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Building synthetic worlds: lessons from the excessive infatuation and oversold disillusionment with the metaverse

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ABSTRACT

The metaverse comprises a range of technologies offering shared digital experiences based on immersive virtual worlds or decentralised economies. Brands, Big Tech, and investors made huge investments in the metaverse, but users did not share their excitement and the bubble duly burst. We explore this story by drawing on a wide range of data sources and first-hand knowledge. We consider the metaverse as a set of overlapping, partly competing ecosystems and expand the lens of industry architecture to Ecosystem Architecture to examine the rules, roles, and responsibilities involved. We find that incumbent firms rushed to embrace the metaverse in the hope of pre-empting disruption and safeguarding their competitive position, leading to over-investment. Greed among ecosystem orchestrators impeded contributors from creating value, while persistent technological shortcomings impaired the user experience. Our study throws new light on the dynamics of innovation and technology hypes and the challenges involved in cultivating and coordinating ecosystems.

KEYWORDS

Metaverse; industry evolution; hype; innovation dynamics; ecosystem architecture

JEL CLASSIFICATION

L1; L22; L23; L8; M3

1. Introduction

Only a few months ago, the metaverse was set to change everything. It was touted as the next internet revolution, poised to transform every aspect of our lives through unprecedented immersion in digital worlds with Goldman Sachs predicting in 2021 it would soon be worth \$12.5 trillion, Citi bidding the number up to \$13 trillion¹ and business executives proclaiming how it will change the world (Ball 2022). By creating a new ‘infrastructure technology,’ it would transcend traditional industries and change the way we shop, work, and connect with each other. During a frenzied period that peaked at the end of 2021, Pitchbook reported venture capital investment in the space hit an all-time high of \$16 billion as myriad firms flocked to invest in ‘the next new thing.’ However,

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¹See <https://www.goldmansachs.com/intelligence/pages/gs-research/framing-the-future-of-web-3.0-metaverse-edition/report.pdf> (p. 19) and https://www.citigroup.com/global/insights/citigps/metaverse-and-money_20220330 where Citi estimates that ‘the total addressable market for the Metaverse economy could grow to between \$8 trillion and \$13 trillion by 2030.’

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2022 saw a marked change in sentiment. By May 2023, Microsoft was announcing the closure of its virtual workspace platform AltSpaceVR. Disney shut its metaverse division, Decentraland, which despite being one of the most richly funded metaverse products could only muster around 38 daily active users (Thompson 2022). Meta's Horizon Worlds, meanwhile, announced layoffs soon after revealing it had fallen well short of the 500,000-user target set for the end of 2022 (Austin 2023).²

These dynamics are particularly fascinating because of the nature of the metaverse phenomenon. It is not merely a product or technology for which potential demand and acceptance has been misjudged, leading to a bubble and a crash (Goldfarb and Kirsch 2020). Like many recent technological advances, the metaverse is the creation of diverse ecosystems of co-specialised actors collaborating to bring a new technology to life (Adner 2017; Jacobides, Cennamo, and Gawer 2018). To understand its dynamics, we must consider the interactions among the orchestrators and complementors within that ecosystem, driven by the actions and decisions of incumbents and entrants. By extension, the recent history of the metaverse can help us better understand how such ecosystems are formed and evolve and what leads to their growth and relative decline.

In particular, in this paper we use the rich context of the development of the metaverse, which we had the opportunity to observe up close and in real time, to address three questions: First, why did powerful *incumbent* firms embrace this new way of doing business (Adner and Lieberman 2021) with such enthusiasm, despite end users being relatively lukewarm? Second, why did the metaverse fail to offer a valuable end-user proposition, despite such lavish investment? Finally, what do the broken promises of the metaverse tell us about what drives ecosystem failure?

Defining our term more precisely, we view 'the metaverse' as a collective term for a group of digital experiences built on shared digital worlds or virtual economies, individually known as 'metaverses.' Each metaverse typically depends on a technology or platform that is created, developed, and supported by an ecosystem of collaborating actors comprising orchestrators, collaborators, software providers, and end users. In order to analyse (each) metaverse as an ecosystem, we must map the various actors involved, the monetisation and incentives of the key players, and the rules, roles, and relationships that pertain to the division of labour – in other words, the structure akin to the underlying Industry Architecture (IA) (Jacobides, Knudsen, and Augier 2006), albeit, applied to a setting that moves beyond one sector, and describes relationships among webs of participants. This '*ecosystem architecture*' (EA) and its evolution allow us to understand what drove the dynamics that unfolded in the metaverse. Drawing on Bower's groundbreaking work (Bower and Gilbert 2005), we connect the decision-making criteria within firms to their decisions to invest and engage in the metaverse, along with the resulting ecosystem dynamics. Thus, we offer one of the few studies to map an ecosystem and its evolution in detail.

To provide a granular view of the metaverse ecosystem, we leverage exceptional access to industrial data, mixed methods (including real-time participation in key events), natural language processing, and interviews over a period of 18 months. Theories of disruption might predict that incumbent firms would shy away from potentially valuable

²Despite these setbacks, however, the rhetoric has arguably been overdone. The Metaverse may not have lived up to its fame but still has activity and promise as our [Appendix](#) suggests.

investments – for example, due to an obsession with current customers (Christensen and Bower 1996). However, in technological settings where ecosystem dominance is the prize, we find that incumbent kingpins rush to pre-empt disruption, for fear that new segments and products might ultimately usurp them. This leads to what so far appears to be *excessive* investment – and it is undertaken by incumbents rather than disruptive entrants. Our analysis thus extends the work of Adner and Lieberman (2021) and Adner (2021) by showcasing how incumbents’ broader incentives drive them to engage intensively with potentially disruptive complements. This crucial factor may explain their increasing longevity, as discussed by Birkinshaw (2022) and Jacobides, MacDuffie, and Tae (2023).

Turning to the decline of the metaverse, a key driver was the failure of the technology, particularly hardware (Augmented and Virtual Reality, AR/VR devices), to deliver a valuable customer experience, so users’ reality did not live up to the hype. We also find that orchestrators became too greedy – sometimes myopically so, aspiring to cement their own position through a gatekeeper arrangement that would net them up to 47.5% of the total revenues. Failing to energise complementors or appropriately account for the complementary technologies in AR/VR, they were content instead to engage incumbents with marketing budgets rather than final customers. Thus, our findings corroborate Jacobides et al.’s (2023) recent conjecture that *distributional* failures (such as those that transpired in hierarchical metaverse ecosystems) can lead to *functional* failures by imposing disincentives on complementors.

2. Theoretical background

Ecosystems are defined as groups of actors that must collaborate intensively to achieve a joint outcome. Over the last few years, scholars have taken an increasing interest in ecosystems and how their emergence extends our understanding of the dynamics within sectors. It is now understood that technological progress requires the coordination of multiple complementors, originating from different sectors and integrating different technologies. However, the record of such ventures is mixed (Adner 2017; Ganco, Kapoor, and Lee 2020; Jacobides, Cennamo, and Gawer 2018), with many failing to achieve their intended outcomes as a result of poor design or implementation (Adner and Euchner 2022; Candelon et al. 2023). Exploring potential explanations, research has documented the failure of firms to coalesce into a collaborative agreement, or a viable set of arrangements, and forfeiting the benefits of the shared technology as a result. Negotiations falter because parties hesitate to commit to a deal that might hinder their own domination in their core markets (Ozcan and Santos 2015). Incumbents are generally seen as less willing to support innovation, as they are more concerned with its competitive ramifications.

