of the next generation of the Internet (Web 3.0)? Or is it just a marketing repackaging of virtual reality markets that up to now did not deliver as expected? This paper attempts to provide answers to these questions. It introduces the notion of the metaverse, looks at its definition(s), and describes its key elements, thereby outlining the metaverse ecosystem. The article also attempts to draw lessons from the pioneering experiences of former virtual worlds, and thus examines some case studies from the video game industry. In conclusion, we investigate the metaverse's potential constraints (energy/environment, cost of hardware and bandwidth, lack of business models, regulation) and opportunities, and reveal the challenges ahead for its widespread adoption.

Keywords

Metaverse; Virtual worlds; Video games; Web 3.0; Challenges; Opportunities; Evolution; Technologies; Trends; Future; Immersive; Markets.

1. Introduction

Immersive technologies have been characterised by a strong growth over the last years, mostly in the field of videogames; this trend has even been strengthened by the deployment of new technologies such as 5G (**Simon**, 2019). However, in 2021, a rise in sales of non-fungible tokens (NFTs) as well as announcements from Big Tech players indicating their interest and investment in the space, especially when *Facebook* re-branded itself as *Meta* in October 2021, triggered a lot of attention and buzz around a notion that has been around for over 30 years. Indeed, the term Metaverse was pushed forward in the 1992 Neal Stephenson's science-fiction book *Snow Crash*[1].

Metaverse became the stuff of rejuvenated corporate agendas, not only of *Meta*. Some consultancies have been forecasting that the metaverse industry (whatever the vagueness of its definition, and the remits of the industry) could reach $USD 800 billion as soon as 2024 *vs.* about $USD 500 billion in 2020 (*Bloomberg Intelligence*, 2021). *McKinsey* (2022) mentioned a potential of up to $USD 5 trillion in value by 2030. *Citi* came with an even more optimistic forecast, stating that, depending on the definition, the positive contribution of the metaverse (*Citi GPS*, 2022, p. 4) could vary between $USD 8 and 13 trillion, but $USD 1 up to 2 trillion under a narrower definition. This was probably highly optimistic especially in the backdrop of what happened to *Meta* since: a whopping lost of value of $USD 500 billion over 2022 (**Majithia**, 2022).

However, optimistic as they may have been, these predictions were predicated on the huge success of videogames supposedly part of this category, such as *Fortnite* or *Roblox*. Video game revenue, indeed, account for half of *Bloomberg*'s estimate. Over the last twenty years, video game companies have been investing in virtual and immersive environments with technologies such as augmented or virtual reality. The Chinese video game behemoth *Tencent*, already holding shares (40%) of *Epic Games* (the editor of *Fornite*) and *Roblox*, has also launched a musical metaverse *Tmeland*. The firm claimed having registered around a hundred trade marks as of September 2021 such as "QQ Metaverse", "QQ Music Metaverse" and "Kings Metaverse" (**Chan**, 2022). In November 2021, *China Mobile*, *China Unicom* and *China Telecom* partnered with several tech companies to form *China's Metaverse Industry Committee* (**Ye**, 2021). One year later, in November 2022, the South Korean telco, *SK Telecom*[2], launched its *Ifland* platform in 49 international markets aiming at becoming a leading global social metaverse space (**Donkin**, 2022).

> Over the last twenty years, video game companies have been investing in virtual and immersive environments with technologies such as augmented or virtual reality

Deloitte (2022) is rather cautious noting that:

> "Some observers of recent trends are circumspect about the potential opportunities related to the metaverse, casting recent startup activity as tantamount to the dot-com surge of the late 1990s".

The apparently inflated figures of the future market are merely the output of an addition of already existing sub-markets (see Figure 2) that may or may not develop in a coordinated fashion and expand within this new ecosystem. Nevertheless, whatever the risks involved, in terms of opportunities as stressed by *McKinsey* (2022, p. 57):

> "the metaverse is too big for companies to ignore".

It also already became a goal of public policies[3,4]. For instance, the metaverse is among the priorities set up in a post-covid recovery plan in South Korea, part of the *Digital New Deal* agenda, coupled with a 400 million euros strategic plan for the new metaverse industries for the year 2022 (**Basdevant**; **François**; **Ronfard**, 2022, p. 63). On November 1, 2022, the Chinese *MIIT* jointly released a 4-year action regarded as China's first national-level policy that supports the metaverse development in the country (**Interesse**, 2022). In September 2022, Thierry Breton, the European Commissioner for the Internal Market, sketched

> "a metaverse centred on Europe's values and rules" (**Breton**, 2022).

The French government commissioned a study on the topic (**Basdevant**; **François**; **Ronfard**, 2022).

The first part of this paper aims at introducing the notion, looking at it(s) definition(s) and describing its key elements, thereby presenting the metaverse ecosystem. The second part tries to draw the lessons from the pioneering experiences of former virtual worlds. It looks at some case studies from the video games industry. The third conclusive part investigates the constraints (energy/environment, cost of the hardware and bandwidth, lack of business models, regulation) and the opportunities. It reveals the challenges ahead for a widespread adoption.

2. Looking for the metaverse

"Metaverse is a portmanteau of meta, meaning transcendent, and verse, from universe" (**Zyda**, 2021).

If most experts do not agree on a definition of metaverse, they certainly agree that there is no single definition:

> "The metaverse is still being defined, both literally and figuratively" (*Bloomberg*, 2022).

One of the most comprehensive studies[5] of the notion still states:

> "An agreed upon definition of the term metaverse within the literature has yet to be agreed on" (**Dwivedi** *et al.*, 2022).

By the same token, most but not all will also categorize the metaverse as "the next iteration of the Internet" or Web.3[6], mostly the successor of the mobile Internet, designed to bring the digital and physical worlds together.

3. Defining the metaverse

The metaverse may be tentatively defined as a network of multiuser virtual spaces in 3D, interconnected, interoperable, immersive and persistent, merging physical reality with digital virtuality. At the same time, it should be stressed that most experts also agree that we do not have such a metaverse yet: the existing proto-metaverses available today are neither interconnected, nor interoperable. They are not immersive or persistent[7] either and are, at best, a spatialised network of virtual experiences (**Lamarche-Toloza**, 2022). Besides, according to *Citi* (2022, p. 5):

> "In the current state, the internet infrastructure is unsuitable for building a fully-immersive content streaming Metaverse environment, that enables users to go seamlessly from one experience to another".

