

The Political Economy of the Metaverse

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▶ Key Takeaways

- The metaverse is a persistent online world with a developed economy, that can be experienced in virtual reality (VR) by unlimited numbers of people.
- Current talk of the metaverse is primarily a narrative about the growth potential of the video gaming and enterprise software sectors, in the context of advances in VR technology and changes to everyday life brought about by the Covid-19 pandemic.
- Major technological and governance breakthroughs will be required before the metaverse can be built.
- Efforts to realize the metaverse are more likely to be led by incumbent American and Chinese big tech companies than European challengers.

Metaverse Visions

In October 2021, Mark Zuckerberg used his keynote presentation at Facebook’s Connect conference to announce a change in the company’s strategy. The previous decade had been defined by mobile; now Facebook would invest an additional \$10 billion per year on developing technology for the metaverse, and re-brand as Meta to reflect its ambitions.¹

Although the concept of the metaverse originates in Neal Stephenson’s 1992 novel *Snow Crash*,² it had barely featured in public consciousness before Zuckerberg’s presentation.³ Subsequent media coverage and public discourse suggest what is understood by “the metaverse” is far from settled. For some, it seems to mean simply virtual reality (VR) software—for example, the rhythm game “Beat Saber” or Microsoft’s teleconferencing app Mesh.⁴ For others, it refers to massively multiplayer online games (MMOs) with persistent game worlds, such as *Second Life* and *Minecraft*, implying VR is not even a necessary condition for the metaverse.

Within the latter group, advocates of web3—the putative next iteration of the web’s core infrastructure based on blockchain and crypto tokens—believe the metaverse cannot be a closed ecosystem controlled by a tech company or a state. Instead, it must be an open ecosystem that is technically and politically decentralized. Blockchain-based MMOs like *Decentraland* and *The Sandbox* would therefore qualify for the metaverse, but *Second Life* (owned by Linde Plc) and *Minecraft* (owned by Microsoft) would not.

What is the metaverse?

For the purposes of this brief, I propose a definition based on *Snow Crash* and Ernest Cline’s novel *Ready Player One* (2011).⁵ These visions of the metaverse matter because of the direct influence they have had in Silicon Valley. Stephenson was employed as a futurist by Jeff Bezos’s space exploration company Blue Origin and the VR hardware manufacturer Magic Leap, while *Ready Player One* was required reading for new hires at Oculus, the VR company acquired by Meta in 2014.⁶ While Stephenson and Cline are often credited with prescience about the technological future, in some ways their predictions have been self-fulfilling, with tech companies attempting to build the metaverse future that they imagined.

What does that future look like? Stephenson and Cline’s novels imagine the metaverse as a massive, immersive, persistent, open, and economically-developed virtual world. It is massive in that it can support simultaneous participation by an unlimited number of

1. “Facebook Reports Third Quarter 2021 Results”, Meta, October 25, 2021.

2. N. Stephenson, *Snow Crash*, London: Penguin Books, 1992, p. 366.

3. Google search trends for the topic “Metaverse” are available at: <https://trends.google.co.uk>.

4. For simplicity, I use the term “VR” to encompass Virtual Reality, Augmented Reality, Mixed Reality, and Extended Reality.

5. E. Clive, *Ready Player One*, New York: Crown Publishing Group, 2011, 384 p.

6. @PalmerLucky, Twitter, July 8, 2020, available at: <https://twitter.com>.

users. It is immersive in that it offers a three-dimensional, embodied, VR experience (in contrast to today's experience of most MMOs which is two-dimensional, confined to a screen, and mediated by clicking, typing, and tapping). It is persistent in that it never pauses or re-sets. It is open in that anyone with access to VR hardware can enter it, move around inside it as an avatar, interact with other avatars, transact in it, build on it, and so on. Finally, it is economically developed in that there is extensive trading of goods and services inside it, with transactions taking place in electronic currency.⁷

People use the metaverse to work, socialize, and play. To give some specific examples from *Snow Crash*: they develop property, strike business deals, conduct archival research, attend rock concerts, drink in exclusive bars, take psychedelic drugs, race motorbikes, and fight with samurai swords.

What will it take to build the metaverse?