Maintaining this presumption that incumbents would generally be wary of change, the literature has considered how entrants would circumnavigate such an obstacle. Ansari et al. (2016) recount how TiVo, a digital video recording service that had the potential to substitute existing players’ offers, evolved to balance its desire to signal novelty and acquire customers with the need for complementors’ support. Snihur et al. (2018) document the development of Salesforce into the CRM market, looking at how it framed its offering in relation to incumbents such as Siebel and adjusted its business model to fit

their needs. Khanagha et al. (2022) show how Cisco framed Fog – potentially a substitute for both Cloud and Edge computing – as ‘another’ ecosystem, making it appear less of a substitute than it really was. Framing traditional players as incumbents and platforms as entrants, Cozzolino et al. (2021) examine the emergence of digital advertising platforms from the perspective of incumbents and consider whether their evolving responses are collaborative, competitive, or cooperative. This work takes the ecosystem structure as given and focuses on how actors manage around it, noting that incumbents’ response is ambivalent at best.

More recent work has brought more nuance to the notion of disruption. Adner (2021) and Adner and Lieberman (2021) note that the proliferation of ecosystems means that we must consider disruptive dynamics from the perspective of relationships between associated activities and products. They argue that while the theory of disruptive innovation, as promulgated by Christensen and Bower (1996), explains disruption in *substitutes*—i.e. new products, services, or technologies that can be used as alternatives to what the focal market offers – it cannot account for disruption in *complements*, i.e. systemic innovation through the emergence of new and more complex processes of production or consumption.³ Since complements might *enhance* the value of the focal market rather than eroding it, they might appear attractive to incumbents. And as Tripsas (1997) first noted, the emergence of new *connected* activities changes the value of those with complementary relations.

Thus, the question is whether complementary innovation enhances value or destroys it. For example, if ride-hailing (closely analysed by Teng & Jacobides, 2020) is seen as a complement to automobile production – Uber drivers need cars to drive – it might sustain the core market. However, the appeal of ride-hailing to end users might also dent the desirability of owning a car, raising the risk of value inversion. As such, incumbents may support or discourage complementary innovations on the basis of their evaluation of the likely repercussions in their own markets, which may or may not be accurate.

On the whole, this literature has not taken a bird’s-eye view of how complementary actors co-evolve and what drives their trajectories. Exceptions to this rule at Adner and Kapoor (2010, 2016) who consider the co-evolution of complementors in a specific sector, and how these populations affect each other and Adner (2021: Chapter 4) who stresses the importance of these interdependencies as drivers of success or failure. A paper focused on this topic is Jacobides, Brusoni, and Candelon (2021), who trace the evolution of Artificial Intelligence (AI). They argue that to understand new technologies that draw on complex ecosystems, we must properly map out their Ecosystem Architectures (EA). They also show that this architecture may differ consequentially between countries and create new winners and losers. They further point out that in order to understand ecosystem evolution, we need to extend the original tenets of IA

³Note that the origins of Christensen’s theory of disruptive innovation are in Bower’s work on resource allocation, as Christensen notes that successful firms follow the desires of their clients. Hence, they will inevitably *underinvest* in potentially promising, rapidly improving but as yet untested technologies, only to regret their (short-term rational but strategically myopic) inaction later. Adner’s (2021) research focuses on the decision processes within firms, but its focus is on *framing*, i.e. management’s ability to understand the evolution of the competitive landscape. Adner and Lieberman (2021) do not consider dynamics within existing firms, and Adner (2021) is not concerned with *excessive* investments in innovation such as the ones we witnessed in the metaverse. The focus of existing work such as Adner (2012, 2021) or Adner and Kapoor (2010, 2016) has been on investment which proves excessive *ex post facto* because the complements needed had not been in place – a theme we will explore.

research (Jacobides, Knudsen, and Augier 2006) to encompass the rules, roles, and relationships that emerge in the context of sectors that comprise multiple overlapping ecosystems. They suggest that change, whether disruptive or not, must be understood in the context of the focus, interests, co-specialisation, and governance of ecosystems that both collaborate and compete.

Jacobides et al. (2023) expand on this view by suggesting that ecosystems arise as a response to externalities that cannot be resolved by existing structural forms (be they integrated markets or supply chains), and articulate the coordination mechanisms and governance tools that operate in platforms and ecosystems. They also suggest that the very features that underpin the creation of ecosystems also sow the seeds of their inherent problems and focus on two potential issues of governance that emerge. They conjecture that ecosystems – especially those that are run in a more open, participative, and decentralised way (Hsieh and Vergne 2023) – suffer from *functional* failures, i.e. their structure prevents them from living up to their promise due to the complexities of coordination. Ecosystems that are more hierarchically run, meanwhile, are afflicted by *distributional* failures, either because they offer the wrong incentives or because the orchestrator can (and does) abuse their dominant position.

Relatedly, the rapidly growing literature on platform and ecosystem competition (Jacobides and Lianos 2021b; Rietveld and Ploog 2021; Rietveld and Schilling 2020) highlights the risk that relationships between ecosystem participants are abusive or one-sided, with orchestrators capturing the lion's share as their ecosystems succeed. This work has also identified the role of 'multi-product ecosystems' (Jacobides 2022), suggesting that ecosystem firms broaden their boundaries to ensure they cement their power over customers and thus also complementors (Gawer 2022; Jacobides, Cennamo, and Gawer 2023). This tendency has been shown to be a significant driver of the surprising resilience of incumbents (Birkinshaw 2022), and explains why incumbents are so proactive with many new technologies (Jacobides, MacDuffie, and Tae 2023).

In all, there is a convergence of interest in how sectors with complementary sets of firms that form one or more ecosystems co-evolve, and how the dynamics of disruption unfold within them. While the literature has broadly focused on incumbents' conservative bias, interest is growing in the role played by ecosystem rules and roles. This makes a study in an evolving ecosystem such as the metaverse particularly attractive, since we can consider, first, how ecosystem relationships drive aggregate dynamics, and second, the relationship between incumbents and new technologies.

3. Methodology and evidentiary basis

We were fortunate to be uniquely well positioned to track 'history in the making' and observe the protagonists of large-scale change. We used a mixed-methods approach drawing on archival sources, expert interviews with executives, and analysis of reports and web-scraped data. Our use of the data sources was iterative and focused on obtaining a better understanding of our context.

First, we conducted a thorough review of academic literature, business magazines, and news articles, in line with recommendations for conducting systematic literature reviews (Tranfield, Denyer, and Smart 2003). We then consulted reports from Forrester, BCG, Deloitte, JP Morgan, CitiBank, McKinsey, and Credit Suisse as well as experts in the field

including Herman Narula, Quharrison Terry, and DJ Skee. This gave us a solid understanding of the current state of research and industry discussions around the metaverse.

We also participated in a number of metaverse-related events, including the Web Summit in Lisbon, to discuss perspectives and strategies with industry experts. Finally, the first author participated in the World Economic Forum's Metaverse Governance Working Group from March 2022 to June 2023 (see WEF, 2022, 2023). This group comprised 56 executives, drawn from various relevant fields, who were tasked with preparing reports (on interoperability and standards). The members met every month for multi-stakeholder dialogue, while working groups focused on the evolution and governance of the metaverse, affording us a direct window into the dynamics of sectoral sense-making and convergence as well as policymaking.

We also conducted expert interviews to gain first-hand insights from diverse perspectives. Specifically, we conducted 27 semi-structured interviews from November 2022 to April 2023 with experts and upper-level managers across the metaverse. Our choice of interviewees evolved in parallel with our mapping of the sector, while the topics were chosen based on participants' profiles. The key themes that we explored were:

- (1) Companies' reasons for making the move to the metaverse so early, even though it was unproven
- (2) The key areas for value creation perceived by firms, both B2C and B2B
- (3) Firms' perspectives on the hardware (AR/VR) for immersive metaverses and software (content) available across both immersive and web3 metaverses and how each enabled (or hindered) the end user's experience
- (4) The reasons for the metaverse's decline, and what strategies were deployed during the 'metaverse winter.'

