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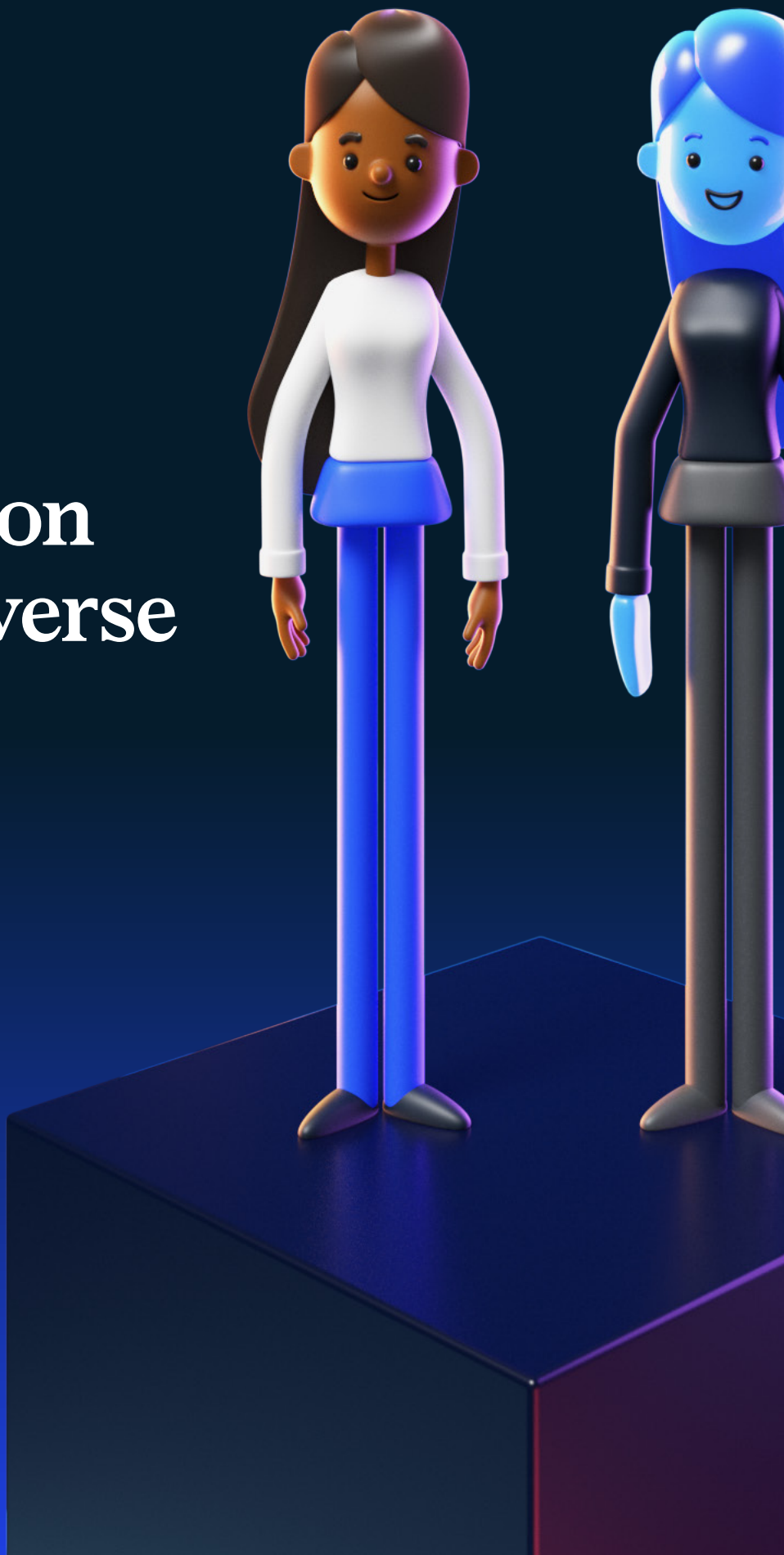

June 2022

Value creation in the metaverse

The real business of the virtual world

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Contents

Preface

This report examines the emergence of the metaverse: its history and characteristics, the factors driving investment, how consumers and businesses are using it today and may in the future, its value-creation potential, and how leaders and policy makers can plan their strategies and near-term actions. Our work began by surveying more than 3,400 consumers and executives on metaverse adoption, its potential, and how it may shift behaviors. We also interviewed 13 senior leaders and metaverse experts. In analyzing the metaverse's value-creation potential and total investment landscape, we examined the drivers of activity among major corporations, venture capital, and private-equity funds. We examined the potential impact of the metaverse on sectors most closely tied to its technology and uses, with our work supplemented with additional research, case studies, and real-world examples.

This latest research is the result of collaboration between multiple practices within McKinsey, including Growth, Marketing & Sales, McKinsey Digital, and Telecommunications, Media & Technology. We also drew on the expertise of the McKinsey Technology Council, which comprises more than 60 scientists, engineers, investors, and entrepreneurs from external tech organizations and institutions, along with our own internal experts. This report also leverages an expanding body of knowledge around the metaverse and deep expertise among our McKinsey colleagues, including contributions from: Jiamei Bai, Kim Baroudy, Ian De Bode, Marc Brodherson, Gordon Candelin, Marek Grabowski, Matt Higginson, Klemens Hjartar, Marius Huber, Vinayak HV, Nils Jean-Mairet, Chau Nguyen, Ichiro Otobe, Kim Rants, Kartik Trehan, and Richard Ward. We also sought the expertise of metaverse expert Matthew Ball, managing partner of EpyllionCo and McKinsey knowledge partner.

The project team comprised Inês Araújo Lopes, Antonio Celso Maciel Tavares, Andreas Henriksen, Madalina Kmen, Lotte Lauer, Estelle Menye Zanga, Philibert Parquier, Stephen Schwab, Ewa Starzynska, and Peter Vang. We would also like to thank Growth, Marketing & Sales' Global Communications Director Cindy Van Horne, Global Publishing Manager Molly Katz, and Global Publishing Coordinator Hannah McGee, as well as Luke Collins, Jen Thiele, and John-Michael-Maas for their editorial leadership. Additionally, we would like to thank the extended communications team EMEA External Relations Manager Kinga Young, North America External Relations Manager Eric Sherman, Global Digital Specialist Sharon Woo, Communications Specialist Marion Obadia, and Jason Forrest.

Finally, we sincerely thank the senior executives and experts who graciously agreed to be interviewed to provide their perspective on the current state of the metaverse and its potential.

Our ambition is for this report to help drive ongoing dialogue about the development of the metaverse, help leaders of both consumer and business-to-business clients better understand its power and potential, identify strategic imperatives, and act as a force for its positive evolution. This work is independent and has not been commissioned or sponsored in any way by any business, government, or other institution.

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In brief

Value creation in the metaverse

The metaverse is still being defined, both literally and figuratively. Yet its potential to unleash the next wave of digital disruption seems increasingly clear, with real-life benefits already emerging for early adopting users and companies. As we saw in previous shifts in technology such as the emergence of the internet followed by social media, mobile, and cloud, novel strategies can quickly become table stakes. The metaverse has the potential to impact everything from employee engagement to the customer experience, omnichannel sales and marketing, product innovation, and community building. Examining its potential effect should be part of strategy discussions, with leaders accelerating their analysis of how the metaverse could drive a very different world within the next decade. Of course, many questions remain, including how virtual worlds will be balanced with the physical world to ensure the metaverse is built in a responsible manner, how it can be a safe environment for consumers, how closely it will align with the "open" vision of the next iteration of the internet, and whether technology can advance quickly enough to build the metaverse of our imagination. This report examines the metaverse's building blocks, investment flows, and what is driving them, and how consumer and business behavior is evolving, its potential economic impact, and actions leaders should consider to capture value.

— There continue to be questions around the longevity and potential of the metaverse, with an extreme view regarding it as merely a rebranded gaming platform of little wider interest. We do not share that skepticism and believe the metaverse has the potential to be the next iteration of the internet. It may seamlessly combine our digital and physical lives by featuring a sense of immersion, real-time interactivity, user agency, interoperability across platforms and devices, the ability for thousands of people to interact simultaneously, and use cases spanning activities well beyond gaming. But the pace of its development will depend on multiple technological and user-experience factors, and is not limited to one platform, device, or even technology.

— The metaverse's technology stack has four core building blocks: content and experiences, platforms (such as game engines), infrastructure and hardware (including devices and networks), and enablers (such as payment mechanisms and security). Ten layers span these components, providing the critical building blocks on which all metaverse experiences are based. One primary question about the future evolution of the metaverse is the extent to which the interoperability of these elements can be advanced.