> If most experts do not agree on a definition of metaverse, they certainly agree that there is no single definition: "The metaverse is still being defined, both literally and figuratively" (*Bloomberg*, 2022)

In other words, significant investments have still to be made in each of the major components of the metaverse, for instance in next-generation chips, servers, and networking hardware[8].

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The metaverse relies on five majors components[9] and four pillars. The components are:

1) Hardware: devices for access and interface. It encompasses connected devices like mobile phones, PCs, and gaming consoles but also new metaverse-focused hardware (headsets for VR, smart glasses for AR), or haptics to bring the sense of touch.

2) Infrastructure (network and computing): 5G and low latency network, cloud, and edge infrastructure. The metaverse requires compute and processing infrastructure that can support both big data flows and low latency.

3) Content and applications: all the various types of software and content, including gaming, third party content, UGC, developer and creator content.

4) Communities: various use cases with many individuals/users who interact and socialise within the platform and also across applications/platforms (*Crédit Suisse*, 2022, p. 8).

5) Enabling systems to "settle" transactions for participation, content creation or direct commerce, among which payment and security / identity.

The four pillars are the following:

I. 3D is key for the spatialisation of the web[10] (real time 3D design engines –such as *Unity* or *Unreal*– and 3D models), as well as other visualisation tools (such as avatar development).

II. Formats of extended reality[11] (XR: VR, AR, mixed reality and other alternative forms of immersive applications) enable linking the physical and the virtual world.

III. Mass production of the requested content implied using artificial intelligence.

IV. The economy of the metaverse leans on the combination of the blockchain technology[12] and of NFTs, the latter create scarcity and hence value in the virtual worlds, they provide proof of ownership for metaverse-based property.

These pillars are important but not necessary conditions for a metaverse. As Figure 1 illustrates, some of the metaverses, for instance, relies on blockchain or VR helmet but others such as *Roblox* do not.

Figure 1. Mapping some metaverses according to technologies.
Source: adapted from **Basdevant**, **François** and **Ronfard** (2022), p. 38.

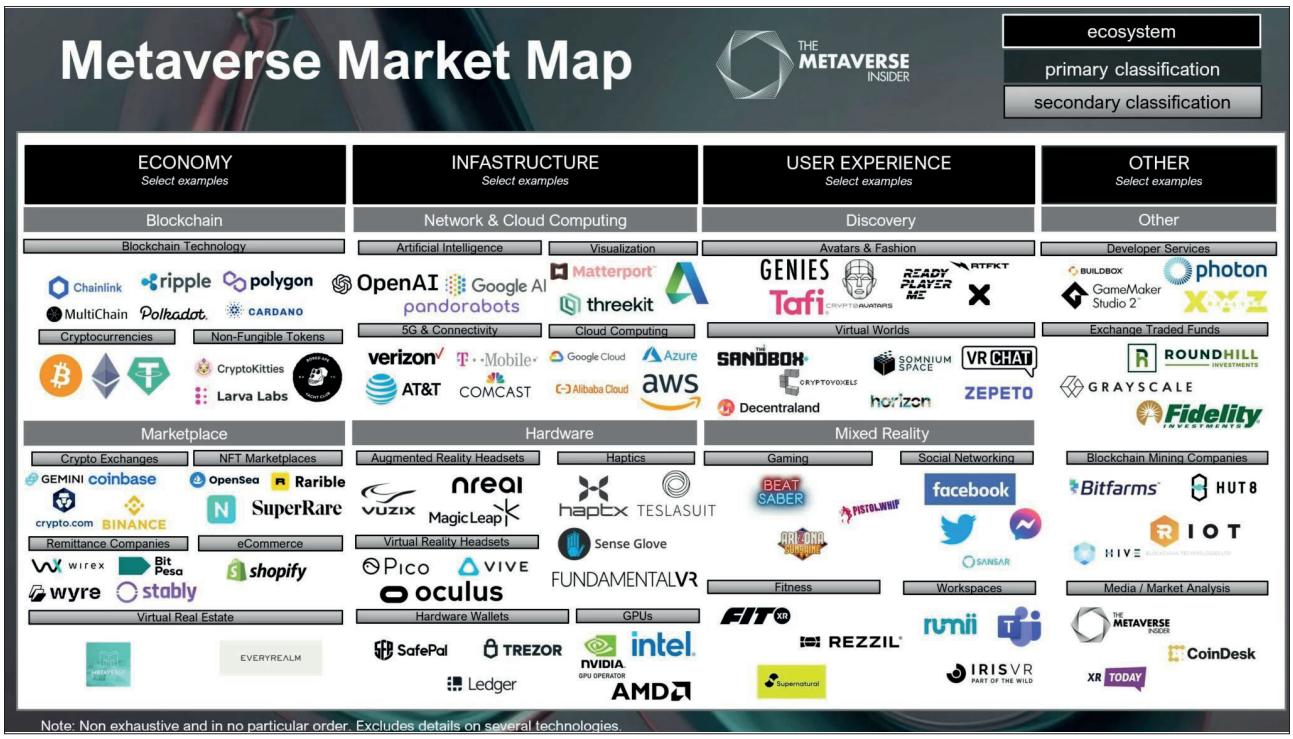

Figure 2. The metaverse market map.
Source: **Hussain** (2022).

4. The metaverse ecosystem: verticals and expected use cases

Still bringing together already existing segments, some experts offer a map of the metaverse (**Hussain**, 2022; *Newzoo*, 2022; **Radoff**, 2021) under their own classification of components. Figure 2 reveals that the sector seems to be rather crowded[13] with various firms acting in the different sub-segments. It looks more like a mosaic of non-interoperable sub-segments. This points to issues of competition, coordination and standardisation.

Today, the most popular way to experience the metaverse is via a video game played on a virtual reality (VR) headset. Recently, virtual events, performances, and shows have all grown in popularity. Figure 2 shows some examples of use cases but most of them remain by and large anecdotal. For instance, *Balenciaga* released virtual fashion brands in *Fortnite*, and a digital *Gucci* "bag" was sold for over $4,000 on *Roblox* in May 2021 (*Cbinsights*, 2022). *Disney* registered a patent known as "virtual world simulator in a real place," and was planning building a theme park in the metaverse (*Citi*, 2022, p. 31). However, the new metaverse unit was closed down in 2023. A handful of virtual real estate companies are buying, reselling, developing, and renting virtual properties in decentralized virtual worlds. The major players in virtual real estate are: *Decentraland*, *Sandbox*, *Somnium Space*, and *Cryptovoxels* (**Mileva**, 2022). Similar companies were already active in *Second Life*[14]. *Microsoft Mesh* and *Facebook Horizons Workrooms* offer office applications, *Infosys* introduced the *Infosys* metaverse foundry a platform to navigate technologies such as XR, DLT (distributed ledger technology), 5G, AI, IoT... In education, some game-based learning in virtual worlds have already been introduced (**Mystakidis**, 2022), and other current developments are happening[15].