By this definition, the metaverse does not yet exist, and will take decades to build. Why is this? Firstly, because although investment by the likes of Alphabet, Samsung, Tencent and Meta has led to rapid advances in VR technology, major technical challenges remain. One of these is concurrency: that is, the ability for large numbers of users to be active simultaneously in the same virtual environment.⁸ Computational complexity increases quadratically—not linearly—as more users are added, meaning that today's most advanced MMOs such as Fortnite struggle to handle more than 100 concurrent users and rely on in-game narrative techniques to give the appearance of greater numbers. In 2021 the VR software company Improbable demonstrated that it was possible to host 1,450 concurrent users at a virtual concert and 4,000 in an MMO.⁹ 10,000 is the upper limit for its software today—barely 0.0002% of the world's 4.9 billion internet users.¹⁰

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There are also payments and legal barriers to overcome. Trade in virtual goods already occurs inside MMOs (cf. *infra*), but this takes place in currencies which are native to each game and cannot typically be converted back into fiat currency (for example: Linden Dollars in *Second Life*; Minecoins in *Minecraft*; V-Bucks in *Fortnite*). By contrast, a developed metaverse economy would require the equivalent of reserve currencies that were universally accepted as a medium of exchange—conceivably Central Bank Digital Currencies (CBDCs), and/or popular cryptocurrencies like Bitcoin and Ether. Similarly,

7. For a summary of the definitions of the metaverse in 54 peer-reviewed papers, see S.-M. Park and Y.-G. Kim, "A Metaverse: Taxonomy, Components, Applications, and Open Challenges," *IEEE Access*, Vol. 10, pp. 4 209–4 251, January 2022.

8. For an accessible explanation of the technical challenge, see M. Ball "The Metaverse: What It Is, Where to Find it, and Who Will Build It," January 13, 2020, available at: <https://www.matthewball.vc>.

9. Improbable, Company Website, available at: <https://www.improbable.io>.

10. "Individuals Using the Internet," International Telecommunication Union, available at: <https://www.itu.int>.

an enforceable system of property rights would be required to prevent the developers of metaverse apps confiscating, destroying, or otherwise interfering with virtual goods users had bought. Web3 advocates argue that blockchain-based non-fungible tokens (NFTs) offer such a solution, although this is contested.¹¹

Just as significant is the dependency on technical standards. The web relies on a global standards body, W3C, and only works because technologies like HTTP, URLs, and HTML have been universally adopted. The metaverse requires different VR platforms to interoperate: for this to happen, rafts of new standards and protocols will be required, along with a rationalization of existing web standards. This is a huge project which has hardly started: there are currently no standards for components as fundamental to the metaverse as avatars, and while W3C has a Metaverse Interoperability Community group, to date it has produced few outputs.¹² The absence of standards also acts as a disincentive to third party creators of virtual goods and services, as their work is locked in to the platform on which it was originally developed. This in turn impedes growth in the virtual economy.

How will the metaverse be governed?

Finally, once a fully-fledged metaverse has been built, it will need to be governed. Order will need to be maintained; rules about what can be bought and sold, and who can do and say what to whom will need to be agreed and enforced. There will need to be mechanisms for resolving disputes.

Nothing about the current governance of the web suggests this role would be fulfilled by states or intergovernmental organizations. Today, both the dominant social media platforms and the majority of virtual worlds are privately-owned spaces. As such, they are governed at the absolute discretion of their developers—albeit subject to national and supranational laws, and with a greater or lesser degree of input from their user communities. This is a possibility for the metaverse too—in fact, in both *Snow Crash* and *Ready Player One* the metaverse is under private monopoly control. But in the current context of concern about the power and legitimacy of big tech companies, such an arrangement seems dissonant.

Once again web3 advocates—many of whom are ideologically libertarian—believe they have a technical solution, in the form of Distributed Autonomous Organizations (DAOs). DAOs are effectively digital co-operatives, which give individuals voting rights and a financial stake in the platforms they use. Rather than depending on a central authority, DAO rules are automatically enforced through smart contracts (contracts written in computer code and stored on the blockchain), with rule changes and matters

11. On the technical shortcomings of NFTs as records of digital property, see M. Marlinspike, “My First Impressions of Web3,” January 7, 2022, available at: <https://moxie.org>.

12. W3C website, available at: <https://www.w3.org>.

that are outside the scope of the rules put to a majority vote. Some existing MMOs, including Decentraland, are already governed by DAOs, as are many Decentralized Finance (DeFi) projects.