— Large technology companies, venture capital (VC), private equity (PE), start-ups, and established brands are seeking to capitalize on the metaverse opportunity. Corporations, VC, and PE have already invested more than $120 billion in the metaverse in the first five months of 2022, more than double the $57 billion invested in all of 2021, a large part of it is driven by Microsoft's planned acquisition of Activision for $69 billion. Large technology companies are the biggest investors—and to a much greater extent than they were for artificial intelligence (AI) at a similar stage in its evolution, for example. Industries currently leading metaverse adoption also plan to dedicate a significant share of their digital investment budgets to it.

— Multiple factors are driving this investor enthusiasm, including ongoing technological advances across the infrastructure required to run the metaverse; demographic tailwinds; increasingly consumer-led brand marketing and engagement; and increasing marketplace readiness as users explore today's early version of the metaverse largely driven by gaming (with some games boasting tens of millions of active players) with applications emerging that span socializing, fitness, commerce, virtual learning, and others.

— Our survey of more than 3,400 consumers and executives found significant excitement about the potential of the metaverse. Almost 60 percent of consumers using today's early version of the metaverse are excited about transitioning everyday activities to it, with connectivity among people the biggest driver, followed by the potential to explore digital worlds. Some 95 percent of business leaders expect the metaverse to have a positive impact on their industry within five to ten years, and 61 percent expect it to moderately change the way their industry operates. Industries most likely to be impacted by the metaverse include consumer and retail, media and telecommunications, and healthcare, and those industries are also among those already undertaking metaverse initiatives.

— While estimates of the potential economic value of the metaverse vary widely, our bottom-up view of consumer and enterprise use cases suggests it may generate up to $5 trillion in impact by 2030—equivalent to the size of the world's third-largest economy today, Japan. It is shaping up to be the biggest new growth opportunity for several industries in the coming decade, given its potential to enable new business models, products, and services, and act as an engagement channel for both business-to-consumer and business-to-business purposes.

— The potential impact of the metaverse varies by industry, although we believe it holds implications for all. For instance, we estimate it may have a market impact of between $2 trillion and $2.6 trillion on e-commerce by 2030, depending on whether a base or upside case is realized. Similarly, we estimate it to have an impact of $180 billion to $270 billion on the academic virtual learning market, a $144 billion to $206 billion impact on the advertising market, and a $108 billion to $125 billion impact on the gaming market. These effects may manifest in very different ways across the value chain, however.

— Companies already leveraging the metaverse may build lasting competitive advantages. Business leaders should develop a strategic stance by defining metaverse goals and the role they want to play; testing, learning, and adopting by launching initial activities, monitoring results, and examining user behavior; and preparing to scale by identifying necessary capabilities and embedding the metaverse in their operating model. They should also explore becoming metaverse users themselves.

— The metaverse also poses urgent challenges that cut across firms, their employees, independent developers and content creators, governments, and, of course, consumers. Part of the workforce will need to be reskilled to take advantage of it rather than compete with it, and cities and countries serious about establishing themselves as hubs for its development will need to join the global competition to attract talent and investment. The metaverse also has obvious societal implications. A variety of stakeholders will need to define a road map toward an ethical, safe, and inclusive metaverse experience. Guidelines may also be necessary around issues including data privacy, security, ethics and regulatory compliance, physical health and safety, sustainability, and equity and fairness.

Value creation in the metaverse

The real business of the virtual world

What's the opportunity?

In **2021**, venture capital and private-equity funding into the metaverse reached

$13 billion

By **2030**, the value of the metaverse could reach…

~$5 trillion

In **2022** already, investment into the metaverse space is more than double what it was in all of **2021**

>$120 billion +

Consumers and brands are already engaging

59% of consumers are excited about transitioning their everyday activities to the metaverse

57% of metaverse-aware companies say they are adopters

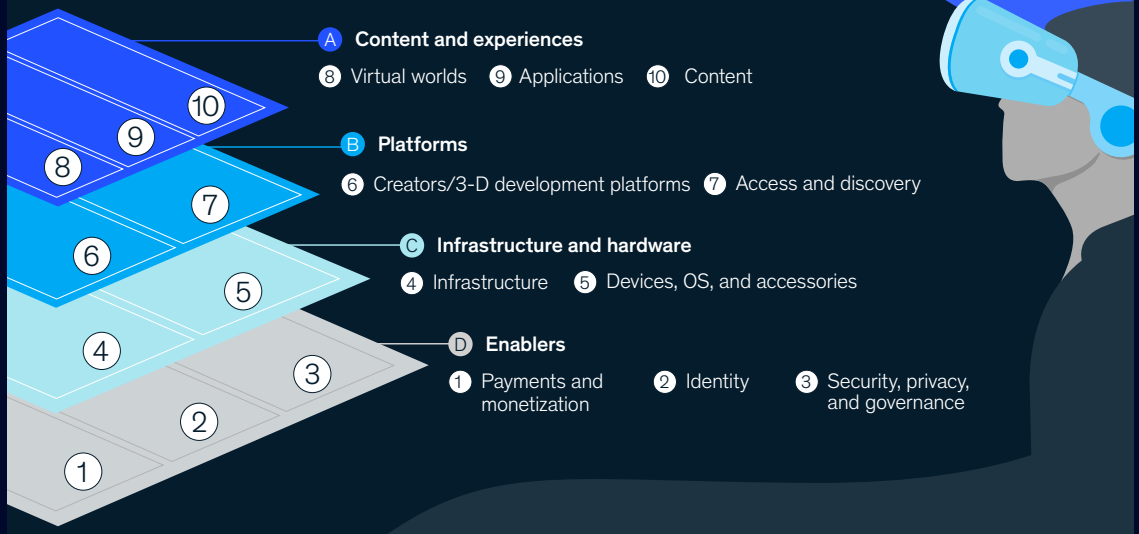
Top 5 activities consumers are excited about

- Social
- Entertainment
- Gaming
- Travel
- Shopping

Top 5 enterprise use cases companies are implementing

- Marketing campaign or initiatives
- Learning and development for employees
- Meetings in the metaverse
- Events or conferences
- Product design or digital twinning

The ten layers of the metaverse



3 steps to capture the value

Develop a value-focused strategy

Define your goals and the role you want to play that will generate value

Test, learn, and adopt

Launch initial activities, monitor results, and refine

Prepare to scale

Align talent and tech capabilities, embed in your business strategy and operating model

Introduction

It is 1992. A group of students and researchers at the University of Illinois are creating the Mosaic browser, a user-friendly way to search the nascent internet. This is made available to the world a year later—the same year CERN releases into the public domain the World Wide Web software that Tim Berners-Lee has invented three years earlier.[1] Yet mobile phones still have buttons, the iPhone won't appear for another 15 years, and the iPad is still 18 years away. And even if those devices had somehow miraculously existed, Wi-Fi did not appear until 1997.