Some consultancies may claim that:

> "Yet the metaverse appears to be much more than 'just entertainment'" (*Mind the bridge*, 2022).

Nevertheless, as stressed earlier, most of these verticals are still to be developed and the bulk of market consists of games with live entertainment and social media making up the remainder, but these two use cases may just represent additional opportunities for game makers. The same consultancy acknowledges that, even of the case of South Korea, presented as a leading country:

Figure 3. Example of use cases.
Source: *Citi* (2022, p. 4).

> "Digital media and gaming applications are the most prominent (and obvious) uses of "metaverse" tech, ranging from 3D content creation, to AR, audio/video, and streaming and broadcasting experiences" (*Mind the bridge*, 2022).

Figure 4 shows a more sobering map of the ecosystem. Therefore, in the next section, we will take a closer look at the game industry and other predecessors of the metaverse.

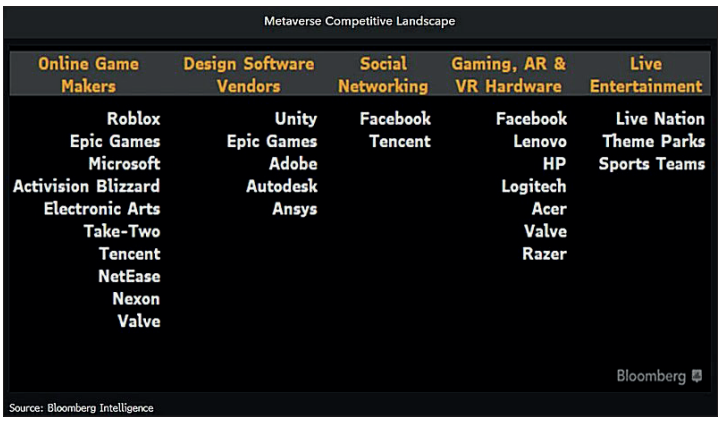

Figure 4. The metaverse competitive landscape.
Source: *Bloomberg Intelligence* (2022).

5. Pioneers: Virtual environments and immersive games

Virtual environments (*Deuxième Monde*, *Habbo Hotel*, *Second Life*) and immersive games (such as *Fortnite*, *Roblox* and *VRChat*) as antecedents of the metaverse may offer some insights into the potential socio-economic impact of a fully functional persistent cross platform metaverse:

> "The gaming industry has played a fundamental role in shaping the Metaverse and it is likely to continue doing so with immersive elements like 3D avatars, building new virtual worlds, and observations as a gameplay" (*Citi*, 2022, p. 36).

As early as 2006, during the "Metaverse Roadmap Summit", experts described the metaverse as

> "the meeting of video games and web 2.0" (**Basdevant**; **François**; **Ronfard**, 2022, p. 33).

5.1. Communities and virtual worlds[16]

In 1989, *Habitat* was the first virtual world platform, a 2D graphical interface enabled cartoon-like avatars to walk around and communicate with chat bubbles. The second wave of social virtual reality systems followed in the 1990s and 2000s. Platforms such as *Traveler*, *Croquet*, *ActiveWorlds*, *There*, *Blue Mars*, *Second Life* and *Open Simulator* used client-server architecture and integrated a graphical user interface and multimedia communication. These communities began as iterations on traditional online chat by providing users with agency and some form of embodiment of their avatar.

CitySpace was one of the first proto-metaverses, active from 1993 on to 1996. The following year, Alain Le Diberder from *Canal+ Multimedia* and a French studio, *Cryo Interactive*, launched the first French proto-metaverse: *Deuxième Monde*, a virtual copy of Paris where users could use chats to communicate with avatars (**Lamy**, 2022). It remained active for five years until being closed down in 2002 for lack of profitability as it was supposed to be funded through advertising and the sales of virtual shops (**Galibert**, 2003). As of 2000, a Finnish company, *Sulake*, opened up an online community, focusing on teens and young adults, under the guise on a virtual hotel *Habbo* where users could visit public areas (restaurants, cinemas and clubs) and create guest rooms. It accumulated 316 million avatars and is still active today (**Partleton**, 2020) with 800,000 monthly active users across 115 countries.

These early services paved the way for the introduction, by *Linden Lab*[17], of *Second Life*[18], a virtual online world, in 2003. Users could create avatars to interact with places, objects and other avatars through chat, IM or voice. By 2013, with 36 million accounts created and 1 million monthly active users it reached revenue of $USD 3.2 billion from on-site, in-world transactions. The service also used a virtual currency to buy, sell, rent or trade goods and services. Users could participate to the production of news. In addition to magazines, blogs, news bureaus, podcasts and television stations, three newspapers, the "Alphaville Herald", the "Metaverse Messenger" and the "Second Life Newspaper" were thriving. With 100,000 regular readers, the "Metaverse Messenger" became the most widely read newspaper (**Brennen** *et al.*, 2010). Although *Second Life* declined, as it did not manage to take the mobile turn among other elements, it is still active claiming 750,000 monthly active users on the platform and $USD 650 million in annual transactions. As noted by Philip Rosedale, *Second Life*:

> "is probably the longest running experiment in the possibilities of a metaverse-like experience" (quoted by **Gent**, 2021).

One of the issues faced by the community was the lack of a good user interface so that its players could easily move through and interact with its various user-built worlds. On the positive side, *Second Life* ushered in the use of a virtual currency for in-world transactions (Linden Dollars), the lessons were grasped by social media providers such as *Facebook* or *Tencent*. Asian game companies pioneered in-games virtual items. More recently, decentralized virtual worlds have been providing similar experiences to virtual worlds (see Box 1).