However, DAOs also have some significant drawbacks. From a theoretical perspective, the absence of any central authority means it is impossible to assign accountability, making them unpopular with regulatory authorities.¹³ From a practical perspective, they are highly exposed to coding errors, while the need for members to be able to understand smart contract code is simply unrealistic at mass scale.¹⁴

Is the metaverse utopian or dystopian?

It is notable that in both *Snow Crash* and *Ready Player One*, the metaverse derives its appeal to users from being more benign than the real world. In *Snow Crash*, nation-states have been succeeded by small privately-governed enclaves, many of which are in the control of organized crime, with swathes of lawless territory in between. Work is casualized, poorly paid, and fraught with danger. In *Ready Player One*, the depletion of the earth's natural resources has led to a severe economic depression with most people living in acute poverty. The implication is that citizens' participation in the metaverse is a reflection of their dissatisfaction with the material conditions of their existence, and their despair at the inability of decaying political institutions to improve those conditions.

An especially pessimistic interpretation of the metaverse's hold on the imagination of Silicon Valley would be that tech investors and CEOs expect economic inequality to worsen inexorably, and hope that the distractions of the metaverse will be enough to prevent them from being expropriated in a violent revolution. A more mundane one would be the tech sector's need for new revenue streams. The growth opportunity in social media is mostly exhausted, while an increasing societal emphasis on data privacy has put pressure on advertising sales.¹⁵ The metaverse may simply be its best idea for generating future shareholder value (*cf. infra*).

Metaverse Realities

In any event, large amounts of capital and engineering talent are being invested with an expectation of returns in much less time than it will take to complete the metaverse. So what are the immediate economic opportunities that tech companies see in starting to build it?

13. For example, DeFi protocols which are governed by a DAOs, such as Uniswap, are unable to undertake anti-money laundering checks.

14. For example, see K. Finlay, "A \$50 Million Hack Just Showed That the DAO Was All Too Human," *Wired*, June 18, 2016.

15. A. Heath, "Facebook Lost Daily Users for the First Time Ever Last Quarter," *The Verge*, February 2, 2022.

Hardware

Most obviously, manufacturers hope the market for VR headsets, gesture tracking devices, haptic wearables, and wall displays will grow. 11.2 million headsets were sold in 2021, while estimates of the VR hardware market size range from \$6.3 billion (growing at a compound annual growth rate [CAGR] of 45 percent), to \$21.8 billion (growing at a CAGR of 15 percent).¹⁶ Having sunk billions of dollars of research and development into VR, companies like Alphabet (which owns HTC), HP, Meta and Sony have a strong vested interest in those growth forecasts being achieved. As well as a vision of the technological future, the metaverse can be seen as an enabling narrative for their corporate strategies.

Video Gaming

The emergence of VR gaming is happening in parallel to a shift in the video gaming industry away from one-off sales and towards services business models. For example, part of the strategic rationale for Microsoft's \$68.7 billion acquisition of Activision Blizzard, announced in January 2022, is to incorporate popular franchises like Call of Duty into the catalog of its Xbox Game Pass service—a sort of gaming equivalent to Netflix.¹⁷ In this context, the more immersive experience offered by VR can be expected to increase average revenue per user, by encouraging gamers to maintain their subscriptions and spend more of their time playing, leading in turn to higher volumes of in-game micro-transactions.

If the idea of a metaverse economy seems implausible, it is worth bearing in mind that such micro-transactions already amount to as much as \$93 billion annually.¹⁸ Currently, they primarily involve purchases of virtual goods which change avatars' appearance (known as

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“skins”) or allow them to make different movements and gestures (known as “emotes”), although they also include sales of user-built games on platforms like Roblox and Fortnite Creative. This everyday in-game trade, rather than widely-hyped NFT purchases of land titles in online worlds, digital

superyachts, or cartoon monkeys, is the evidence that the virtual economy has scope to grow as payments and legal infrastructure evolves.¹⁹ Meanwhile, concerts played by the DJ Marshmello inside Fortnite and the K-Pop star AleXa inside Scavengers hint at the potential for MMOs to encompass virtual entertainment venues, with additional revenues flowing from ticketing and merchandise.

16. “Virtual Reality Market Share, Growth,” Fortune Business Insights, August, 2021; Grand View Research, “Virtual Reality Market Size, Share & Trends Analysis,” April 2022.

17. “Activision Blizzard: The Massive \$70bn Gaming Deal That's Good News for Xbox,” BBC, January 20, 2022, available at: www.bbc.co.uk.