We aimed to balance interviewees' accounts of their own organisations' perception with that of the external environment and other actors, so as to reduce potential bias and generate new hypotheses. While we aimed for convergence, we were also inspired by source scepticism (Bucheli and Wadhvani 2014), meaning that each actor did not necessarily possess a part of 'the truth' that had to be triangulated no matter what; rather, they each expressed a particular vantage point that was potentially subject to implicit or explicit biases. Thus, we leveraged the methodological orientations of business history more than those of qualitative research. [Table 1](#) lists our interview participants.

Additionally, to provide a complementary quantitative angle, we conducted Natural Language Processing (NLP) analysis on public speeches from top executives in the industry, industry white papers, press releases, and CEO interview scripts from Meta, Microsoft, Axie Infinity, The Sandbox, and Roblox. Based on this analysis, we identified the 15 most frequently occurring words that each company used to describe platform owners' engagement with the metaverse – a common technique for summarising the main themes in a corpus of text (Jacobi, Van Atteveldt, and Welbers 2016). We used this approach to document these firms' different views of the metaverse and our own understanding of how they perceived their roles within it.

Returning to sector-level dynamics, we also examined keyword prevalence in metaverse articles and conducted NLP analysis on reports from Top 10 Wall Street equity research firms to gather insight on investment recommendations and valuations 2 weeks prior and 2 months

Table 1. List of interview participants.

Role	Company
Product Manager	Meta Reality Labs
Former Brand Partnership Manager	Roblox
Former Esports & Gaming Lead	Nike
Digitalisation Strategy Manager	BMW NEXT
Former Head of Sustainable Innovation	Kering Sa
Former Director, Strategic Partnerships	Nike
Former Senior Consultant	Weplay Consulting
Game Operation Director	Mihoyo
Former policy risk expert	Bytedance
Former interim CTO for XR	Walmart
VP metaverse ventures	Gucci
Head of digital transformation	Siemens mobility
Former COO	STRIVR
Head of Digital Transformation	Bayer
VP of B2B marketing	Agate International
Lead Corporate Foresight	Swiss Re
CEO	Spring Studios
CEO	Le Printemps
Strategy Expert	Tencent
Gaming Strategy Expert	ByteDance
Live streaming Strategy Executive	ByteDance
Managing Director and Partner, Luxury Goods and Fashion	BCG
Knowledge expert	BCG
Senior Knowledge Analyst, Metaverse	BCG
Senior Venture Architect, BCG X Ventures	BCG
Senior Knowledge Analyst, Industrial metaverse and IoT	BCG

post-major events. We further analysed public sentiment in Google search trends and posts on Twitter (now X) reacting to major metaverse events such as Facebook rebranding to Meta, Gucci launching in Roblox, Nike acquiring RTFKT, and Microsoft partnering with Meta. We analysed over 200k tweets in total and recorded the total percentage of positive and negative keywords in the period leading up to and shortly after the actual event. These data showed how positive sentiment among incumbents, investors, and marketers differed drastically from end users' neutral or negative sentiment towards similar events, supporting the argument that value creators led a hype that value consumers did not share.

Overall, our mixed-methods approach – integrating literature review, interviews, report analysis, web data scraping, and natural language processing – facilitates iterative data comparison and is consistent with the principles for developing grounded theory (Charmaz 2014; Glaser and Strauss 2010).

4. Our setting: a brief history of the metaverse and its key actors

4.1. A brief history

The term 'metaverse' was coined by science fiction writer Neal Stephenson in his 1992 novel *Snow Crash* (Stephenson 1992), in which he imagined a fully immersive, 3D virtual world where people could interact through avatars. However, the idea of virtual worlds had originated even earlier with Morton Heilig's 1955 'Sensorama,' a theatre experience designed to interact directly with all five of the audience's senses (Heilig 1992). Following this, a team at MIT worked on 'Sword of Damocles,' the first head-mounted display system (Stanford 2011), and 1978 saw the first computer-based virtual world experience, Multi-User Dungeon (or

MUD1). Over time, the term ‘metaverse’ has expanded to encompass broader notions of interconnected virtual spaces, augmented reality, and almost any shared digital experience.

In the early 2000s, metaverse-like experiences became popular with the release of *Second Life* and *Roblox*, which allowed users to create and customise their own virtual worlds. Subsequent advancements in AR/VR technology continued to generate excitement among both consumers and industry. Popular interest was confirmed by Ernest Cline’s bestselling sci-fi novel *Ready Player One* (Cline 2011), which depicted a full-fledged virtual world and was later adapted into a blockbuster movie.

In 2014, Facebook acquired the VR company Oculus for \$2 billion, stating that they were investing in the ‘platforms of tomorrow.’ Shortly afterwards, HTC launched the Vive, a consumer VR headset, in collaboration with Valve Corporation, developer of hugely popular videogame series such as *Half-Life*, *Portal*, and *Dota*.

Following Facebook’s move, tech giants such as Microsoft and Nvidia also started investing in metaverse solutions, with Magic Leap One first showcased in 2018, Microsoft launching the HoloLens 2 in 2019, and Nvidia launching Omniverse in 2021. Around this time, NFTs started becoming a popular method of monetisation, with Axie Infinity popularising play-to-earn gaming using NFTs.

These early investments in platform and hardware development were motivated by a fear of missing the opportunity to monopolise business models – a dynamic that had also played out with Apple and Android in the app store ecosystem. By positioning themselves at the forefront of the metaverse, tech giants aimed to achieve customer lock-in and shape user habits, much as Amazon has done in ecommerce.

However, 2021 saw the hype explode in earnest. Facebook rebranded as ‘Meta’ with the goal of bringing the metaverse to life. Venture capital and private equity investment leaped from \$586 million in 2020 to \$16 billion in 2021 (Pitchbook, n.d.). In August 2022, Gartner’s hype cycle (Insights 2022) placed the metaverse on the cusp of the ‘peak of inflated expectations’ and predicted that by 2026 a quarter of us would spend at least an hour a day in the metaverse, whether for work, shopping, education, or entertainment. Companies such as Citi Group foresaw incredibly lucrative opportunities, as laid out in their report (Citi GPS: Global Perspectives & Solutions 2022) predicting that the metaverse could be a \$13 trillion industry by 2030.

Fashion brands whipped up the frenzy still further by investing in branded virtual experiences to cash in on media coverage and lock in customers. Seeing the metaverse as a key sales channel in the future, and as a way to understand GenZ and GenA segments more deeply, they aimed to kick-start the time-consuming process of building internal capabilities right away. They also hoped to prevent disruptive tech companies from displacing their legacy brands by taking complete control of the new business models of the metaverse.⁴

Web3 and NFT hype, generated largely by individual creators and brands, fuelled the excitement still further. In December 2021, Nike announced the acquisition of RTKFT to deliver next-generation collectibles into the metaverse, while Adidas (2022) launched its first NFT project into the metaverse in collaboration with BAYC and PUNKS in 2022. The timeline of key events is summarised in Figure 1.

Towards the end of 2022, however, enthusiasm began to wane. Venture capital and private equity investment dropped to ~\$6 billion in 2022 (Pitchbook, n.d.). By September, NFT sales

⁴Based on interviews with multiple companies including Walmart and Gucci.