> "Today, the most popular way to experience the metaverse is via a video game played on a virtual reality (VR) headset. Recently, virtual events, performances, and shows have all grown in popularity"

Box 1. Decentralized virtual worlds

Decentralized virtual worlds such as *Decentraland*, *The Sandbox*, *Cryptovoxels* and *Somnium Space* are usually considered as metaverses or as the more recent proto-metaverses. They offer similar experiences to virtual worlds, but, unlike virtual worlds, are built using blockchain technologies. Transactions are all based on each world's unique cryptocurrency. Furthermore, in-world items or land are traded as NFTs, which act as decentralized proof-of-ownership certificates for digital assets. In contrast, the immersive metaverse is more concerned with how people will interact and experience the virtual world. Their business models differ, as well, from virtual worlds and games: they generate revenue from the sale of virtual land, crypto, and other digital assets as opposed to taking a percentage of the profits generated by in-world creators. The two decentralized worlds seem to be the closer to a community-owned, community-governed, open metaverse.

Decentraland and *The Sandbox* are two of the most popular decentralized worlds. *Decentraland* (*https://decentraland.org*), started off in 2017 and is a completely immersive 3D metaverse. It focuses on enabling players to purchase plots of land alongside exploring the massive virtual universe. MANA is the in-world cryptocurrency of the platform (based on the *Ethereum* blockchain technology). The company claims its world is owned by its users.

Sandbox, founded in 2011 by Arthur Madrid and Sébastien Borget, (*https://www.sandbox.game/en*), has been operating since 2012 as a blockchain-based virtual world and pivoted to a 3D gaming platform in 2017. SAND is the utility token for conducting all transactions on the platform. The platform claims that 70,000,000 worlds have been created; and that over 100,000 worlds are created every day. The is presented as an ecosystem for players and creators, consisting of three main components: a voxel* editor (to empower creators to design 3D voxel objects), a marketplace, and the game itself.

* A portmanteau of volume and pixel used in 3D computer graphics.

Source: compiled by author from *Cbinsights* (2022), **Howell** (2022), and *The Sandbox Whitepaper* (2020). *https://installers.sandbox.game/The_Sandbox_Whitepaper_2020.pdf*

There.com, also launched in 2003, was very similar virtual world to *Second Life*, with its own digital currency called Therebucks. **Messinger** *et al.* (2008) gave

> "one estimate, 20 to 30 million people regularly participated in virtual worlds in 2006, spending an average of almost twenty-two hours per week within these spaces."

Virtual worlds differ from massively multiplayer online role-playing games as they are not finalized (no goals to reach) and focus on interaction among users and the exploration of the virtual world. Lastly, these virtual worlds can be looked upon as some kind of field trials, of specific R&D as it was noted for *Deuxième Monde* (**Galibert**, 2003).

5.2. Games spearheading the development

Back in the late 1990s, online games were called "persistent worlds (PW)," which refers to continuously and steadily running online worlds, states Steven Ma (Senior Vice President at *Tencent*) (**Ma**, 2022). Gaming companies have been since the early 2000 racing to offer more unique experiences to their users, opening up multiuser virtual worlds and introducing innovative business models based on in-game transactions (**Simon**, 2021). Indeed, in the 2000s, the rise of multiplayer gaming and the launch of MMORPGs (massively multiplayer online games) like *EverQuest* (1999), *Eve Online* (2003), and the *World of Warcraft* (**Blizzard**, 2004) offered an opportunity for developers to test the concept of what will later be called the metaverse. In this section we take a quick look at some of the games that frequently labelled "metaverse" or given as examples of the current metaverse.

Released in 2017 by *Epic Games*, *Fortnite* is among the most successful Free-to-Play (F2P) multiplayer games. *Fortnite* is distributed as three game modes: *Fortnite*, "Save the World" is a player-versus-environment cooperative game, *Fortnite* "Battle Royale" is a player-versus-player game for up to 100 players, and *Fortnite* "Creative" is a sandbox game. *Fortnite* introduced live in-game events: in 2020, Travis Scott's (an American rapper) "virtual concert" on drew 12.3 million concurrent players (**Lange**, 2020).

> "Virtual environments (*Deuxième Monde*, *Habbo Hotel*, *Second Life*) and immersive games (such as *Fortnite*, *Roblox* and *VRChat*) as antecedents of the metaverse may offer some insights into the potential socio-economic impact of a fully functional persistent cross platform metaverse"

Minecraft and *Roblox* are the leading sandbox games where players can create their own path through the games. Both became some of the world most popular games, *Roblox* with 49.5 million DAU (daily active users) and *Minecraft* with 141 million MAU (monthly active users) (*Newzoo*, 2022, p. 37). Unlike other video games, but like virtual worlds, sandbox games do not have set objectives thereby granting users some space for creativity. Sandbox games, rather than focusing on linear gameplay and the requirement to complete levels, allow players to freely explore and build environments. Players therefore enjoy a large amount of freedom in choosing how to play the game. The two key industry players dominate the genre of creator games with voxel graphics. *Roblox* is free to play, while *Minecraft* charges around $30 for the starter pack. Both games offer add-ons and extras.

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Roblox[19], launched in 2006, is an online gaming platform and storefront that allows users to develop, play user-created games and capture value. Like with *Second Life*, users are represented via their avatars, they are free to buy, sell, and create digital in-game items as well as participate in both real-life and virtual events. Most games in *Roblox* are multiplayer. *Meep City*, published by *Roblox* in February 2016, was the first *Roblox* game to surpass 1 billion player visits.

Minecraft was released in 2011 by the Swedish studio *Mojang*. Players can explore a pixelated world made from blocks, and voxel graphics-based 3D worlds, in which they can extract raw materials, craft in-game items and build virtually everything. *Minecraft* focuses more on solo play. *Minecraft* is reported to have been sold in over 200 million copies with over 125 million monthly active players (**Henningson**, 2022). *Minecraft Earth* implements augmented reality. The *Xbox Minecraft Marketplace* allows users to sell the items, models and mini-games they have created to other users, giving the world its own functioning economy.

Chinese companies such as *Tencent* and *NetEase* are increasingly investing into metaverse games. *NetEase*, China's second-largest publisher of online games after *Tencent*, has also invested in the metaverse social network *Imvu*, and some *Sandbox* games. *Tencent* has invested in *Roblox* and holds 40% of the shares of *Epic Games*. The Chinese behemoth is probably already leading in the field through its major portfolio[20] as shown in Figure 5.

Leading video games companies have been shopping around to complete their portfolios. Against that backdrop, it is easier to understand the acquisition strategy deployed by *Microsoft* to keep on growing a gaming empire: acquisition of *Mojang* in 2014 for $USD 2.5 billion, and the planned[21] acquisition of *Activision Blizzard* $USD 68.7 billion as of January 2022. *Microsoft* was a leading player in the field of video games in any case. In sharp contrast, although *Facebook* was instrumental for the success of *Zynga*, the company never capitalized on videogames[22] which may put the company in a weaker position compared to other major players. If *Fortnite* attracts 250 million active players a month, *Meta*'s *Horizon Worlds* target of 500,000 users by the end of 2022 was not achieved: the current figure is nearer 200,000 (**Rose**, 2022).