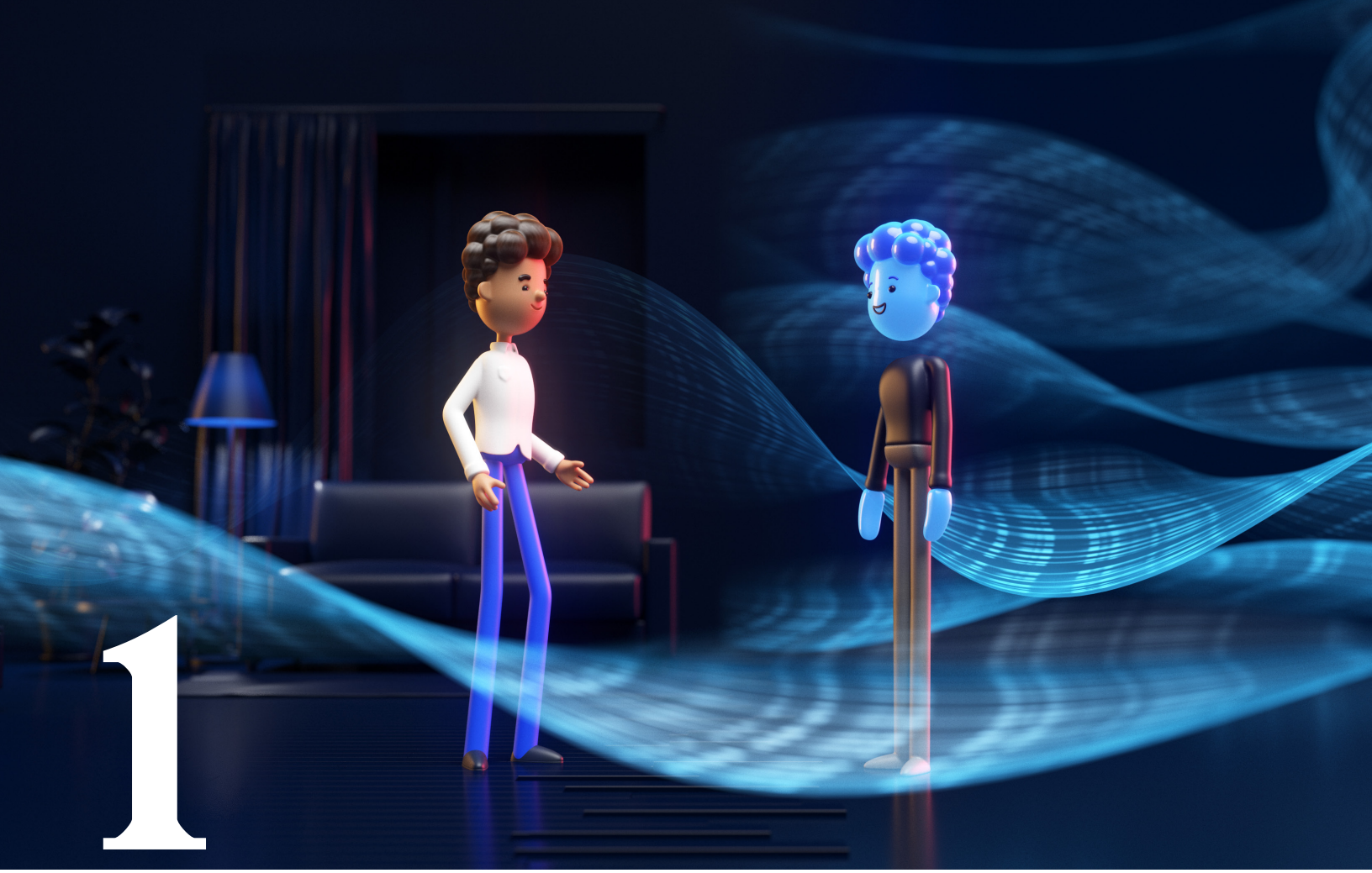
So much technology we take for granted today seemed almost impossible 30 years ago. In a decade or two, how will we look back on today? It depends. The metaverse is at an inflection point in its development, just as the social networks and user-generated content driving the transition to Web 2.0 in 2004 sparked utopian visions of consumer control and the democratization of the internet. The direction the metaverse takes is tied to stakeholders' collective actions in the years ahead, and the extent to which their behavior is influenced by considerations of its potential societal and environmental impact.

Of course, there are also significant challenges to be overcome. Just as it took time to develop the technology that sparked the emergence of our devices today, the metaverse of people's imaginations is not currently technically feasible. Networks are too slow, and computing power too weak. Graphics engines need to be exponentially more powerful, and interface hardware is needed to truly take advantage of the technology as it evolves.

Yet it would be brave to bet against the developing solutions and billions of dollars flowing into every corner of metaverse infrastructure. Even if it feels as though we have seen something like this before—almost two decades ago, *Second Life* became a phenomenon by introducing game players to the notion of "living" in an always-on virtual world, only for it to seemingly disappear (it still exists and attracts new users each month[2])—the reality is that the metaverse *is* different.

The "proto-metaverse"[3] exists, fueled by a powerful force: the gaming experience. Gaming eclipses other subsectors of the entertainment industry with its popularity. With more than three billion users globally[4] and a total value of more than $200 billion,[5] the gaming sector is larger than movies and music. Consumers and companies are already experimenting with the early metaverse for everything from socializing to fitness, commerce, virtual learning, and scores of other daily activities. Like any technology, the metaverse is neither inherently good nor bad; it will be what we make it, and we can learn from previous eras of dramatic technological change.

This report acknowledges the metaverse's positive potential with a focus on its likely economic and business impact. But while the future appears bright, there will inevitably be challenges. The metaverse is still in a relatively nascent state with current adoption comparable to where artificial intelligence (AI) adoption was five years ago.[6] Our survey conducted for this report found executives are generally positive about it: metaverse adopters report greater financial success and a more positive outlook compared with their peers, with higher current and expected profit margins.[7] But much depends on how the metaverse evolves. And how the world evolves too.



1

Defining the undefined: What is the metaverse, really?

It is a gaming platform, a virtual retail destination, a training tool, an advertising channel, a digital classroom, a new gateway to digital experiences. The metaverse seems to be whatever people's imaginations dream it to be. But today the metaverse remains difficult to define,[8] even though the term has been in circulation for decades. What we do know is that, beyond the hype, the metaverse is real, potentially revolutionary, and has the makings of a significant opportunity. Yet how it will eventually develop remains to be seen.

While the definition is still fluid—and will likely continue to be for some time—the consensus view is the metaverse is the next iteration of the internet, where it becomes something we are immersed in, rather than something we just view. "The metaverse will be the successor to the mobile internet," Mark Zuckerberg said last November as he announced that the name of the company he cofounded, Facebook, was changing to Meta. "We'll be able to feel present—like we're right there with people no matter how far apart we actually are."[9]

Definition and characteristics

Our working definition positions the metaverse as the next iteration of the internet that seamlessly combines our digital and physical lives. "We're trying to not define the metaverse so rigidly that it limits the imagination of creators," Square Enix CEO Yosuke Matsuda told us. Beyond this, two things are clear. First, the development of the metaverse is gaining momentum as billions of dollars are invested, gaming continues to seed the emerging (or "proto") metaverse, and nongaming use cases emerge for both businesses and consumers. Second, despite many different potential definitions of the metaverse, it has several foundational characteristics:

— At its most basic, the metaverse will have three features:

- a sense of immersion
- real-time interactivity
- user agency

— Ultimately, the full vision of the metaverse will also include the following:

- interoperability across platforms and devices
- concurrency with thousands of people interacting simultaneously
- use cases spanning human activity well beyond gaming

Separating fact from fiction

The metaverse captured universal headlines for the first time after Facebook's name change last year. Yet Steven Spielberg's *Ready Player One* was released three years earlier, based on a novel released in 2011.[10] And the concept of the metaverse far predates that—the term was first coined in Neal Stephenson's 1992 novel *Snow Crash*, and versions of what's now the metaverse have evolved for almost half a century

'We have Instagram. We have email. We have messaging. And then there's our real-life friends; the real-life activity that we're participating in. Sometimes there's an intersection between those two. But when I think about a real-world vision of the metaverse, it's really a union of those where they become much more deeply fused; where there's a digital extension to everything that's real.'

–John Hanke, CEO of Niantic

(see sidebar "The history of the metaverse"). Yet for a concept now three decades old—and something increasingly used by consumers and businesses alike, whether they understand the term or not—there are several persistent misconceptions about the metaverse.

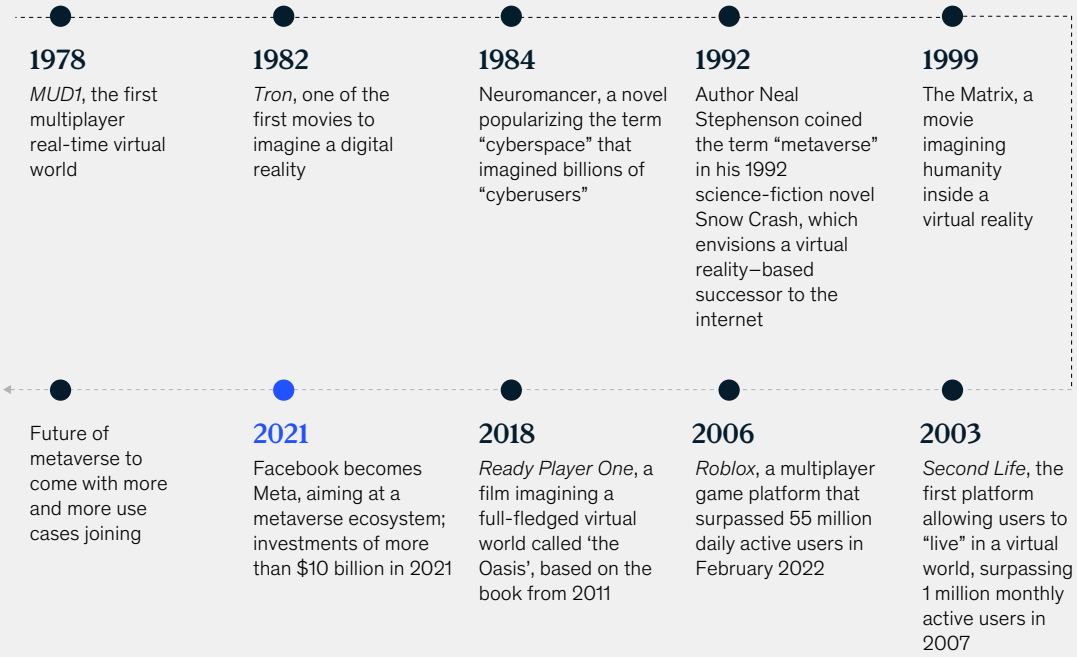
The metaverse does not replace real life

Ready Player One presents a virtual world (the OASIS) as infinitely superior to the dystopian real world. Yet the actual metaverse does not represent a choice between the virtual and the real worlds. The best, superior version of the metaverse will complement rather than compete with the real world, enhancing our real-life experiences rather than supplanting them. "I think about the metaverse as a continuation of where tech was headed prior to COVID-19," Niantic CEO John Hanke told us. "We have Instagram. We have email. We have messaging. And then there's our real-life friends; the real-life activity that we're participating in. Sometimes there's an intersection between those two. But when I think about a real-world vision of the metaverse, it's really a union of those where they become much more deeply fused; where there's a digital extension to everything that's real."