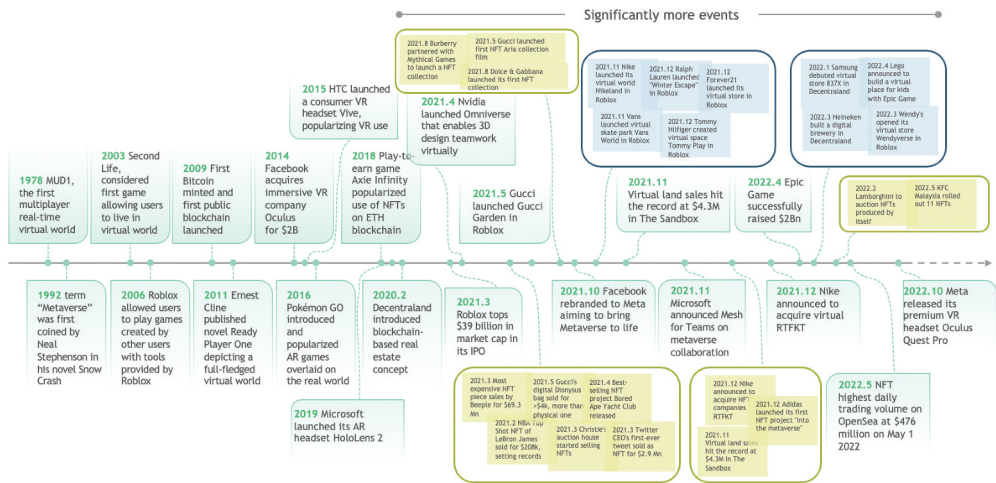


Figure 1. Timeline of metaverse history and key events.

had dipped to just \$466 million from a January high of \$17 billion, according to data from Dune (2021). In addition, multiple companies cancelled metaverse initiatives. Microsoft announced it was closing its virtual workspace platform AltSpaceVR in January 2023 and laid off 100 people (Roth 2023). Disney shut its Metaverse division in March 2023, while Walmart ended its Roblox-based Metaverse project shortly afterwards (Monteros 2023). Finally, Meta’s Horizon Worlds announced layoffs soon after it was revealed they had fallen significantly short of the 500,000-user target set for the end of 2022 (Zitron 2023). A complete list of press sources referenced in the article can be found in Table 2.

Table 2. Press Sources.

Article	Author
It’s Lonely in the Metaverse	Thompson (2022)
Metaverse Digital Social Responsibility	Candelon et al., (2023)
Gartner’s hype cycle	Insights (2022)
Citi Report	Citi GPS: Global Perspective Solutions
Dune Analytics	Dune (2021)
Microsoft announcement	Microsoft, 2023
Walmart announcement	(Monteros 2023)
Meta’s Horizon Worlds	Zitron (2023)
NVIDIA	NVIDIA (2023)
Top 5 brands with NFT revenue	METAV.RS
Forbes	Brown, 2020
Metaverse Fashion Week	Mvfw.org
Vogue Business	Vogue, 2023
And the winner of Metaverse Fashion Week 2023 is...	Sander Lutz, 2023
Social Media Giant Snap disbands	Napolitano (2022)
Disney’s Metaverse reportedly cancelled	Francis (2023)
Why you feel motion sickness during virtual reality	Kim (2019)
Samsung, Google, Qualcomm mixed-reality	Mehta (2023)
Microsoft industrial metaverse team set to fold	Ghoshal (2023)
Apple unveils \$3,500 Vision Pro set	Spangler (2023)
World Economic Forum	Campos, 2023
AI will accelerate Metaverse	Velasquez, 2023
Gartner’s latest hype cycle	Insights (2022)
JP Morgan Metaverse report	JP Morgan (2022)
Apple Pro R&D costs	Pooley, 2023
Meta metaverse spend	Mann, 2022
Metaverse investments	Myakin, 2022, 2023 updates
Roblox creators economy	Levy, 2021

4.2. Ecosystems, actors, rules, roles, and relationships in the metaverse

The metaverse is a shorthand for a set of partly overlapping and partly competing technologies and ecosystems that combine to create digital experiences for a wide variety of users and use cases. These technologically enabled value propositions depend on the contributions of a combination of players, some complementary, and some competitive. A comprehensive list of use cases can be seen in Table 3.

Table 3. Summary of use cases in the metaverse.

Use Case	Examples	Target Audience
Sell & trade virtual goods	<p>Nike sold \$185 million of digital wearables (NFTs) in 2022 through RTKFT partnership and launch of Swoosh studio</p> <p>\$25.6 million via NFT sales with Collezione Genesi event being one of the biggest events in fashion NFT history</p> <p>Gucci launched Gucci Town inside Roblox. Gucci's most expensive NFT sold for the equivalent of more than \$3700, and Gucci Town boasted over 33.4 million visits as of end of 2022</p> <p>Adidas partnered with Bored Ape Yacht Club for their virtual goods collection, which proved successful on primary and secondary markets</p>	B2C
Virtual events and activities	<p>Travis Scott's virtual concert in <i>Fortnite</i> earned him \$20m, according to Forbes (Brown, 2020)</p> <p>Decentraland hosted Metaverse Fashion Week in 2022 & 2023, which brings together hundreds of brands and community designers including Dolce & Gabbana, DKNY, Vogue Singapore to create an online fashion event</p> <p>Heineken launched the world's first 'virtual beer' with their virtual brewery in Decentraland—a virtual environment for customers to meet up (Broomfield, 2022; mvfw, 2023: 2). H&M developed a virtual showroom for new collections, while H&M Philippines hosted a virtual concert with pop group BGYO. Concertgoers from 61 countries attended the event, with merchandise selling out within 15 minutes</p> <p>Vans launched 'Vans World' in <i>Roblox</i> to bring skateboarding, fashion, and community together in a 3D space</p>	
Play-to-earn games	<p><i>Axie Infinity</i> is a platform where players can breed and fight teams of creatures</p> <p><i>Sorare</i> raised a \$680 million Series B round, it has partnerships with 300 clubs and leagues around the globe, and announced a four-year partnership with the UK Premier League in January 2023</p>	
Collaboration	<p>Microsoft's Mesh enables organizations to give customers an immersive new way to connect through avatars and spatial audio accessed through PC, Mac, or VR headset</p> <p>Meta also launched VR headsets and tools for virtual collaboration. In a survey of more than 1000 employees, 72% of respondents that that it would be exciting to incorporate VR into their working lives</p> <p>VR Chat users interact with each other as 3D character models, create worlds using the Unity SDK, and customize avatars.</p>	B2C & B2B
Training	<p>Bank of America (Bank of America, 2021) first in its industry to launch a VR training program to nearly 4300 financial centers</p> <p>Walmart (Incao, 2018) also embraced VR training at their Walmart Academies nationwide and rolled out Oculus VR headsets</p> <p>Bohemia Interactive Simulations (Bohemian Interactive Simulations, n.d.) is a global training and simulation software company for defense and civilian organizations</p> <p>FLAIM Trainer (Flaim, n.d.) is the world's first technology to offer immersive firefighting training solutions using high-fidelity, multi-sensory virtual fire environments</p>	B2B
Digital Product Development	<p>Siemens and NVIDIA (Siemens, 2022) partnered to support industrial metaverse use cases by combining Siemens' industrial automation software with NVIDIA's graphics and AI.</p>	

Within the metaverse as a whole, we can discern two distinct types of ecosystem:

- (1) **Immersion-focused ecosystems** rely on advances in AR, VR, and mixed reality (MR) to provide immersive experiences for a variety of B2C use cases (such as productivity tools) and enterprise tools (such as immersive training). These ecosystems are usually created and directed by strong ecosystem orchestrators.
- (2) **Web3-focused ecosystems** rely on blockchain technology to build decentralised, functioning economies where users can create, own, buy, and sell digital assets and services. These ecosystems are generally more open and interoperable.

Both types of ecosystems comprise four key groups of players: orchestrators/platform owners, contributors, software providers, and end users, as seen in [Figure 2](#).

Orchestrators/Platform Owners: Platform owners are responsible for providing and maintaining the underlying infrastructure that enables users to interact, create, and engage within the virtual environment.

To explore how internal dynamics between platform owners and other players unfold, we focus our analysis on six leading platform owners: three focused on immersion and three focused on web3. They are:

Meta (formerly Facebook): An immersion-focused platform owner who has committed significant resources to building comprehensive virtual experiences through their VR Meta Quest headsets and Horizon Worlds virtual universe, where both enterprise users and consumers can connect, collaborate, play games, and attend virtual events.