Nevertheless, these strategies only reveal that these companies are trying to diversify their user's experience, offering additional products and services and expecting new streams of revenue. Up-to-now, the new streams of revenue remain marginal. For instance, *Tencent* posted decreased revenues from music and games-related live streaming services (*Tencent*, 2022, p. 10). The business models of the metaverse related services are still uncertain. The longevity of *Habbo* or *Second Life* testify, notwithstanding, of the ability to serve a niche market.

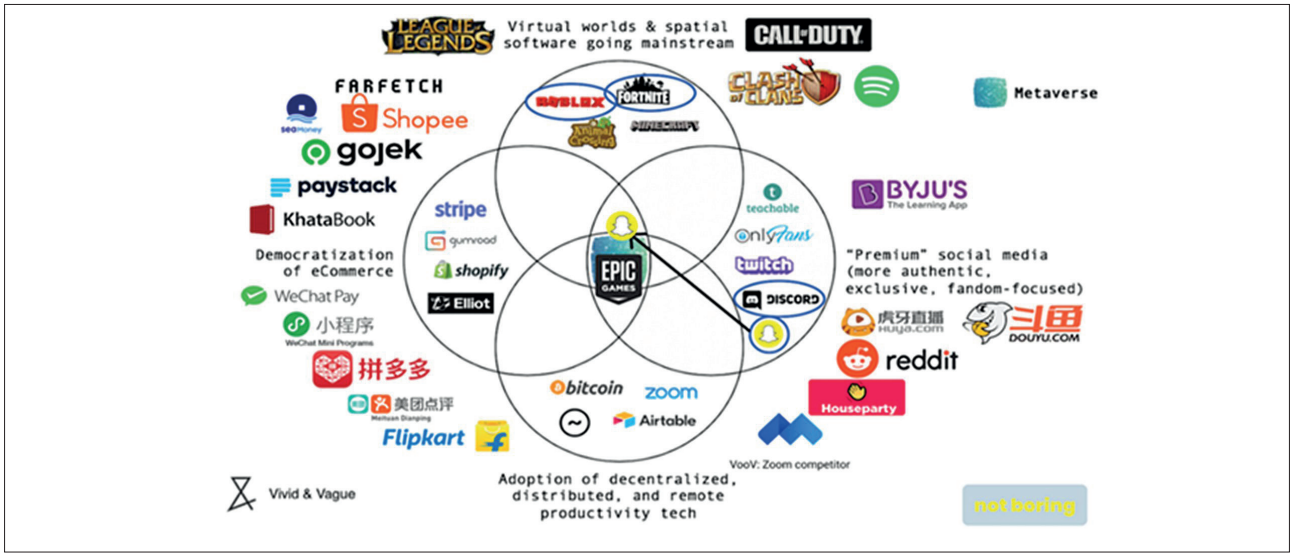

Figure 5. *Tencent*'s metaverse.
Source: **McCormick** (2020), based on **Geffen** (2020).

An early attempt, *Sony*'s 2008 metaverse *PlayStation Home* that allowed registered *PlayStation Network* users to create an in-game avatar and interact with others in an online social space, was a failure. It remained in beta all the way until its closure in 2015[23]. Still on the negative side, pure metaverse players have not been so far fortunate. *Roblox* has seen its stock price plummet by 27% across the last year. Besides, *Roblox* is not a profitable company with a net loss of over $162 million in Q1 2022 alone (*Newzoo*, 2022, p. 18).

> There is still a long way to go before mass adoption, simply seen from a demand side

Play-to-earn gaming has been heralded as

> "the job board for the metaverse" (**Brambilla-Hall**; **Baier-Lentz**, 2021).

The blockchain game *Axie Infinity*, a card collectible title, that allows players to earn tokens and trade in-game assets in real world digital exchanges has been

> "the poster child of the blockchain gaming movement" (*Newzoo*, 2022, p. 29)

and grew up very quickly. It turned out that its in-game economy was not sustainable. By the same token, video game companies currently trying to get into NFTs are facing

> "constant fan and media backlash" (**Van-der-Velde**, 2021),

as illustrated by the difficult introduction of *Ubisoft Quartz*[24] marketplaces. On the opposite, *Minecraft* took a strong position against the introduction of

> "NFTs and other blockchain technologies creates digital ownership based on scarcity and exclusion, which does not align with values of creative inclusion and playing together"
> *https://www.minecraft.net/en-us/article/minecraft-and-nfts*

6. Conclusion: challenges ahead

We concentrated so far on the supply side but these examples of the negative reactions from already active players indicate that there is still a long way to go before mass adoption, simply seen from a demand side and notwithstanding other issues. The new streams of activities may take some time to deliver: for instance, media fusion activity remains low with only 6% of consumers watching music events within a game, and merchandise sales within live streamed events is also low at 4% consumer penetration (**Mulligan**, 2022). Still on the demand side, corporations, right now, may not be up to embrace the metaverse.

Furthermore, it is likely that distinct media vertical preferences will remain strong. Rosedale stresses that:

> "most adults are not yet comfortable engaging with new people, or engaging socially, in a multi-player context online" (quoted by **Gent**, 2021).

From another perspective, it means that one cannot expect the mobile video games boom to be easily reproduced; especially as casual games and now hyper-casual[25] are dominating. It is the major trend on the consumer side and it should be stressed that both kind of games are characterized by simple rules and lack of commitment required, do not need a major time investment to play, in contrast to more complex hardcore games targeted at hobbyist gamers. For instance, single player games are the most popular among Indian users and India is the world's biggest mobile game market in downloads (but not in value). For India, LatAm or Africa accessibility and affordability will be key. India is a leading country for software services and videogames but the metaverse may be quite far off. Indian big tech (*Infosys*, *Reliance*, and *Tata*) will focus on business applications (*IND*, 2022) with the possible exception of the video game company *Nazara*.