18. “The Virtual Economy,” L’Atelier, available at: <https://atelier.net>.

19. For examples see E. Howcroft, “Virtual Real Estate Plot Sells for Record \$2.4 million,” Reuters, November 24, 2021, available at: www.reuters.com; R. Perper, “Rare Bored Ape Yacht Club NFT Sells for Record \$3.4 Million USD,” *Hypebeast*, October 26, 2021, available at: <https://hypebeast.com>; A. Chow, “The Metaflower Super Mega Yacht’ NFT Sells for a Record \$650,000 USD,” *Hypebeast*, November 24, 2021, available at: <https://hypebeast.com>.

Enterprise Software

At an earlier stage to gaming but similarly tangible is the use of VR in work environments—sometimes referred to as “the enterprise metaverse”. There are specialized applications of VR technology in training—for example, learning complex store layouts, or to operate machinery. However, the biggest opportunity, which has come sharply into focus during the Covid-19 pandemic, is in increasing the effectiveness of remote work. Recent research has shown that remote working has costs for both organizations and employees.²⁰ Communication and collaboration suffer, while many individuals find themselves affected by “Zoom fatigue” thanks to the combination of immobility and the exaggerated facial expressions and gestures one has to make to compensate for the ambiguity of body language on video calls.²¹

The alternative offered by VR is persistent virtual office environments, in which employees can meet as embodied avatars. VR allows them to use and read body language and to participate more actively in workshop discussions (for example, by writing on a flipchart). It also creates the possibility for the kind of serendipitous “corridor conversations” which Alphabet and others have credited for important new product innovations.²² The management consultancy Accenture already has a virtual space known as the Nth Floor, modeled on its San Francisco office, which it uses for employee inductions and all-hands meetings.²³

Assuming that climate and public health imperatives continue to discourage commuting and business travel, it seems plausible that organizations with geographically-dispersed workforces will be willing to increase their spending on enterprise software to allow their employees to work together in VR. The main beneficiary would be Microsoft, which already generates more than \$20 billion per quarter from sales of cloud software, and has the opportunity to upsell its VR product Mesh to the 500,000 organizations which subscribe to its messaging and videoconferencing product Teams.²⁴ Meta has developed VR collaboration software called Horizon Workrooms, but with far fewer enterprise clients than Microsoft it may rely on planned integrations with Zoom and Slack to achieve widespread adoption.²⁵

Meanwhile, comments by Baidu executive Ma Jie at an event held in the company’s virtual world XiRang serve as a reminder of why “the enterprise metaverse” is a misnomer. Ma noted that XiRang would not support trading of NFTs or cryptocurrencies (which are

20. L. Yang *et al.* “The Effects of Remote Work on Collaboration Among Information Workers,” *Nature Human Behavior* 6, 2022, pp. 43–54.

21. V. Ramachandran, “Stanford Researchers Identify Four Causes for ‘Zoom Fatigue’ and Their Simple Fixes,” *Stanford News*, February 23, 2021, available at: <https://news.stanford.edu>.

22. See for example A. Agnihotri and S. Bhattacharya, “Google’s Workplace Design for Serendipity,” *SAGE Business Cases*, January 3, 2022.

23. J. Warnke, “Are You Ready for Close Encounters of the Virtual Kind?,” *Accenture*, November 30, 2020, available at: <https://www.accenture.com>.

24. E. Protalinski, “Microsoft Teams Is Now Used by 500,000 Organizations,” *VentureBeat*, March 19, 2019, available at: <https://venturebeat.com>.

25. Oculus, “Zoom Meets Virtual Reality: Announcing Zoom’s Collaboration With Horizon Workrooms”, available at: www.oculus.com.

banned in China), and that “breakthroughs in several key technologies” would be required to deliver the product roadmap, meaning that a full public launch is at least 6 years away.²⁶ Furthermore, there is no suggestion that XiRang will be interoperable with other virtual worlds, pointing to a future of siloed “walled gardens” controlled by the same big tech companies which dominate the web today, and with the same potential to “splinter” into Western and Chinese branches.

Other possibilities for VR

VR-based solutions developed for remote work may also prove to be attractive alternatives to videoconferencing software for socializing with friends and family remotely. Thanks to the diffusion of Lidar technology, it is already possible to create a 3D scan of room using a smartphone. This creates the possibility of remote social events in VR versions of real homes—surely an improvement on the generic interface of Zoom or Google Meet. Whether consumers who would not otherwise have access to VR hardware through work or an interest in video gaming would be willing to pay for such a service is another matter.