There are not multiple metaverses

Saying there are many metaverses is like saying there are many internets. The metaverse is the envisioned end state—incorporating all digital worlds alongside the physical world, with interoperability between them all. As it exists now, metaverse users are spread across multiple platforms; for example, *Decentraland*, *Fortnite*, *Minecraft*, *Roblox*, and *The Sandbox*.

The history of the metaverse



> ‘We’re trying to not define the metaverse so rigidly that it limits the imagination of creators,’
>
> –Yosuke, Matsuda, CEO of Square Enix

The metaverse is not AR/VR

Augmented and virtual reality (AR/VR) are important interfaces to help users experience the metaverse, and point to some of its potentially more exciting experiences (for instance, our research found 62 percent of respondents were excited or very excited by the possibility of travel in the metaverse, especially the ability to visit “places I can’t physically go”—including space). Yet AR and VR join technologies such as smartphones and laptops as just one of many ways people can interact with the metaverse. And we may use very different devices to access metaverse platforms in the future.

The metaverse is not (just) gaming

Gaming has been critical in seeding the metaverse, but the metaverse is not exclusive to gaming. In fact, even some gaming platforms are evolving to address multiple use cases, such as virtual concerts being held in *Fortnite*. And while gaming is indeed the most common activity across all generations and the most popular among Gen Z (87 percent of Gen Z respondents in our survey said they were engaged in gaming), fitness, education, and shopping are popular among millennials, while baby boomers also engage in shopping. That points to the existing and growing appetite among consumers to engage with companies well beyond gaming: 62 percent of consumers we surveyed have engaged with one or more branded virtual experiences, 36 percent are excited about technology brands entering the metaverse, and 30 percent are excited about apparel, fashion, and luxury brands doing so.

The metaverse is not Web3

The first generation of the internet is typically defined as the period from 1991 to 2004, when web pages were largely static and users simply consumed content. The next generation—Web 2.0—was marked by the emergence of social networking and user-generated content.[11] The metaverse *sounds* a lot like Web3. But while Web3 contributes to the metaverse by espousing decentralization and interoperability, it’s not *the* metaverse, which is anchored on immersive experiences that can be both centralized or decentralized (for more on the difference, see sidebar “Advances from Web 2.0 to Web3 give rise to the metaverse”). “Why do these two terms get mixed together?” Matthew Ball, managing partner of EpyllionCo and McKinsey knowledge partner, said on McKinsey’s *At the Edge* podcast. “Well, Web3, by definition, succeeds Web 2.0. The metaverse, by definition, succeeds our current computing and networking paradigm. The fact that they both succeed what we experience as the internet today naturally intertwines the two.”

The metaverse is not only for a small group of users

We have already noted there are three billion gamers in the world, spanning geographies, generations, and genders. For instance, the gaming platform *Roblox* reportedly had nearly 55 million daily average users (DAUs) in February 2022[12] and generated $1.9 billion in revenue in 2021.[13] *Minecraft* has about 140 million monthly active users,[14] and *Fortnite* about 80 million.[15] Gaming has acclimated consumers to the concept of the metaverse: our survey found the share of millennials very excited about the metaverse

Advances from Web 2.0 to Web3 give rise to the metaverse.

		Web 2.0	Web3
	Example virtual worlds	*Second Life* *Roblox* *Fortnite* *World of Warcraft*	*Decentraland* *The Sandbox* *Somnium Space* *Cryptovoxels*
Platform characteristics	**Organizational structure**	Centrally owned Decisions are based on adding shareholder value	Community governed, generally through a foundation decentralized autonomous organization (DAO) Native tokens are issued and enabled Participation in governance Decisions are based on user consensus
	Data storage	Centralized	Decentralized (game assets)
	Platform format	PC/console Virtual reality/augmented reality hardware Mobile/app	PC/console Virtual reality/augmented reality hardware Mobile/app coming soon
	Payments infrastructure	Traditional payments (eg, credit/debit card)	Crypto wallets
User interaction	**Digital assets ownership**	Leased within platform where purchased	Owned through nonfungible tokens (NFTs)
	Digital assets portability	Locked within platform	Transferable
	Content creators	Game studios and/or developers	Community Game studios and/or developers
	Activities	Socialization Multiplayer games Game streaming Competitive games (eg, e-sports)	Play-to-earn games Experiences Same activities as Web 2.0
	Identity	In-platform avatar	Self-sovereign and interoperable identity Anonymous private-key-based identities
Commercial	**Payments**	In-platform virtual currency (eg, Robux for Roblox)	Cryptocurrencies and tokens
	Content revenues	Platform or app store earns 30% of every game purchased; 70% goes to developer (example model)	Peer-to-peer; developers (content creators) directly earn revenue from sales Users/gamers can earn through play or participation in platform governance Royalties on secondary trades of NFTs to creators

Source: "Opportunities in the metaverse: How businesses can explore the metaverse and navigate the hype vs. reality," Onyx by J.P. Morgan, JPMorgan.com, January 19, 2022

(35 percent and 33 percent respectively) was about 50 percent higher than that of Gen Z.[16] In addition, we found a relatively even split between metaverse users by gender: 53 percent of our respondents identified as men; 46 percent identified as women. While overall excitement levels were consistent, there were some differences in the metaverse activities each gender was excited by. Respondents identifying as men prioritized connectivity with people and purchasing real estate, while those identifying as women were most excited by the ability to customize avatars and attend concerts and events.

The building blocks of the metaverse

Having explored what the metaverse is not, it is time to dive into what it actually *is*. As a concept, the metaverse can be broken down into four core building blocks: content and experiences, platforms, infrastructure and hardware, and enablers. Importantly, capital is flowing into this technology stack, across ten component "layers" that constitute the physical and operational structure on which all metaverse experiences are based—these range from back-end tech enablers (such as engines, blockchain, and hardware devices) to platforms and virtual worlds (Exhibit 1). We also anticipate the development and scaling of standards and protocols to enable interoperability.

A big question is whether these building blocks and the layers they comprise will combine to form the metaverse, at least as many envision it. That our digital lives are becoming more complex, immersive, and

Meeting the technology demands of the metaverse

The technology required to power the metaverse is recent. Yet the technology required to truly realize its potential doesn't exist and presents arguably the greatest challenge to the development of the metaverse of people's imaginations. The bottom line is that advancements will be required in compute infrastructure, network infrastructure, and devices:

— **Compute infrastructure.** Limits of concurrency today cap the number of players on gaming experiences without creative workarounds such as spacing players across a map to avoid overloading processing resources. In a fully realized metaverse, many more users will need to be able to be online at once. In addition, *low-quality rendering* means devices without graphics processing units (such as smartphones) cannot present the photorealistic environments required to drive immersion.

— **Network infrastructure.** There are two common issues with network infrastructure today. High-latency "lagging" creates a sensation of video and/or audio being slow when using applications that require a high rate of frames-per-second, such as gaming and metaverse socializing. And low-bandwidth "buffering" occurs when data cannot be transferred quickly enough, delaying access to content or stopping it when it is already in progress.

— **Interface hardware.** Metaverse access today is primarily through flat screens: televisions, computers (PCs and laptops), and smartphones. We expect them to dominate for another five years before transitioning to AR/VR and eventually extended reality (XR). It is unclear what will shape the next wave of metaverse interfaces: for example, if mobile phones evolve quickly enough to enable AR and become the main way of accessing the metaverse, access may become more democratized. Yet significant advancements across all features of AR/VR are required as the metaverse develops, and we don't expect mainstream XR devices—such as contact lenses and brain-computer interfaces—to emerge for at least a decade. Additionally, a broad set of peripherals—from on- and off-body sensors to haptics—are still emerging, and have the potential to significantly expand the market.