This also means that there is risk of a new digital divide without and within countries, as well as between generations. There is a potential disenfranchisement of sections of the population unable to access the necessary infrastructure or to acquire the devices needed to access the metaverse. The demand for bandwidth internet traffic will probably grow exponentially. The supply of electricity is still a problem in some countries and has been a barrier for the development of the Internet. And the new technologies are rather greedy in terms of consumption which raises issues of sustainability: the yearly amount of electricity consumed by the *Ethereum* network is estimated to be equivalent to the annual energy consumption of countries like Peru or Qatar (*Newzoo*, 2022, p. 44); avatars consume as much electricity as Brazilians (**Carr**, 2006).

The increasing number of layers and complexity of involved technologies create opportunities but generate a considerable number of uncertainties, according to *Deloitte* (2022): new cyber vulnerabilities and risks related to digital identity and fraud, new challenges in areas such as trust, reputational risk, disinformation, harassment[26] and even mental health concerns. Some abuses are already being pointed at, for instance, unregulated use of child labour force by *Roblox* (**Parkin**, 2022). The investments in edge computing, next-generation connectivity, software,

> The increasing number of layers and complexity of involved technologies create opportunities but generate a considerable amount of uncertainties

hardware, and talent to support shifts to virtual reality may be significant. Standardization at different levels is also an issue, even if the industry[27] is starting addressing the issue, for instance with the *Metaverse Standards Forum* to develop industry guidelines ensuring immersive VR worlds are compatible. However, other technologies (like 3D modelling, volumetric video, and geospatial data) will need to be more tightly integrated.

> Video games companies and social media are well positioned to take a leading role in developing of a metaverse, but they may favour closed, proprietary metaverses thereby facing competition challenges especially in the new regulatory environment

Assuming that the metaverse becomes the new iteration of the internet, it will mostly likely attract greater scrutiny from global regulators, policymakers, and governments: issues such as anti-money laundering rules for exchanges and wallets, the use of decentralized finance (DeFi), crypto assets, taxes and property rights will come to the fore. As we have seen, video games companies and social media are well positioned to take a leading role in developing of a metaverse, but they may favour closed, proprietary metaverses thereby facing competition challenges especially in the new regulatory environment. Nevertheless, gamers may be reluctant to jump in the band wagon, as the videogames editor of *The Guardian*, **MacDonald** (2023), puts it:

> "The more I hear about the metaverse, the less I want to do with it."

For the moment, we seem to be quite far from a utopian ideal "open metaverse" that would be community-owned, community-governed, and a freely interoperable version. We are left with competing, non-interoperable proto-metaverses. Berners-Lee, deems blockchain protocols to be a barrier to an effectively decentralized web (**Landymore**, 2022).

Meta allegedly invested more than $USD 100 billion on research and development and product development in the sector ($USD 15 billion in 2021 alone) (**Hern**, 2022). The output has been rather disappointing with losses stacking up, especially with *Reality Labs*, its metaverse department, slowing revenue growth.

> "*Facebook*'s metaverse doesn't have legs" concludes **Hern** (2022).

May be the name was stupid! *Meta* has been trying to dominate the field with the "Zuckerverse" (**Mohassed**, 2021) but there are major players competing, so the jury is still out.

7. Notes

1. According to *McKinsey* (2022, p. 12), it even dates back to 1978 with *MUD1*, the first multiplayer real-time virtual world. MUDs (Multi-User Dungeons) were inspired by the role-playing board game *Dungeons & Dragons*.

2. In May 2022, *SK Telecom* partnered with *Deutsche Telekom* to bring its *ifland* metaverse platform to Europe.

3. On November 1, 2022, the *MIIT* jointly released a 4-year action regarded as China's first national-level policy that supports the metaverse development in the country (**Interesse**, *China Briefing*, November 2022).

4. For a presentation of the strategies of China, Saudi, Arabia, South Korea, and the United Arab Emirates, see **Kshetri** (2023), "National Metaverse Strategies".

5. An international collective work of 42 authors. For another comprehensive academic presentation see **Mystakidis** (2022). See, as well, the special issue of *Méta-Media* (**Bremme**, 2021): "Métavers et métamedias. Un 3e chapitre d'Internet".

6. A notion introduced in 2014 by one of the founders of the block chain *Ethereum*, Gavin Wood.

7. With the exception of some massively multiplayer online role-playing games.

8. *Intel* claims that the metaverse will necessitate a 1000x increase in computational efficiency, including advancements in 5G and hybrid edge-cloud infrastructures (*Cbinsights*, 2022).

9. We rely mostly on *Citi* (2022, p. 3) and *Credit Suisse* (2022, p. 4). *McKinsey* considers ten layers that fall into four categories: content and experiences [(content, applications, and virtual worlds), platforms (access and discoveries, creators/3D development platforms), infrastructure and hardware (devices, OS and accessories, infrastructure), and enablers (security/privacy, identity, payment and monetization)] (*McKinsey*, 2022, p. 16).

10. Integrated spatialized voice services first appeared as application for networked virtual environments, e.g., Second Life. With a spatialized voice service, people can identify who is talking if there are several participants in the vicinity

11. *XR: Extended reality* a term referring to all real-and-virtual combined environments and human machine interaction generated by computer technology and wearables. It encompasses AR, VR, mixed reality, and other forms of alternate, expanded, or immersive reality applications, including those not yet invented.

Augmented reality is a view of the real-world environment whose elements are supplemented and enhanced by computer-generated sensory input such as sound, video, or graphics.

Virtual reality is an immersive multimedia or computer simulated environment which allows to interact with it.

Mixed reality (also hybrid reality) is the merging of real and virtual worlds to produce new environments where physical and digital objects co-exist and interact in real time.

12. Most blockchain technologies can be divided into four primary categories: private, public, hybrid, and consortium (**Hussain**, 2022).

13. **Radoff**'s (2021) map is even more overcrowded and *Newzoo* (2022, pp. 5-6) messier.

14. In 2006, a creator in the virtual world *Second Life*, Anshe Chung made million by buying virtual real estate, redeveloping it with *Second Life*'s creator tools, and renting it out to other *Second Life* inhabitants (*Cbinsights*, 2022).

15. See also:
https://olc.worldbank.org/about-olc/education-meets-the-metaverse-reimagining-the-future-of-learning

16. We follow *Credit Suisse*, p. 8, and **Narin** (2021).

17. Founded in 1999 by Philip Rosedale:
https://www.lindenlab.com

18. See Box 1 in **Seekins** (2022, p. 18).

19. See the presentation in *Newzoo* (2022, pp. 16-18).

20. See also the impressive list of *Tencent* ownership provided **Chan** (2022).

21. Still to be approved by competition authorities. As of May 2023, the UK's competition regulator has blocked the acquisition.