Some other applications of VR with varying degrees of relevance to the vision of the metaverse have been tested. A pizza bought with cryptocurrency at a branch of Domino’s in Decentraland has been delivered in the real world.²⁷ BT Sport offered a choice of four virtual seats at the 2017 UEFA Champions League Final, featuring a 360-degree view together with the auditory and visual sense of being in the crowd.²⁸ As long ago as 2009, The Open University created a virtual campus for distance learners in Second Life.²⁹ However, it seems that in retail, sports broadcasting, and education, VR is not yet a “killer app” enabling significantly more growth than the web has already produced.

The European Metaverse?

The French President Emmanuel Macron has recently articulated an aspiration to build a “European Metaverse”. However, this appears to have been less a pronouncement about the future direction of the web, and more a recapitulation of Macron’s wish to see European tech companies challenge the dominance of their American and Asian counterparts.³⁰

26. P. Catterall, “A Year of Metaverse Hype Culminates With Baidu’s Launch of XiRang”, *Pandaily*, December 31, 2021, available at: <https://pandaily.com>.

27. “1st EVER Pizza Order with REAL WORLD DELIVERY Pizza Party!”, Decentraland, March 13, 2021, available at: <https://events.decentraland.org>.

28. Footage available at: <https://vrnation.tv>.

29. “Case Study: The Open University”, Second Life, May 2009, available at: <https://wiki.secondlife.com>.

30. “French Innovation, Audacity and Genius Have Made Our Greatness and Our Success”, *The Big Whale*, April 22, 2022, available at: www.thebigwhale.io.

Europe starts from a low base. That there are no European tech companies on the scale of Alphabet or Tencent is well known, but the picture is scarcely more favorable when it comes to the sectors which stand to benefit most from the push towards the metaverse. In video gaming, 6 of the world's ten largest companies are in Asia and 3 in the USA. The only European firms in the top 20 are Sweden's Embracer (owners of game franchises including Darksiders and Saints Row) and France's Ubisoft (developers of Assassin's Creed). Europe's seemingly weak position is partly a reflection of mergers and acquisitions (M&A) activity in the past decade. For example, Sweden's Mojang Studios, which developed Minecraft, was acquired for \$2.5 billion by Microsoft in 2014, and Finland's Supercell, best known for the mobile game Clash of Clans, for \$8.6 billion by Tencent in 2019.³¹ In enterprise software, Europe is represented by the German resource planning software vendor SAP and the French 3D design software developer Dassault Systèmes—but 15 of the top 20 companies by market capitalization are American.³²

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Does Europe have metaverse-oriented start-ups that might supplant the incumbents? Macron cited two French web3 “unicorns”—Ledger, which manufactures a hardware wallet for crypto assets, and Sorare, a blockchain-based fantasy football game. Whatever their merits, these businesses are unrelated to VR and will only benefit from the metaverse in the event that web3 technologies become its standards, which is far from certain (cf. supra). ASML, the Dutch manufacturer of photolithography machines used in the production of computer chips, is a more likely beneficiary.

Metaverse Materiality

At one point in *Snow Crash*, a powerful character lights a cigarette in the metaverse. “It takes as much computing power realistically to model the smoke coming out of Ng’s mouth,” Stephenson writes, “as it does to model the weather system of the entire planet” This aside points to an important irony about the metaverse: the more vaunting the ambition to transcend reality, the stronger the dependency on the material world becomes. At scale, VR and other metaverse technologies will consume computing power, network bandwidth, energy, minerals and metals even more voraciously than today’s web—with inevitable environmental and geopolitical consequences. Whether those will be justified by the benefits the metaverse offers is an important consideration.

31. A list of video gaming acquisitions is available at: <https://en.wikipedia.org>.

32. Market capitalization data is available by sector at: <https://companiesmarketcap.com>.

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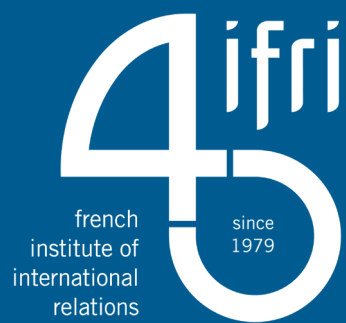
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