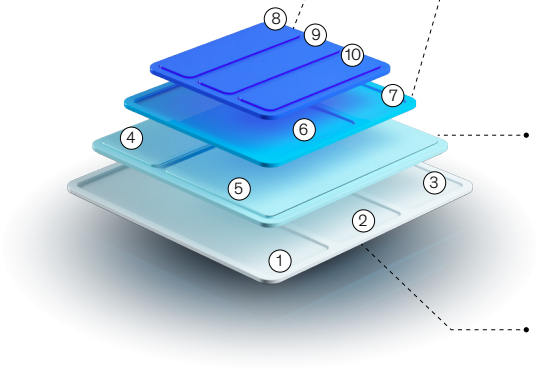
pervasive seems clear. Yet that does not mean the metaverse is guaranteed to develop into a melding of our physical and digital lives.

While incumbents are always at risk of being disrupted by innovation,[17] there are questions about the ability of current technology to result in a fully realized metaverse, particularly when it comes to issues of speed and capacity (see sidebar "Meeting the technology demands of the metaverse"). There's also the issue of the user experience and how that may help—or hurt—the metaverse's adoption and development.

"If the metaverse follows the app-store model that we have today, a person has to go through the trouble of downloading an app and clicking a lot of permissions—it's a pretty large amount of friction to just try something," Niantic's Hanke said. "If you think about the early days of the web, it was surfing around, checking out 20 different websites at a session. They weren't things that kept your attention for hours and hours or that you were loyal to for years, but it was very easy for you to discover and try them. That sort of allowed the whole ecosystem to sort of bootstrap and grow. And I think we need that kind of experience for real-world AR, real-world metaverse."

Exhibit 1

Today's metaverse is made up of ten layers, which fall into four categories.



Content & experiences

⑩ **Content:** Enriches the metaverse experiences—including first-party content, developer content, creator content and UGC, etc

⑨ **Applications:** Tied to specific metaverse use cases—ranging from learning to collaboration to events to industry specific applications

⑧ **Virtual worlds:** Environments where large number of users can gather, interact, create, and move in and out different experiences

Platforms

⑤ **Access and discovery:** Platforms that facilitate distribution and discovery of content, experiences, apps—including browsers, search/visual search, app stores, in-app storefronts

④ **Creators/3D development platforms:** Core set of tools and platforms for building 3-D experiences—including design, game engines, AI services, creator tools

Infrastructure and hardware

⑦ **Devices, OS and accessories:** Device hardware, components, accessories/peripherals and OS layers that are part of the human interface layer

⑥ **Infrastructure:** Underlying infrastructure across cloud, semiconductors, networks, etc that powers the metaverse

Enablers

③ **Security, privacy, and governance:** Security, identity and data governance, privacy, and content moderation platforms

② **Identity:** Platforms that manage digital identity, avatars and social graphs

① **Payments and monetization:** Platforms and tools (eg, advertising, asset stores) to enable the metaverse economy

‘Web3, by definition, succeeds Web 2.0. The metaverse, by definition, succeeds our current computing and networking paradigm. The fact that they both succeed what we experience as the internet today naturally intertwines the two.’

–Matthew Ball, managing partner of EpyllionCo and McKinsey knowledge partner

One example of this today is the ability to move between different websites within the same browser (or tab). Applications and games are largely distinct, stand-alone experiences with limited interoperability. Yet many news sites, for example, provide hyperlinks from articles to external destinations, including competing news sources, allowing the user to seamlessly navigate to new websites.

Every industry faces questions about whether and to what extent the metaverse may impact it, which in turn raises questions about how companies respond. Issues of privacy and security are only likely to intensify as the metaverse develops, raising questions for companies and governments alike. And the broader issue of negative externalities—such as its potential societal impact—remain to be answered. As Digital Play, LEGO Ventures managing director Rob Lowe told us, the ambition is “for the future to become as open as the internet was when it was first launched.” He said, “That is is the kind of promise of what a future metaverse could be for everybody, not this idea of individual, siloed experiences.”

With each generation of screen technology, we’ve become closer to content: from televisions 12-feet away, across the room, to personal computers three-feet away, to mobile devices just a foot from our eyes. And with each shift, the degree of personalization and advertising revenue has increased—along with the time we spend with devices, and their second-order social consequences. We may one day experience the metaverse through glasses, contact lenses, and embedded technology. What may the future hold as we move to fully immersive experiences?

2

Following the money: What is driving investment?

Interest in the metaverse has exploded. Global Google searches for "metaverse" skyrocketed 7,200 percent last year,[18] and metaverse online gaming platform *Roblox* reportedly hit over 55 million daily active users in February 2022.[19] Meta committed more than $10 billion into its Reality Labs division,[20] which makes metaverse-related hardware such as VR goggles. And Microsoft said its planned $69 billion acquisition of gaming company Activision Blizzard would "provide building blocks for the metaverse."[21]

Yet this booming interest has also made it difficult to separate hype from reality. This has always been the case since the advent of the internet, or indeed all technological innovation. We go through periods of heightened excitement about what is possible and may evolve, and it is hard today to avoid thinking back to the early, tumultuous days of the internet. However, it is also worth remembering that while the bust of the first dot-com boom resulted in the disappearance of scores of companies, the internet itself only became ubiquitous.

Beneath the hype, the metaverse's development continues (Exhibit 2). *Roblox*, launched in 2006, has attracted companies including Nike[22] and Gucci[23] as advertisers and partners. *Fortnite* has more than 20 million daily active users (DAUs), has hosted concerts (more than 27 million unique players attended a Travis Scott performance last April[24]), and generated more than $14 billion in transactions between 2018 and 2020.[25] Naver Z's *Zepeto*—Asia's largest metaverse platform—has over 300 million global subscribers,[26] and in April partnered with Samsung for its Galaxy S22 Treasure Hunt campaign.[27]

Virtual real estate has also been in the spotlight—an anonymous user reportedly paid $450,000 to purchase a plot of virtual land in *The Sandbox* next to Snoop Dogg's virtual residence, "Snoopverse."[28] Institutional investors cover a wide range, including brands like Adidas, Samsung, HSBC,[29] and a fast-growing crop of virtual real-estate companies like Republic Realm and Metaverse Group (majority owned by Tokens.com).[30] And the supporting infrastructure is also quickly evolving, including virtual architecture and advisory firms. Yet price increases are driven by scarcity that is designed into present-day platforms like *Decentraland* and *The Sandbox*. That heightens the investment risk involved, even if organizations making the investments aim to derive utility from their virtual real estate by, for instance, using it as their metaverse base of consumer interactions. Their bet is not only on mass adoption of the metaverse in the coming years, but also on adoption of the specific platform that the virtual land is bought in (given near-zero interoperability between worlds for now). As with cryptocurrency and NFTs, the virtual real-estate asset market will likely remain volatile in the near term.

In the meantime, while there may be consolidation in the future, the list of metaverse platforms continues to grow and diversify.

Charting the acceleration of investment

Investment in new technologies does not necessarily guarantee their eventual success, although it does underscore the extent to which companies and institutions have evaluated an opportunity and concluded it is worth pursuing. More than $120 billion has flowed into the metaverse space already in 2022—more than double the $57 million of 2021[31]—as large technology companies, start-ups, and established brands

Exhibit 2

The metaverse is a developing opportunity.