22. Revenue derived from its commercial relationships with *Zynga* (publisher of world hits such as "Farmville") were around 15% in 2011, but have been decreasing since to become almost unnoticeable.

22. The presentation at *Meta Connect* was ironically described as "*PlayStation Home* with worse graphics":
https://www.playstationlifestyle.net/2022/10/12/mark-zuckerberg-metaverse-playstation-home-ps-home-twitter

24. Digits (in-game NFTs) that enable to put items on sale to other eligible players at a price set by the player:
https://quartz.ubisoft.com

25. "Hypercasual game" or "instant game" are extremely easy-to-learn games that require no download, being played in an existing app like a web browser or messaging app.

26. Sexual harassment did plague *Habbo* and *Second World*.

27. Launched by technology and telecoms giants including *Meta Platforms*, *Huawei*, and *Qualcomm*.

8. References

Basdevant, Adrien; **François, Camille**; **Ronfard, Rémi** (2022). *Métavers: "10 leviers d'actions" pour une politique française et européenne*. Rapport, Gouvernement, Mission exploratoire sur les métavers.
https://www.vie-publique.fr/rapport/286878-mission-exploratoire-sur-les-metavers

Bloomberg Intelligence (2021). *Metaverse may be $800 billion market, next tech platform*.
https://www.bloomberg.com/professional/blog/metaverse-may-be-800-billion-market-next-tech-platform

Brambilla-Hall, Stefan; **Baier-Lentz, Moritz** (2021). *What play-to-earn gaming can tell us about the future of the digital economy - and the metaverse*. World Economic Forum.
https://www.weforum.org/agenda/2021/11/what-play-to-earn-games-mean-for-the-economy-and-metaverse

Bremme, Kati (2021). "Métavers et métamedias. Un 3e chapitre d'Internet". *Méta-media*, n. 20.
https://www.meta-media.fr/wp-content/uploads/sites/33/2021/12/METAMEDIA-20.pdf

Brennen, Bonnie; **Dela-Cerna, Erika** (2010). "Journalism in Second Life". *Journalism studies*, v. 11, n. 4, pp. 546-554.
https://epublications.marquette.edu/cgi/viewcontent.cgi?article=1065&context=comm_fac

Breton, Thierry (2022). "People, technologies & infrastructure - Europe's plan to thrive in the metaverse". *Blog of Commissioner Thierry Breton*.
https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_5525

Carr, Nicholas (2006). "Avatars consume as much electricity as Brazilians". *Rough type*.
https://www.roughtype.com/?s=Avatars+consume+as+much+electricity+as+Brazilians+

Chan, Khee-Hoon (2022). *An overview of Tennent's burgeoning games dominance*.
https://www.polygon.com/22949530/tencent-the-worlds-biggest-video-game-company

Cbinsights (2022). "The metaverse could be tech's next trillion-dollar opportunity: These are the companies making it a reality". *Research briefs*.
https://www.cbinsights.com/research/metaverse-market-map

Citi GPS (2022). *Metaverse and money. Decrypting the future*. Global Perspectives & Solutions.
https://goo.su/Feh5nlq

Credit Suisse (2022). *Metaverse: A guide to the next-gen Internet*.
https://www.credit-suisse.com/media/assets/corporate/docs/about-us/media/media-release/2022/03/metaverse-14032022.pdf

Deloitte (2022). *On the board's agenda | US What's all the buzz about the metaverse?*
https://www2.deloitte.com/content/dam/Deloitte/us/Documents/center-for-board-effectiveness/us-cbe-otba-whats-all-the-buzz-about-the-metaverse.pdf

Donkin, Chris (2022). "SKT stakes claim for leading role in global metaverse". *Mobile World Live*, November 23.
https://www.mobileworldlive.com/apps/news-apps/skt-stakes-claim-for-leading-role-in-global-metaverse

Dwivedi, Yogesh-Kumar; **Hughes, Laurie**; **Baabdullah, Abdullah M.**; **Ribeiro-Navarrete, Samuel**; **Giannakis, Mihalis**; **Al-Debei, Mutaz M.**; **Dennehy, Denis**; **Metri, Bhimaraya**; **Buhalis, Dimitrios**; **Cheung, Christy M. K.**; **Conboy, Kieran** *et al.*, (2022). "Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy". *International Journal of Information Management*, v. 66.
https://doi.org/10.1016/j.ijinfomgt.2022.102542

Galibert, Olivier (2003). "Vie et mort du *Deuxième Monde*. Etude critique d'une communauté virtuelle ludique". *Les cahiers du numérique*, v. 4, pp. 195-207.
https://www.cairn.info/revue-les-cahiers-du-numerique-2003-2-page-195.htm

Geffen, Marc (2020). *The minimum viable metaverse*.
https://vividandvague.substack.com/p/the-minimum-viable-metaverse

Gent, Edd (2022). "What can the metaverse learn from Second Life?". *IEEE Spectrum*, v. 59, n. 1, pp. 19-19.
https://spectrum.ieee.org/metaverse-second-life

Howell, James (2022. *Decentraland (MANA) vs Sandbox (SAND). Which metaverse is the best?*
https://101blockchains.com/decentraland-vs-sandbox

Henningson, Joakim (2022). "*The history of Minecraft*.
https://www.redbull.com/se-en/history-of-minecraft

Hern, Alex (2022). "Meta shares dip is proof metaverse plan never really had legs". *The Guardian*, 27 October.
https://www.theguardian.com/technology/2022/oct/27/metas-shares-dip-is-proof-metaverse-plan-never-really-had-legs-facebook

Hussain, Wazarat-Ali (2022). "The metaverse market map – the ecosystem of our emerging virtual worlds", May 16.
https://metaverseinsider.tech/2022/05/16/the-metaverse-ecosystem-a-market-map-for-our-emerging-virtual-worlds

IND Money (2022). "Best metaverse stocks in India: What are their future plans?". November 8.
https://www.indmoney.com/articles/stocks/best-metaverse-stocks-in-India

Interesse, Giulia (2022). *China's debut in the metaverse: trends to watch (updated)*. China briefing.
https://www.china-briefing.com/news/metaverse-in-china-trends

Johar, Amiya (2022). "Tech players form metaverse standards group".
https://www.mobileworldlive.com/featured-content/top-three/tech-players-form-metaverse-standards-group