Microsoft: An immersion-focused platform owner focused on enterprise use cases such as collaboration, training, and industrial applications through MR HoloLens hardware, Mesh for virtual collaboration, and partnerships with other platform creators such as NVIDIA to create digital twins.⁵ (Nvidia 2023)

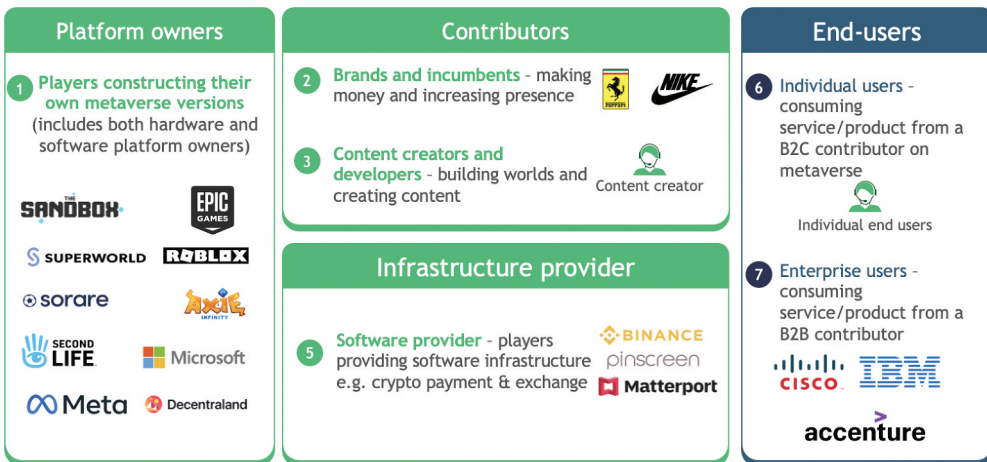


Figure 2. Actor map in the metaverse.

⁵Digital twin' refers to a virtual representation of the real world within the metaverse, mirroring physical assets, processes, and systems to improve efficiency of product development through enhanced analysis and simulation.

Roblox: A gaming platform targeted at a predominantly younger audience that allows users to create and play games in the virtual world. It uses ROBUX digital currency for in-game purchases and trading of digital goods. However, since these assets exist solely within Roblox, it is not, strictly speaking, a web3-enabled virtual world. (Ibrahim 2022)

Decentraland: A web3 platform that allows users to create, own, and monetize digital assets primarily through virtual real estate, events (Metaverse fashion week), and gaming (Decentraland casino). The platform is powered by the MANA token, which is used to buy and sell digital assets in the metaverse.

The Sandbox: A web3 platform that allows users to create, own, and monetize digital assets primarily through gaming and entertainment. The platform is powered by the SAND token, which is used to buy and sell digital assets in the metaverse.

Axie Infinity: A web3 play-to-earn game where players can breed and battle creatures (known as ‘Axies’), collect AXS tokens, and build a digital kingdom for their Axies to inhabit.

Contributors: Contributors form the creative backbone of the metaverse, generating the content that brings the virtual worlds to life. At one end of the spectrum, commercial brands such as Nike, Gucci, Heineken, and Adidas are exploring ways to monetize the metaverse by selling virtual goods or providing branded experiences. At the other extreme, individual developers and content creators contribute by building digital assets, designing virtual spaces, or even creating entire virtual worlds. In return, they receive rewards for users engaging with the experiences that they build.

Software providers: These companies offer tools and platforms that support the creation and operation of the metaverse. Examples include financial tech companies that provide blockchain and cryptocurrency solutions for metaverse transactions and companies such as Matterport that provide technology for creating digital twins of real-world environments.

End users: End users, the ultimate beneficiaries of the metaverse, can be categorised into individual consumers and enterprise users. Consumers engage through gaming, socialising, shopping, and learning, and some can even earn through play-to-earn models. Enterprise or B2B users leverage the metaverse for remote collaboration, training, and product design.

Together, these players enable digitally immersive experiences that either enhance their owners’ existing physical propositions – as with Microsoft’s suite of virtual collaborations and digital twin tools – or form entirely new and self-contained digital ecosystems, as with Axie Infinity or Roblox, as seen in [Figure 3](#).

4.3. A tale of contrasting visions

To break down where each player fits within the metaverse, we investigated the ‘visions’ of five key platforms (Meta, Microsoft, Roblox, The Sandbox, and Axie Infinity) to understand their positioning and value propositions. To do so, we used Natural Language Processing (NLP) to determine the frequency of different words in these platforms’ recent Clevel announcements and white papers.

We found that Microsoft was firmly focused on immersive experiences, primarily on collaboration and productivity aspects (team, people, and meetings), with a strong

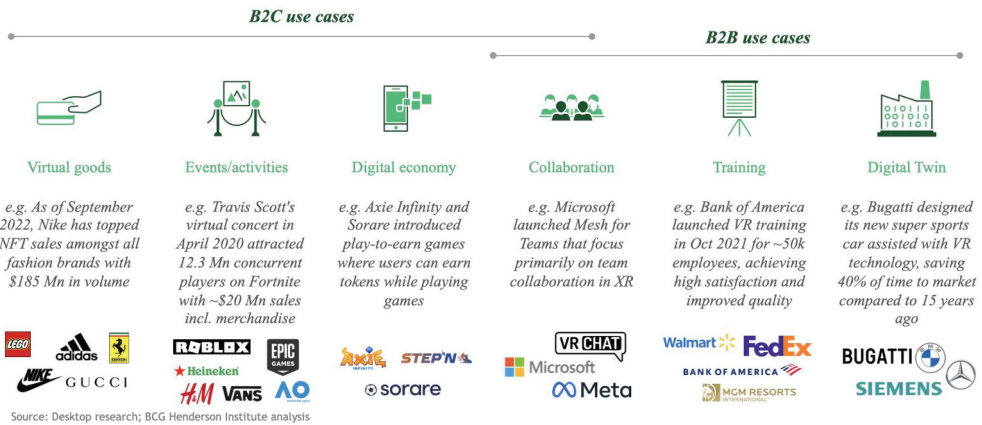


Figure 3. B2C and B2B uses for the metaverse.

emphasis on technology capabilities to enable this (avatar, holographic, etc.). Roblox’s focus was on social communication capabilities, with ‘communication’ and ‘community’ appearing most often. The Sandbox was focused more on building web3 ecosystems powered by users owning digital assets, with ‘asset’ and ‘token’ both appearing frequently, while the prevalence of ‘game’ spoke to its core mechanics. Finally, Axie was firmly focused on a closed gameplay universe, with ‘game,’ ‘player,’ and ‘earn’ appearing most often.

This analysis was particularly revealing in the case of Meta, and perhaps indicates one reason for its downfall. The highest frequency words were ‘metaverse,’ ‘people,’ and ‘build.’ Whilst the other platform owners’ visions and value propositions are clearly reflected in their top terms, Meta’s has struggled to articulate precisely what the metaverse really means, trying to be multiple things to multiple audiences. These word-frequency analyses are illustrated by the word clouds shown in Figure 4.

These marked differences in interpretation actually constituted a source of advantage for players who wanted to be seen as parts of a large and growing market. In this regard, analysts’ impressive figures for the ‘Total Addressable Market’ (TAM) ignited growth expectations, with Citi claiming in a March 2022 report that the metaverse could be



Figure 4. Orchestrator description of the metaverse.

worth \$13 trillion by 2030 (Citi GPS: Global Perspectives & Solutions 2022) and JP Morgan estimating the market opportunity at over \$1 trillion in yearly revenues (Morgan 2022). This triggered the ‘Fear of Missing Out’ (FOMO) that seems to be characteristic of both equity markets and capital sources for ventures, and PE has merely accentuated the trend. The same goes for listed firms, which need to show that they are moving to preserve their growth dynamic, since this is what drives their Price/Earnings ratios and as such their valuations. Moreover, some incumbents’ traditional business had stagnated – for the first time in its history, Facebook lost about half a million daily users in Q4 2021, suggesting global saturation – so they were betting on the metaverse being the next growth engine.