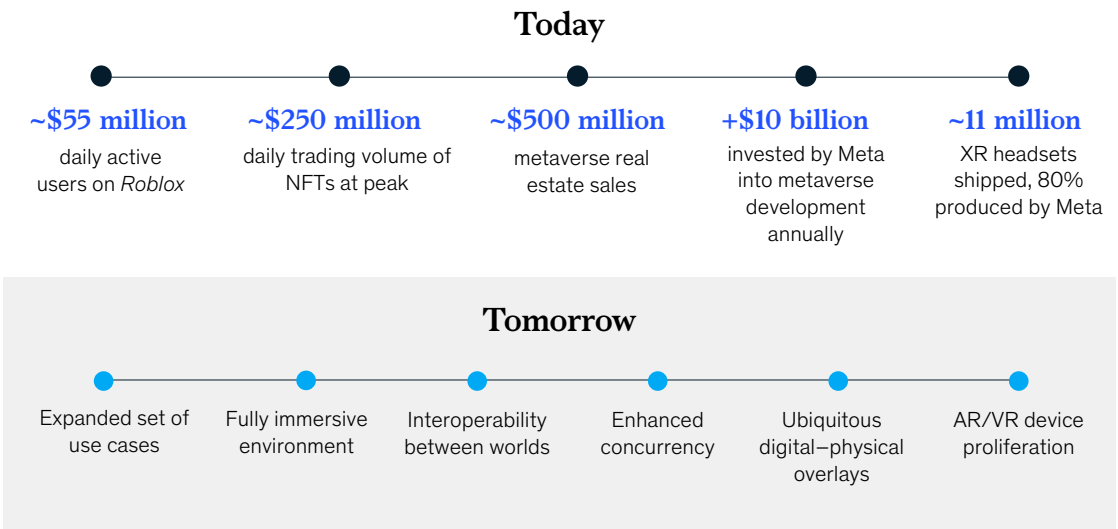
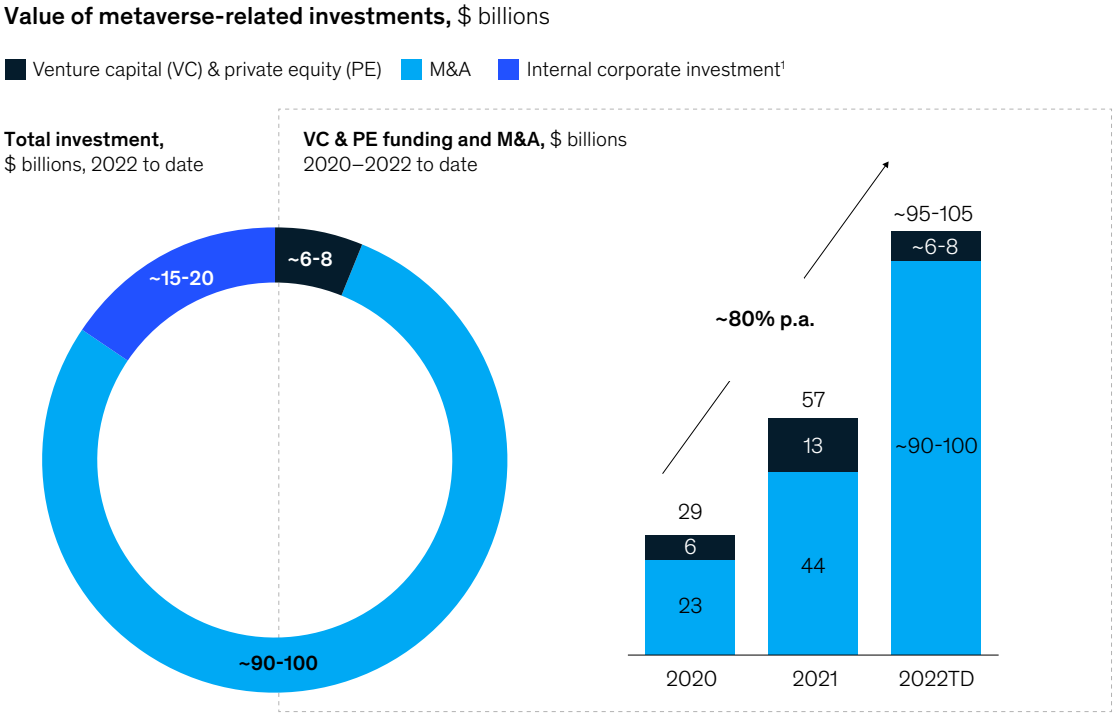


Exhibit 3

Substantial investment signals confidence in the potential of the metaverse.



[1]Internal corporate investment in 2022 derived for top 30 companies investing in the metaverse based on publicly announced investment amounts.
Source: Crunchbase (Jan 2020–May 2022)

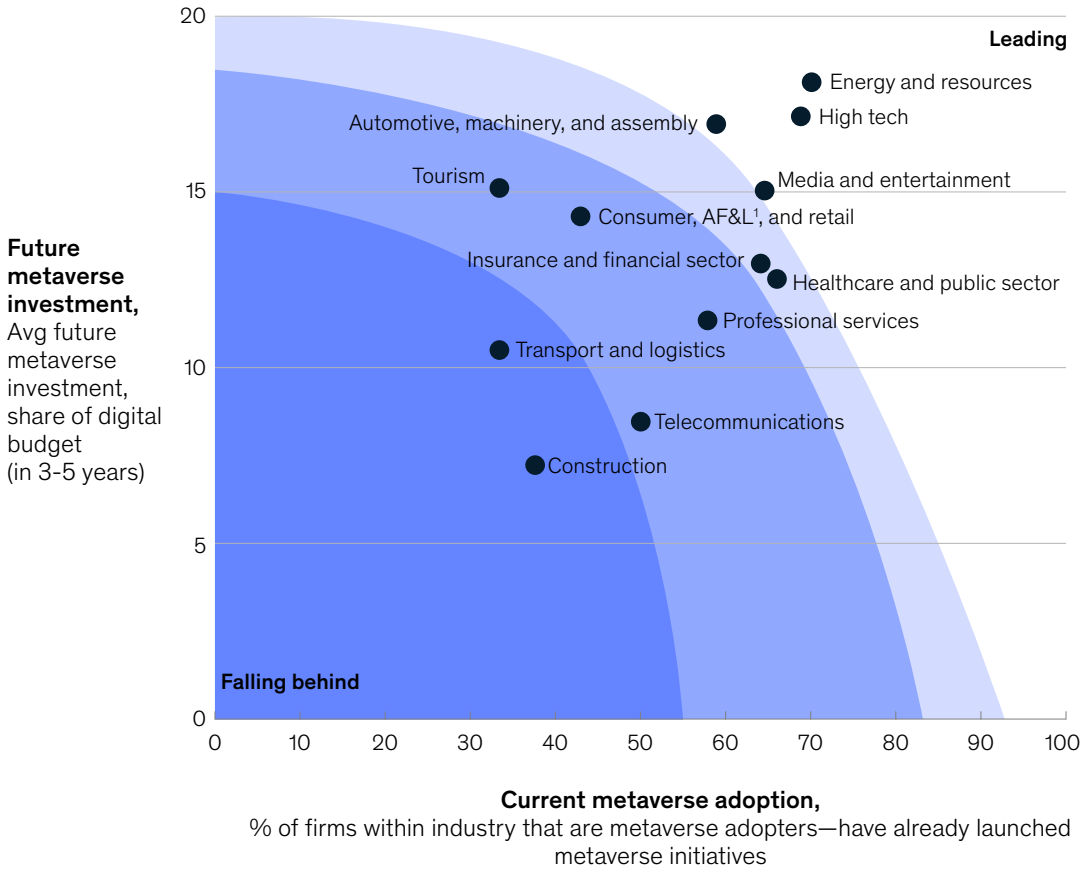
seek to capitalize on the growth opportunity (Exhibit 3). For example, Andreessen Horowitz recently launched Games Fund One, releasing $600 million in venture capital to invest in game studios, metaverse infrastructure, and games themselves.[32] It is also worth noting that cryptocurrencies—while not the same as the metaverse—saw investment of more than $30 billion in 2021. The common element seems to be an underlying belief among investors that our technology paradigm is about to undergo a major reset (see sidebar "The metaverse and Web3," page 26).

Total metaverse-related investment is also proving to be significantly larger than it was for AI, which attracted $39 billion in investment in 2016—arguably a similar stage in its development trajectory to the metaverse today. While total VC and PE investment is somewhat comparable—AI was $6 billion to $9 billion in 2016; the metaverse is $6 billion to $8 billion so far this year—M&A activity is much bigger. We attribute this to the fact the metaverse has emerged, for the most part, as a pure digital play for many companies, exemplified by Microsoft's intended purchase of Activision Blizzard for around $69 billion.[33]

Meanwhile, the sectors leading metaverse adoption also plan to dedicate a significant share of their digital investment budgets to the metaverse with energy (18 percent); automotive, machinery, and assembly (17 percent); high tech (17 percent); tourism (15 percent); and media and entertainment (15 percent) among those leading the charge in terms of allocating share of digital budget to metaverse-related activity over the next three to five years (Exhibit 4).

Exhibit 4

Sectors leading metaverse adoption today also plan to dedicate a significant share of their digital investment budgets to metaverse.