Kshetri, Nir (2023). "National metaverse strategies". *Computer*, v. 56, n. 2, pp. 137-142.
https://doi.org/10.1109/MC.2022.3227681
https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10042106

Lamarche-Toloza, Álvaro (2022). *Les réalités du Métavers. Derrière la ruée vers l'or. Les réalités du Métavers et le rôle de la blockchain dans la virtualisation du monde*.
https://www.clubopenprospective.org/copie-de-2022-s%C3%A9ance-2

Lamy, Corentin (2022). "'Le deuxième monde' de Canal+, dès 1997: le pionnier français du métavers". *Le Monde*, 10 juin.
https://www.lemonde.fr/pixels/visuel/2022/06/10/le-deuxieme-monde-de-canal-des-1997-le-pionnier-francais-du-metavers_6129767_4408996.html

Landymore, Frank (2022). *The guy who invented the World Wide Web thinks we should ignore web3*.
https://futurism.com/the-byte/guy-invented-world-wide-web-ignore-web3

Lange, Jeva (2020). *Travis Scott's 'virtual concert' was the biggest Fortnite event ever*.
https://theweek.com/speedreads/910804/travis-scotts-virtual-concert-biggest-fortnite-event-ever

Ma, Steven (2022). *Metaverse adds new dimensions to games*.
https://www.tencent.com/en-us/articles/2201300.html

MacDonald, Keza (2023). "I've seen the metaverse – and I don't want it". *The Guardian*, January 25.
https://www.theguardian.com/games/2022/jan/25/ive-seen-the-metaverse-and-i-dont-want-it

Majithia, Kavit (2022). *Meta value takes $65B hit as Q3 disappoints*.
https://www.mobileworldlive.com/featured-content/home-banner/meta-value-takes-65b-hit-as-q3-disappoints

McKinsey (2022). *Value creation in the metaverse. The real business of the virtual world.*
https://www.mckinsey.com/business-functions/growth-marketing-and-sales/our-insights/value-creation-in-the-metaverse

McCormick, Packy (2020). "Tencent's dreams. Part II: Investing in the metaverse". *Not boring newsletter*.
https://seekingalpha.com/article/4371548-tencents-dreams-part-ii-investing-in-metaverse

Messinger, Paul R.; **Stroulia, Eleni**; **Lyons, Kelly** (2008). "A typology of virtual worlds: Historical overview and future directions". *Virtual worlds research: Past, present and future*, v. 1, n. 1.
https://jvwr-ojs-utexas.tdl.org/jvwr/article/view/291

Mileva, Geri (2022). "The ultimate guide to metaverse virtual real estate".
https://influencermarketinghub.com/metaverse-virtual-real-estate

Mind the bridge (2022). *Tech scaleup South Korea. Report 2022*.
https://dl.airtable.com/.attachments/1638d910ea6d650fa661e9e03f4d901b/8e60ac0e/2022_MTB_TechScaleupSouthKorea.pdf

Mohassed, Sid (2021). *Zuckerverse: why we should vote with our feet and stay away from Facebook*.
https://blogs.lse.ac.uk/businessreview/2021/12/10/zuckerverse-why-we-should-vote-with-our-feet-and-stay-away-from-facebook

Mulligan, Tim (2022). *Metaverse. Future scenarios for smart TVs*.
https://www.midiaresearch.com/reports/metaverse-future-scenarios-for-smart-tvs

Mystakidis, Stylianos (2022). "Metaverse". *Encyclopedia 2022*, v. 2, pp. 486-497.
https://doi.org/10.3390/encyclopedia2010031

Narin, Gökçe (2021). "A content analysis of the metaverse articles". *Journal of metaverse*, v. 1, n. 1, pp. 17-24 .
https://dergipark.org.tr/en/pub/jmv/issue/67581/1051382

Newzoo (2022). "The metaverse, blockchain gaming, and NFTs: Navigating the Internet's uncharted waters". *Newzoo trend report*.
https://resources.newzoo.com/hubfs/Reports/Metaverse/2022_Newzoo_Metaverse_Blockchain_NFT_Report.pdf

Parkin, Simon (2022). "The trouble with Roblox, the video game empire built on child labour".
https://www.theguardian.com/games/2022/jan/09/the-trouble-with-roblox-the-video-game-empire-built-on-child-labour

Partleton, Kayleigh (2020). "Sulake's networking title Habbo celebrates its 20th anniversary".
https://www.pocketgamer.biz/news/74772/suklakes-networking-title-habbo-celebrates-its-20th-anniversary

Radoff, Jon (2021). "Market map of the metaverse".
https://medium.com/building-the-metaverse/market-map-of-the-metaverse-8ae0cde89696

Rose, Steve (2022). "'The metaverse will be our slow death!' Is Facebook losing its $100bn gamble on virtual reality?". *The Guardian*, December 7.
https://www.theguardian.com/technology/2022/dec/07/metaverse-slow-death-facebook-losing-100bn-gamble-virtual-reality-mark-zuckerberg

Seekins, Russell (2022). "Meeting of worlds. Impacts of the metaverse". *Intermedia*, v. 50, n. 1, pp. 18-21.
https://www.iicom.org/intermedia/vol-50-issue-1/meeting-of-worlds-impacts-of-the-metaverse

Simon, Jean-Paul (2019). "5G: Fuel for the media?". *Intermedia*, v. 47, n. 2, pp. 16-19.
https://www.iicom.org/intermedia/intermedia-jul-2019/5g-fuel-for-the-media

Simon, Jean-Paul (2021). "Free-to-play model". In: Wolf, Mark J. P., *Encyclopaedia of video games: The culture, technology, and art of gaming*, 2nd ed., Westport: Greenwood, pp. 357-359. ISBN: 978 1 440870200

Tencent (2022). *2022 Interim report*.
https://static.www.tencent.com/uploads/2022/09/01/9865e43220e76fe82356b91d3b2a70e6.PDF

Van-der-Velde, Issy (2021), *Report: Ubisoft Quartz NFTs aren't selling despite lots of trades*.
https://www.thegamer.com/report-ubisoft-quartz-nfts-arent-selling-despite-lots-of-trades

Ye, Josh (2021). *Why Chinese tech giants are embracing the metaverse despite state media warnings*.
https://www.scmp.com/tech/tech-trends/article/3156562/why-chinese-tech-giants-are-embracing-metaverse-despite-state

Zyda, Michael (2022). "Let's rename everything "the metaverse!". *Computer*, v. 55, n. 3, pp. 124-129.
https://doi.org/10.1109/MC.2021.3130480