5. Understanding the excessive excitement and subsequent disillusionment

5.1. Explaining excessive excitement with a new ecosystem technology

Our analysis so far has explained what the metaverse is, the Ecosystem Architectures of the multiple, partly intersecting ecosystems that are needed to support it, and how existing actors engage within it. We now turn to the question of why the metaverse was so richly funded and enthusiastically supported by firms and investors alike – and why it did not quite live up to their expectations.

Early on, the metaverse attracted a wave of support from various factions: Meta and Microsoft looking to establish their dominance, traditional businesses looking to expand their brand reach, and open platforms like The Sandbox and Decentraland creating digital economies. Existing actors clearly saw all these offerings as *complements*. For retailers, the metaverse was a new sales channel; for programmers, a new area to create revenue-earning products; and for advisors, a way to generate new business. As one executive at a major retailer told us, ‘The majority of players, whether tech or non-tech, believed in moving into the metaverse early because they were afraid of being displaced . . . these players are normally leaders in their sectors and want to protect their leading position.’

For their part, tech giants, incumbents, and PE firms also invested heavily in the metaverse. Big Tech firms poured funding into building hardware and underlying platforms. Their strategy was to exert their dominance by building and controlling access points into the metaverse, then migrate their users over. Meta put over \$36 billion into Reality Labs, while Microsoft is estimated to have invested over \$1 billion into HoloLens and its planned \$69 billion acquisition of Activision Blizzard is another investment into gaming and the metaverse. In addition, Google’s AR headset team comprised almost 300 people, with likely investments of around \$3 billion, alongside an investment of \$39.5 million in a private equity fund for metaverse projects. Apple has put an estimated 20% of its \$100 billion R&D budget into developing its Vision Pro MR headset. Samsung, HTC, and others also invested undisclosed (but likely large) amounts.

In contrast, the web3 metaverse was supported largely by VC funding, driven by speculation that digital assets would power the next wave of the internet. NFT marketplace Opensea raised \$13.3 billion, metaverse company Improbable closed a \$150 million funding round, Yuga Labs (creator of BAYC) raised \$450 million, The Sandbox received funding of almost \$400 million, and Andreessen Horowitz launched Games Fund One,

which put \$600 million into gaming and metaverse infrastructure. With NFTs selling for record prices, every investor wanted in, conforming to expectations of technology bubbles (Goldfarb and Kirsch 2020).⁶

The level of funding indicates clear excitement across a broad range of groups, all interested in shaping the metaverse around their own needs. This was echoed by corporate sentiment towards the metaverse, especially within marketing departments. Nike acquired RTFKT; Disney, Snap, and others invested heavily in building internal metaverse teams and capabilities; and LEGO invested in Epic Games – all with a view to exploiting the metaverse as a new sales or marketing channel. According to Foresters Q1 B2C Marketing CMO Pulse survey in 2022, 77% of U.S. B2C marketing executives were keen for their brand to explore possibilities within the metaverse, while 76% planned to invest some of their marketing budget in metaverse-related activities. This eagerness could also be explained by incumbents' perceptions of the ease with which the metaverse could be monetised, and the lack of appreciation of the need to create a robust ecosystem of complementors, as noted by Adner (2012: Ch 2, 2021: Ch, 4), and Adner & Kapoor (2016).

The metaverse gives companies an opportunity to improve their image both externally and internally. As such, internal processes, rather than slowing down the use of an innovation (Christensen and Bower 1996), may serve to expand engagement in that innovation beyond what would be useful for the firm itself but still be consistent with the objectives of local decision-makers; hence, resource allocation (Bower and Gilbert 2005) might lead to over-investment. Externally, companies can project an image of being innovative, attracting younger generations through branded metaverse content. Nike, for instance, used the metaverse to build a tech-savvy image, resulting in higher innovation ratings from younger customers. This is supported by interviews with industry experts. One VP at a luxury retailer said they were 'constantly creating different ways to engage customers . . . kids are spending many hours in metaverse platforms, so it is the very place to establish interaction with them.' Internally, embracing new technology can also boost employee satisfaction. Research suggests a positive correlation between innovation and employee performance (Osman, Shariff, and Lajin 2016).

Thus, when we examine the motivations of various players, it is easy to see how tech giants were became excited about the possibility of building (and owning) the next iteration of the internet, investors were excited by the prospect of significant returns from their bets on web3, and incumbents were excited by the ease with which they could experiment and reach new audiences.

5.2. The rubber meets the road: explaining how the metaverse deflated

Despite corporate excitement, end users' reactions were more mixed, as evidenced by consumer surveys and sentiment analyses, as seen in Figure 5. In Foresters' 2021 consumer energy index and retail pulse survey, only 35% of U.S. consumers were excited about the metaverse, while just 29% felt that it would be good for society. Technological

⁶Although not as significant, venture capital funding also backed companies in the immersive B2B training space. Activ Surgical (specialist surgical platform) has received \$100 m to date and Strivr (VR training platform) closed a \$35 m funding round. The industrial metaverse has received significant funding, with companies like NavVis (leader in digital twins) raising almost \$100 m to date and Physna (3D geometric search) raising \$85 m.

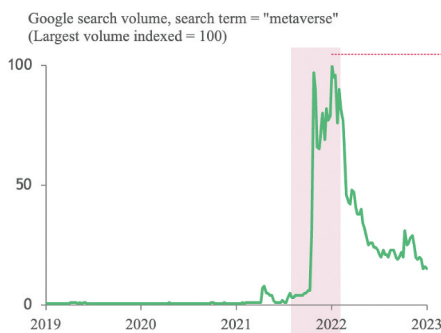
shortcomings were undoubtedly a factor, as the VR/AR experiences on offer failed to deliver against expectations. In addition, according to our sentiment analyses of Twitter posts, the public expressed more neutral or negative sentiments towards major metaverse events compared to the underlying technology itself. For instance, overall sentiment towards Meta’s rebranding was negative, and based on Google search volumes, the metaverse has attracted significantly less attention since Q2 2022. This shows that although marketers were excited by the opportunity, drawn in by the low cost of entry and the potential to reach new audiences, the users themselves had much less enthusiasm, highlighting the clear gap in value creation and consumption between marketers and consumers.

For further evidence, we can take an event that marketers were excited about – Decentraland’s Metaverse Fashion Week 2023—and look at the disappointing user engagement figures it achieved. According to metaverse analytics firm GEEIQ (Lutz 2022), the event attracted fewer than 9000 unique visits – a 92% drop-off from the previous year. We have also witnessed prominent brands announcing that they have shut their metaverse divisions – like Disney (Francis 2023), who shut their division as part of a wider cost-cutting drive within the company that entailed 7000 layoffs. A similar story unfolded at Snap (Napolitano 2022), who paused their metaverse plans as part of announcements that they were laying off 20% of their workforce, signalling that when market conditions get tough, the metaverse is no longer a priority.

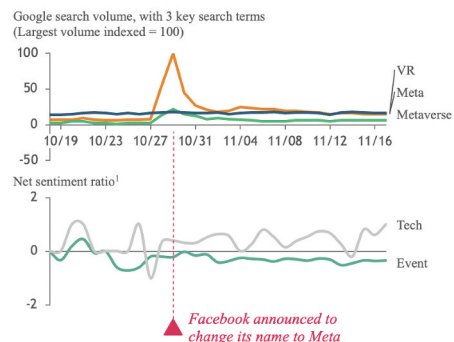
Immersion-based players faced a similar plight. In February 2023, Microsoft announced that it was laying off all 100 workers from its industrial metaverse division as part of a company-wide reduction of 10,000 employees (Griffith 2023). In March 2023, the firm went on to announce the closure of its virtual workspace platform AltSpaceVR due to a lack of funds (Roth 2023). Meta also announced 11,000 layoffs across multiple divisions, including Reality Labs (Wheeler 2022), as it announced that it had fallen significantly short of its 500,000 user target set for the end of 2022.