[1]Apparel, footwear, and luxury.
Source: McKinsey & Company Senior Executive Survey, April 2022

The broader investment landscape is dominated by three categories of investors:

— **Large technology companies,** including for example Meta, Microsoft, Nvidia, Apple, and Alphabet, among others, are taking deliberate actions toward shaping the metaverse. The most prominent example is Facebook's name change to Meta, solidifying its intent to become a leader in the space, but others include Microsoft's intended Activision Blizzard acquisition,[34] Nvidia's Omniverse,[35] the planned release late this year of Sony's PlayStation VR2 headset,[36] and the possibility of Apple entering the AR space in 2023.[37]

— **Venture capital** is investing heavily in the space. Examples include NFT marketplace OpenSea raising $300 million at a $13.3 billion valuation in a Series-C funding round led by Paradigm and Coatue,[38] metaverse technology company Improbable raising $150 million led by Andreessen Horowitz and SoftBank,[39] Yuga Labs (creator of the Bored Ape Yacht Club) raising $450 million at a $4 billion valuation to build a virtual world,[40] *The Sandbox* receiving $93 million from SoftBank,[41] and Niantic receiving $300 million from Coatue.[42]

— **Corporations and brands** outside of tech are putting resources behind efforts to get ahead. Disney appointed a senior executive to oversee its metaverse strategy,[43] for instance, while LEGO invested in Epic Games (makers of *Fortnite*).[44] Epic Games also collaborated with luxury brand Balenciaga, which has created a dedicated metaverse division and launched its latest collection inside a virtual space.[45] The most recent technological trends and advancements such as e-commerce, smart devices, and social media are arguably starting to reach a point of declining returns in terms of their ability to generate a competitive advantage. In response, brands are seeking innovative ways to get ahead of the competition. With its expanding number of use cases, the metaverse offers growth opportunities that first-mover brands are keen to explore and develop.

Of course, the distribution of investments across the metaverse ecosystem can be seen as either troubling or inspiring. It is troubling if you view the metaverse at this point—unlike previous consumer-led revolutions—as generating more excitement among technology companies and executives than from actual consumers. Yet it is inspiring if you view the involvement of brands as a sign that they have learned from previous consumer-led revolutions and want to be involved earlier this time around.

"What does this mean collectively? It means that this idea that we've thought of for decades is now a little bit more tangible, even if in the virtual sense," McKinsey senior adviser Ball said. "There are hundreds of millions of people connecting to these environments every day. There are many of the most storied companies on earth building a presence, and we have commerce in the tens and soon to be hundreds of billions of dollars."

In fact, this idea of connecting virtually that has been decades in the making is now increasingly real: as of October 2021, Facebook had almost three billion users in virtual platforms, with gaming and e-sports attracting a quarter of a billion and global crypto not far behind at 220 million. Decentralized finance and blockchain gaming garnered 3.45 million and 2.36 million users respectively, while there are close to half a million users of NFT platforms and approximately 50,000 users engaging in Web3 virtual worlds.[46]

Like the current version of the internet, the metaverse is expected to show significant network and synergy effects, meaning the value of each individual metaverse feature (such as owning digital assets) will increase with the amount of use cases and consumer offerings. This means a fully integrated, end-to-end ecosystem must be built if the metaverse is to reach its full value proposition.

Factors driving investor enthusiasm

Although the long-term vision of the metaverse is still to be realized, the early version of the metaverse is well established. More than three billion gamers globally are fueling it, and that proof of concept makes a difference for investors. In fact, there are multiple factors driving their enthusiasm and the growing belief we are at an inflection point where the metaverse as many imagine it will begin to materialize.

Ongoing technological advances

The infrastructure required to run the metaverse has rapidly improved and opened new possibilities. While significant technology challenges remain (see sidebar "Meeting the technology demands of the metaverse"), we have already seen blockchain spark the decentralized creator economy and emerge as the most promising current technology for achieving the promise of the future metaverse for interoperability between worlds. The full rollout of 5G (and beyond) will enable processing these large worlds on mobile devices.[47] A number of other advances will facilitate development of the metaverse:

— **Back-end engines erode barriers to creation.** The improved availability of the back-end engines that drive the user experience (in particular Unreal Engine and Unity) have reduced the barrier to creation,

as a wider audience of studios and creators have gained access to creating advanced games and experiences.[48] This advancement is critical to the metaverse, as it enables the shift from more traditional 2-D internet spaces to more immersive experiences.

— **Edge computing powers the metaverse.** Edge computing, also known as multi-access edge computing or mobile edge computing, will play an important role in driving the computing power required to run the metaverse. At its core, edge computing enables data to be captured, stored, and processed locally across smart devices and local networks rather than in the cloud.[49] By obviating the need to send data to the cloud to be processed, edge computing helps solve problems of limited bandwidth and latency—critical for an immersive, high-fidelity experience.

— **5G will play a defining role.** 5G technology solves the need for faster networks with lower latency to enable vastly more connected devices to process data, including VR headsets or AI-powered bots that will open up experiences such as the sense of touch, and AR that lets visitors have in-depth conversations with AI hosts.[50] The full rollout of 5G is regarded as critical to facilitating edge computing, although there is already discussion about the potential of 6G to enable more sophisticated uses of the metaverse.[51]

— **Devices merge the physical and virtual world.** While AR/VR devices aren't yet mainstream, they're maturing fast. Meta shipped 10 million Oculus Quest 2 headsets in 2021,[52] and new devices including gloves and bodysuits—some with haptic feedback—are gaining traction.[53] With companies including Meta, Microsoft, Qualcomm, and Sony leaning into the space, it is not unrealistic to expect a breakthrough in terms of adoption in the near future, as well as additional device types.

— **Software development drives metaverse applications.** Leading software companies are betting on the opportunity to build the "application layer" on top of the infrastructure. For example, Microsoft is currently building and improving upon a number of metaverse enterprise solutions across the Microsoft cloud (such as Dynamics 365 Connected Spaces, Microsoft Mesh, and Azure Digital Twins).[54]

Increasing stakeholder readiness

While gaming is already mainstream (and providing the largest current online worlds in terms of players), additional use cases are emerging rapidly—including new AR/VR-powered social-media experiences, immersive retail, entertainment, sports, and education. "Gaming is already incredibly social and you have continuous innovation of social features," Activision Blizzard chief strategy officer Ken Wee told us.

'Gaming is already incredibly social and you have continuous innovation of social features. But as you're trying to draw in people who don't self-identify as gamers, a more extensive set of social-engagement mechanisms is going to be required to convince them to spend more time in the metaverse.'

–Ken Wee, chief strategy officer at Activision Blizzard

"But as you're trying to draw in people who don't self-identify as gamers, a more extensive set of social-engagement mechanisms is going to be required to convince them to spend more time in the metaverse."

Company activity

Brands are also experimenting: luxury-goods company Gucci has a presence across many platforms,[55] Nike has Nikeland in *Roblox*,[56] and fast-food company Wendy's has had an event in *Fortnite* and has a presence on *Horizon Worlds*.[57] In addition, less-talked-about but sizable enterprise use cases also continue to scale, including specific categories such as retail, healthcare, and manufacturing, and also cross-sector examples such as learning and development, remote collaboration, conferences and events, and customer support.

Consumer uses

We only expect more examples as the metaverse matures. "Use cases beyond gaming are not just in the future, they're already emerging," the founder and CEO of XR Safety Initiative Kavya Pearlman told us. "According to the United Nations, 1.6 billion children moved to online learning with the pandemic,[58] so this is an area ripe for disruption where many people are looking for alternatives. We're also seeing a lot of experimentation within the medical field, such as using HoloLens for assisted surgeries."

We envision the fully developed, long-term version of the metaverse to encompass most daily activities, spanning five core categories:

1. **Gaming** has been driving the development of the metaverse.
2. **Socializing** extends existing consumer behavior through platforms such as *Decentraland*, *The Sandbox*, and *Second Life.*
3. **Fitness** often marries gaming and connectivity through providers such as Peloton.
4. **Commerce** includes Sotheby's proprietary marketplace for curated NFT art,[59] virtual-only fashion company Fabricant,[60] as well as start-ups promoting an immersive retail experience, including Obsess[61] and AnamXR.[62] A primary question is whether the metaverse can be a channel for selling real products at scale, and emerging technology enabling thousands of people to simultaneously interact may help.[63]
5. **Remote learning** remotely groups individuals in virtual classrooms.

The metaverse also has the potential to impact sectors Ball describes as "categories that have long avoided digital disruption." "My hope is that the metaverse and VR and AR will finally start to show actual, tangible, measurable productivity improvements in education and healthcare," he said.

'Use cases beyond gaming are not just in the future, they're already emerging.'

—Kavya Pearlman, founder and CEO of XR Safety Initiative

Enterprise solutions

The metaverse will enable incremental improvements in the enterprise solutions we know today alongside entirely new innovations. Notable categories include the following:

— **Enhanced remote collaboration:** An incremental improvement will see a move from 2-D screens to an immersive 3-D space as online meetings in the metaverse further enable remote work and potentially diminish the need for co-locating.[64] As we move toward this transition, we expect to see a continuation of the pandemic-induced rethinking of how organizations are structured.