This disillusionment has several dimensions, which differ depending on the ecosystem type. The first and most fundamental reason for the lack of adoption of immersion-

Public attention to metaverse was largely drawn by Facebook rebranding itself to Meta during Oct 2021



Public sentiment remained negative despite "hype" generated by Meta seen from Google search



1. (Positive # - Negative #) / (Positive # + Negative #)
Source: Google, BCG Henderson Institute analysis

Figure 5. Public interest in terms of the metaverse.

focused ecosystems is that VR technology, and specifically hardware, is developing more slowly than expected and hindering the user experience. This is a failure of the ecosystem of complementors to provide something that ‘works’ from the end user’s perspective (Adner and Lieberman 2021; Kapoor and Adner 2012) – even though this is likely to change soon. Users have complained about the ‘clunky’ and ‘heavy to wear’ headsets; the software is known to commonly cause dizziness and nausea (Kim 2019); and limitations in rendering tech and balancing performance with cost have caused effects such as limited facial expressions – to name just a few of the commonly cited problems with the technology.

Our interviews supported this finding, with lagging hardware development often cited as a reason for disillusionment with the metaverse: ‘VR devices are heavy, and without applications like smartphone, people can’t do much within it’ (Head of Digital Transformation, industrial firm); ‘Overall, the tech development is not there yet’ (CTO, industrial goods company). This was also experienced first-hand, as BCG conducted joint collaboration sessions with a number of partners in the metaverse. In collaborative use cases, one limitation of VR is that it disregards participants’ body language, making the experience less immersive than existing digital channels. One partner explained that the meetings did not work due to the ‘VR headset and lack of body language in the avatars.’ While Meta, Microsoft, and others invested heavily in creating a superior product to become the ‘prime mover’ of an ecosystem that was hard to replicate (Jacobides 2019), the strategy still proved difficult to execute. The collaboration between Meta and Microsoft in October 2022 sought to tackle such issues, but progress has still been slow, and subpar experiences have caused many users to abandon immersion-based experiences, allowing the alternative web3 metaverses to gain greater traction.

Another key topic is limited interoperability, which is particularly relevant in web3 ecosystems. Publicly, all involved agree that interoperability is crucial as it enables multiple metaverses from different creators to be connected. However, since this requires a great deal of coordination, there is a question mark over whether some key players will want to get involved – or even whether the aim is feasible at all. For some ‘walled garden’ metaverses, certain incentives can obstruct full interoperability. For example, Meta is even reluctant to allow developers to build within their metaverse, deterring those who might create a more immersive experience.

Another factor is the risk of strong orchestrators establishing terms of trade that are highly favourable if not exploitative (Jacobides and Lianos 2021b). For instance, as we have seen, Axie Infinity employs a play-to-earn model to keep players engaged. Creators can sell assets in the marketplace for a nominal fee (4.25%), while the platform profits from transaction and entry fees (Bautista 2022). In contrast, Horizon Worlds imposes a steep 47.5% fee on creators (Wodecki 2022), which could be contributing to its sluggish adoption rate: fewer than 1% of users engage in world creation (Benjamin 2022). Other open platforms keep fees low to encourage developers. For example, fees of 5% and 2.5% are applied to transactions in The Sandbox and Decentraland, respectively (Hickey 2022), implying that low fees are necessary to drive adoption. As one expert noted, ‘Monopoly is in the DNA of Facebook . . . but it is unlikely that Meta could monopolize like they did in social media.’ A particularly interesting case study here is Roblox, which has one of the most active developer communities. In 2021–2022, creators reportedly earned over \$1bn

on the platform – up 164% over the previous 2 years. As Roblox asserts on its website, ‘We exist to serve and not compete with our community.’⁷

Finally, we must also consider the wider market conditions and pinpoint the watershed moments that precipitated the fall of the metaverse. Use cases for web3 metaverses were largely driven by highly speculative valuations of digital assets (native tokens and NFTs), making them susceptible to bubble dynamics and impeding collaboration and focus on end-uses. From May 2022, as the value of the cryptocurrency market began to plummet, the value of NFTs also declined at speed. The collapse of FTX in November 2022 prompted even steeper falls. In terms of the immersion-focused metaverses, 2020–2022 had seen an abundance of spending driven by low interest rates. Combined with the Covid pandemic and a desire to create better digital experiences, it made for a perfect storm of investment. However, 2022 and 2023 saw interest rates rise and a new focus on efficiency over innovation. This, combined with the rise of Generative AI, saw many companies switching their spending to the next new trend. However, as the [Appendix](#) suggests, we believe that the metaverse is not quite as dead as some reports suggest, and we expect it to rebound as the AR/VR technology improves and more use cases emerge.

6. Discussion and conclusion

We have traced the meteoric rise and rapid fall of the metaverse and used the story to explore ecosystem dynamics and the nature and agency of disruptive change. Our rich data and immersion in the process has allowed us to provide a detailed, granular view that shows that what might initially appear to be a single unified ecosystem (‘the metaverse’) may actually be a set of loosely connected activities. By mapping the architecture around the metaverse – the ‘rules, roles, and relationships’ à la Jacobides et al. (2006) applied to ecosystems – we revealed that within a set of interrelated sectors, one can have multiple ecosystems that coexist, partly overlap, and partly compete. This is one of the few papers to map the evolving set of ecosystem architectures in this way. To do so, we take account of monetisation, which has thus far evaded systematic study but is crucial to understanding dynamics within the sector and the aggregate level of demand, including the potential for ‘irrational booms’ or busts.

We find that distinct and partly compatible ecosystems, which partly compete for complementors, occupy distinct spaces in terms of what they offer to the customers, and try to shape the perception of what ‘the metaverse’ is, engaging in a rhetorical context, trying to shape cognition around this context (see Grodal 2018; Kaplan and Tripsas 2008), to support their own version. Unlike in existing work (Grodal 2018), we do not assume there is one, unified conception of a new ‘set of activities’ such as the ‘metaverse’ since we look into the heterogeneity and the co-existence of different conceptions from

⁷Although they have an active community, Roblox takes almost 75% of total sales (27% operating costs, 22% platform hosting, and 25% app stores and payment processing), which is far greater than any web3 platform. However, first and foremost, creators are loyal end users so it is the community and level of fan engagement that is more important to establish first rather than low take rates in this scenario. In addition, Roblox are actively looking at how to increase monetisation options for creators through ability for creators to offer subscriptions to their users and, as of September 2023, opened up the Roblox marketplace for all to sell (prior to then it was only available for select users and brands).

partly overlapping, partly compatible ecosystems all fighting for resources and legitimacy, but each with their own approach.

Our findings confirm and expand recent research which has looked at the importance of distinct knowledge bases (and distinct angles to benefit from business activities) that actors bring to the table, especially early in an industry's evolution (Moeen and Agarwal 2017; Moeen, Agarwal, and Shah 2020). We expand on this view by showcasing that actors are not all working in the same direction, as their interest is not only on 'the' metaverse, but rather 'their version of' the metaverse. We show how looking at the ecosystem – and the effort of focal firms to attract partners, clients, and funders, shapes their actions and rhetoric. Our NLP analysis clearly shows this as being a contest between ecosystems, even though these are not mutually exclusive interpretations of the same 'reality' with one 'dominant solution' that might emerge (Klepper 1996) but rather distinct proposals of what each ecosystem can offer. Actors use the ambiguity to their advantage at the height of the bubble, opportunistically trying to bolster their chances of success.

We also find that ecosystems may be more or less hierarchically structured and that ecosystem governance raises inherent issues of its own, as speculated by Jacobides et al. (2023). More hierarchical governance may tilt an ecosystem towards unfair value distribution, which might discourage complementors to the point where distributional dysfunction ends up undermining functional viability.

We further find that innovation dynamics are difficult to manage in such tightly connected environments. While actors usually understand potential areas of joint values such as standardisation and interoperability, they may still be hard to achieve due to practical considerations, the need for coordination, and key players' desire to maintain control. As such, technologies may fail or underwhelm as a result of the looser relationships in an ecosystem, and we confirm earlier warning signs by Adner (2012 Ch. 2, 2021 Ch 1 and 4) and Adner and Kapoor (2016) that the *relevant* ecosystem must be in place for investment to be profitable – and that we should not take that for granted.

Moving to the question of *who drives innovation*, we find that, surprisingly, incumbents are often the disruptors. In an ecosystem, and particularly in a multi-product ecosystem, established actors have no wish to risk their ecosystem dominance, and hence look to innovation and change as anti-competitive tools (Jacobides and Lianos 2021b). This may be one reason why incumbents embraced this new, potentially complementary way of doing business so enthusiastically – and well ahead of end users. This narrative deviates from the traditional view of disruption, where powerful incumbents are so focused on serving existing customers that they may miss innovations altogether. We also find that some other participants in the sector, such as retailers, may have a related if distinct interest in engaging with new technologies because of the optics of innovation. By linking firm decision-making and the take-up of innovation, this analysis could help reinvigorate the tradition of Bower & Gilbert and revisit Christensen's thesis.

In particular, the way capital is allocated to the economy can run ahead of reality, inverting what may once have been a truism in terms of innovation. Traditionally, firms were beset by the classic 'innovator's paradox' (Christensen and Bower 1996), where potentially valuable innovations never see the light of day as a result of both myopia and capital allocation within firms. With the metaverse, however, we see firms willing to invest

heavily in unproven innovations that will not necessarily pay off, without either the appropriate due diligence or even any strategic alignment that might provide a justification.

So, why do some technologies cause investors, tech giants, and incumbents to go overboard with their investments so early on in the hype cycle? In the case of the metaverse, it seems that a specific combination of factors came together at a particular historical moment. The metaverse promised to extend tech giants' social networks and incumbents' brand reach while providing a space for digital assets to thrive. Market conditions for investing were favourable and the metaverse was a fungible space that could be moulded to many different visions. Tech giants wanted to be the first movers so they could set standards and create lock-ins for users. Finally, the ease with which creators, developers, and brands could contribute to the metaverse also served to fuel the hype. Theoretically speaking, this opens up a fascinating discussion on technologies that may be partly complementary – including those related to AI. Living through a technological revolution creates many opportunities, but it also raises the risk of misdirecting capital.

Our analysis thus also extends the emphasis placed by Adner and Lieberman (2021) and Adner (2021) on disruption through complements. Our approach explicitly distinguishes between the underlying technologies, their impact, and the incentives of key actors. We find that incumbents are much more likely to *support* ostensibly 'disruptive' technologies in order to pre-emptively coopt them, especially when they relate to complements. Our approach is consistent with the recent observations of Jacobides, MacDuffie, and Tae (2023), who suggest that incumbents can attain a remarkable staying power by acquiring, allying with, or investing in new technologies to maintain their dominance.

Finally, the metaverse showcases the importance of mapping the various partly intersecting ecosystems, and exploring their *Ecosystem Architecture*, in terms of the positions (orchestrators, complementors, and partners) the rules and roles that link players (open, closed) and their monetisation and intent. This expands existing work on Industry Architecture (Jacobides, Knudsen, and Augier 2006) adjusting it to the ecosystem context to explain why particular ecosystems have come to be formed, and considers both inter- and intra-ecosystem dynamics, showing how the two are connected. In turn, ecosystem functional and distributional failures as well as their collective success or failures explain the evolution of EA. In the metaverse world, the firms with the strongest appetite for creating their own unique metaverse ecosystems have been those that already hold strong ecosystem positions in existing domains. Ironically, it may be that their focus on how value is distributed may have distracted them from the opportunities for new value to be created. Our approach also shows that some goals that may be desirable and even necessary for overall ecosystem survival, such as interoperability, may be undermined by the existing EA, conflicting interests between players, and the fact that coordination is decentralised. We thus contribute to the recent literature on the intrinsic faults of ecosystems (Jacobides, Cennamo, and Gawer 2023) and confirm the speculation that excessive focus on value appropriation can undermine ecosystem health.

Disclosure statement

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Appendix

Towards a more balanced expectation on the Metaverse

While it is always dangerous to make predictions about technology and strategy, we feel compelled to say that, on the basis of the information available to us as we write this article in the summer of 2023, and despite the disillusionment, we believe that the metaverse is not fully dead. There are signs that both the immersion-based metaverses and web3 metaverses are still active, focusing on advancing the infrastructure and working on more targeted use cases.

In terms of immersion-based metaverses, there has been a recent flurry of activity in hardware improvements. Most notably, in June 2023, Apple announced its Apple Vision Pro AR headset (Apple 2023), which, according to CEO Tim Cook, ‘seamlessly blends the real world and the virtual world.’ The device, priced at \$3,499, has reportedly (Spangler 2023) been in development for 7 years and will launch in the U.S. early in 2024. It features Apple’s proprietary visionOS, the world’s first spatial operating system, and has a ‘tight integration of hardware and software’ to create an end-to-end immersive ecosystem for both entertainment and work, enabling use cases such as an infinite canvas for work apps so they can appear side by side at any scale, engaging entertainment experiences, a 3D camera to experience spatial photos, and immersive FaceTime, with tight alliances (such as Disney+), as opposed to an ecosystem.⁸ Samsung, Google, and Qualcomm also recently announced a partnership (Mehta 2023) to join forces to create a new mixed-reality platform based on cutting-edge hardware and software. Suggesting that some solutions require greater vertical integration to achieve the technical standards required and improve the end user experience.

Secondly, immersion-focused metaverses are doubling down on partnerships and targeted user cases, downplaying dominance in favour of coalescing around shared visions to improve value propositions (Jacobides, MacDuffie, and Tae 2023). After Microsoft closed both AltSpaceVR and its industrial Metaverse division, the firm hinted at the role of lack of focus in a statement (Ghoshal 2023) asserting that they were now ‘applying our focus to the areas that matter most to our customers.’ When asked about strategies to tackle the decline of the metaverse, we heard this same theme in a number of our expert interviews, with one former CTO of a large U.S. retailer commenting, ‘Companies should focus on emerging use cases that can actually solve problems ... I can imagine all hospitals using VR training in 20 years.’ Platform owners and brands remained committed to investing in the metaverse—but in more targeted ways, learning from early experiments to refine their approaches and deliver use cases that solve specific problems for their customers. The recent announcement that NVIDIA and Microsoft were teaming up to bring the industrial metaverse to millions of enterprise use cases is a solid example of this.

Finally, web3 worlds are moving from use cases driven by speculation and reliant on asset appreciation (e.g., virtual real estate) to more utility-driven use cases offering more engaging user experiences (e.g., gaming). Investors such as Animoca Brands are still investing heavily in the metaverse, with a strong emphasis on gaming. Whilst it is impossible to predict the future of this market, it is important to remember that the metaverse is still at an early stage of its journey. According to Gartner’s latest hype cycle (Insights 2022), the Metaverse is at the start of an arc that will last a decade, so we will no doubt see many more applications and pivots to come.

⁸Apple announced a partnership with Disney as part of the launch, bringing the popular brand back to the metaverse for the first time since the closure of its metaverse division in early 2023. Disney’s CEO Bob Iger commented that the ‘Apple Vision Pro is a revolutionary platform that can make our vision a reality.’