— **Reimagined learning and development:** Simulations of real-life settings and situations will allow for a far more captivating learning process, opening possibilities both in onboarding new colleagues and developing current personnel, which is increasingly important for organizations competing for talent on a global scale.

— **Digital twins:** We are also seeing new innovations such as BMW's effort to build a digital factory twin on Nvidia Omniverse,[65] which is expected to drive efficiency improvements across its supply chain. By building virtual replicas of physical settings and objects that generate data in real-time, far richer analyses can be generated than previously to enable improved decision making.

Business agendas and larger tech investments will likely focus on those that move the productivity needle, such as automation and process visualization. Today, 50 percent of our work activities can be improved with these technologies, which include robotics, digital twins, and 3-D or 4-D printing.[66]

Public-sector activity

There is also a rapid expansion of use cases in the public sector. For instance, Dubai's Virtual Assets Regulatory Authority earlier this year established Metaverse HQ on *The Sandbox*,[67] making it the first regulator in the emerging digital space. The Dubai Metaverse Strategy estimates the metaverse will add $4 billion to its economy and support 42,000 jobs by 2030.[68]

'We believe that with the metaverse we can create higher-quality government services. Current government services are demand driven. However, we believe that in the future we can provide services in advance of demand—we can provide a new form of government services and, in that sense, it will be very helpful to citizens. We also believe this metaverse platform will help citizens see Seoul city in a different perspective.'

—Jong-Soo Park, CIO of Seoul's Smart City Police Bureau

The first city government is also set to join the metaverse: leaders in South Korea's capital, Seoul, announced a five-year "Metaverse Seoul Basic Plan" that will begin by creating a virtual Seoul City Hall, plaza, and civil-service center. The CIO of Seoul's Smart City Policy Bureau, Jong-Soo Park, told us the objective was to "provide civic freedom, participation, engagement, and communication."

"We believe that with the metaverse we can create higher-quality government services," he said. "Current government services are demand driven. However, we believe that in the future we can provide services in advance of demand—we can provide a new form of government services and, in that sense, it will be very helpful to citizens. We also believe this metaverse platform will help citizens see Seoul city in a different perspective."

There are also emerging examples of using the metaverse to address social issues, such as the Whole Earth Foundation's Guardians of Metal and Concrete game,[69] which crowdsources data collection to

The metaverse and Web3

While the metaverse is opening new opportunities for creators to create and users to engage and experience, the Web3-enabled metaverse advances these opportunities with a new paradigm.

Web3 heralds a new decentralized ecosystem, in which users begin to own, monetize, and utilize their data for their own benefit, and creators can monetize their content and talents in different ways. It's enabled by three core technologies:

— *blockchain* offering a universal, public, permanent, single source of truth

— *digital assets* issued on a blockchain, representing value portability and permanence

— *smart contracts* containing conditional programming code that create utility by facilitating self-executing applications

As a result, metaverse applications built on Web3 benefit from more permanence, functionality, and interoperability than more traditional Web 2.0 VR experiences.

Since digital assets are a core component of the Web3 technology stack, access to these is central to future metaverse design. Creators can freely launch new digital assets on any blockchain they desire and distribute these assets via Web3-native marketplaces with dramatically lower fee models than their Web 2.0 equivalents. In addition, the advent of noncustodial wallets enables users to access their digital possessions by connecting their wallet to each metaverse venue. Digital assets in such wallets can include cryptocurrencies, digital equities, stablecoins,[76] and NFTs in the form of skins, tools, and even virtual real estate. Assets are typically issued on the same blockchain as the metaverse venue (for example, Ethereum, Polygon), but cross-chain bridges are enabling greater portability of digital assets between different metaverse venues.

Finally, core services will need to evolve alongside emerging technologies in order for the Web3 metaverse to fulfill its potential. Since much is typically based on open-source and composable code (classes and functions that can be combined to become building blocks of larger systems), we expect the Web3 metaverse to advance rapidly, through steps including the following:

— creating solutions to enable the digital identification of users crossing over from the physical to virtual worlds

— improving the user interface and user experience of the wallet experience, such as replacing traditional keys and addresses with more familiar naming conventions

— advancing the graphical user interface of metaverse venues, from current 2-D renderings and controls that can be clunky, to a more immersive VR-like experience

— expanding the utility of Web3 metaverse venues to generate true value, such as unique access to resources and experiences

The extent of untapped opportunity and accelerating pace of development make the Web3-enabled metaverse a subject senior executives need to keep an eye on.

‘It’s going to be important to create a truly creator-focused economy in the open metaverse, where creators can realize the value of their creations and not just be at the mercy of a gatekeeper that takes all the profit off the top because they are at the gate and they can do it.’

—Marc Petit, VP of Epic Games’ Unreal Engine Ecosystem

capture infrastructure conditions in real time so repairs can be made.[70] “I’m quite interested in the aspect of blockchain as an incentive scheme,” Square Enix’s Yosuke Matsuda said, referring to the game. “It’s trying to solve social issues with games using the incentive scheme of blockchain. This is opening up whole new possibilities.”

Demographic tailwinds

If gaming is the forerunner of who uses the metaverse, the trends are positive: gaming demographics are widening across age and gender. As of 2020, 48 percent of all gamers in China[71] and 41 percent of all US video-game players identified as female.[72] In addition, data from the United States show 79 percent of video-game players in 2020 were over the age of 18 and 41 percent older than 35.[73] In addition, Gen Z consumers—the oldest of which are in their mid-20s—are increasingly an income-earning force to be reckoned with and are more familiar with virtual worlds and lives.

A global community of independent developers and creators

Developing immersive, engaging content is increasingly shifting toward individual content creators—evident in the more than 50 percent increase in “influencer” marketing over the past five years across platforms from China’s WeChat and Pinduoduo to YouTube and Instagram in the Western world. This bodes well for growth of the metaverse, as a significant share of innovative, engaging experiences will likely come from these creator-users.

A thriving creator economy has emerged, powering user-generated content diversity across virtual platforms. As demonstrated by the rise of social media and games based on user-generated content, we are seeing increased demand for digital self-expression and co-creation of virtual environments. “Most game companies like us have been focused on creating content, but the metaverse will expand the possibility and ease of providing the space for players to contribute and create,” Yosuke Matsuda said. A survey of US consumers shows about 70 percent of general consumers (Gen Z to Gen X) rate their digital identity as “somewhat important” or “very important.”[74] We expect the creator economy to see further tailwinds as decentralized Web3 platforms emerge.

“It’s going to be important to create a truly creator-focused economy in the open metaverse, where creators can realize the value of their creations and not just be at the mercy of a gatekeeper that takes all

‘It’s a virtual immersion into the next generation of the internet. The metaverse will be iterative, not any one size or shape. And the capabilities we have within it will all be unlocked by both open standards and the devices that we wear or that we use to interact in these worlds.’

—Brian Solis, global innovation evangelist at Salesforce

the profit off the top because they are at the gate and they can do it,” the vice president of Epic Games’ Unreal Engine Ecosystem, Marc Petit, told us. “We have to create a new generation of platforms that implement a better economy for creators. And that’s where, for me, things need to be fair, open, and interoperable. The technicality of making fully simulated worlds move from one platform to another is complex but give us a few years and we’ll figure it out.”

Growing consumer openness to a new kind of internet

Consumers are increasingly expressing discontent with many aspects of the internet as it has evolved today, from the proliferation of misinformation to data and privacy concerns, how social-media platforms generate user dependence, and their effect on users’ mental health. In parallel, creators are increasingly expressing discontent with the way in which content is monetized and proceeds distributed. Both trends are contributing to the Web3 movement gaining momentum globally, with the result potentially a major disruption in value pools—which is why investors are staking a position early (see sidebar “The metaverse and Web3”). “Every brand is going to go in and negotiate with every aspiring metaverse operator […] and negotiate terms that ensure they can have a direct customer relationship,” Epic Games CEO Tim Sweeney told the *Financial Times*[75] with regard to how the economics may change. “We know this because we were talking to all these companies and they’re all very consistent and adamant about remaining first-class citizens in the metaverse and not being intermediated by any company they partner with.”

The metaverse sits at this inflection point in its evolution due to factors ranging from the size of the opportunity to drivers of expected growth and the amount being invested. We believe the intense interest of the past year ignited dramatic corporate experimentation which has laid a foundation for the metaverse’s evolution and will likely maintain momentum for the foreseeable future. “It’s a virtual immersion into the next generation of the internet,” Salesforce global innovation evangelist Brian Solis told us. “The metaverse will be iterative, not any one size or shape. And the capabilities we have within it will all be unlocked by both open standards and the devices that we wear or that we use to interact in these worlds.”

3

Scanning the horizon: How is consumer and business behavior evolving?

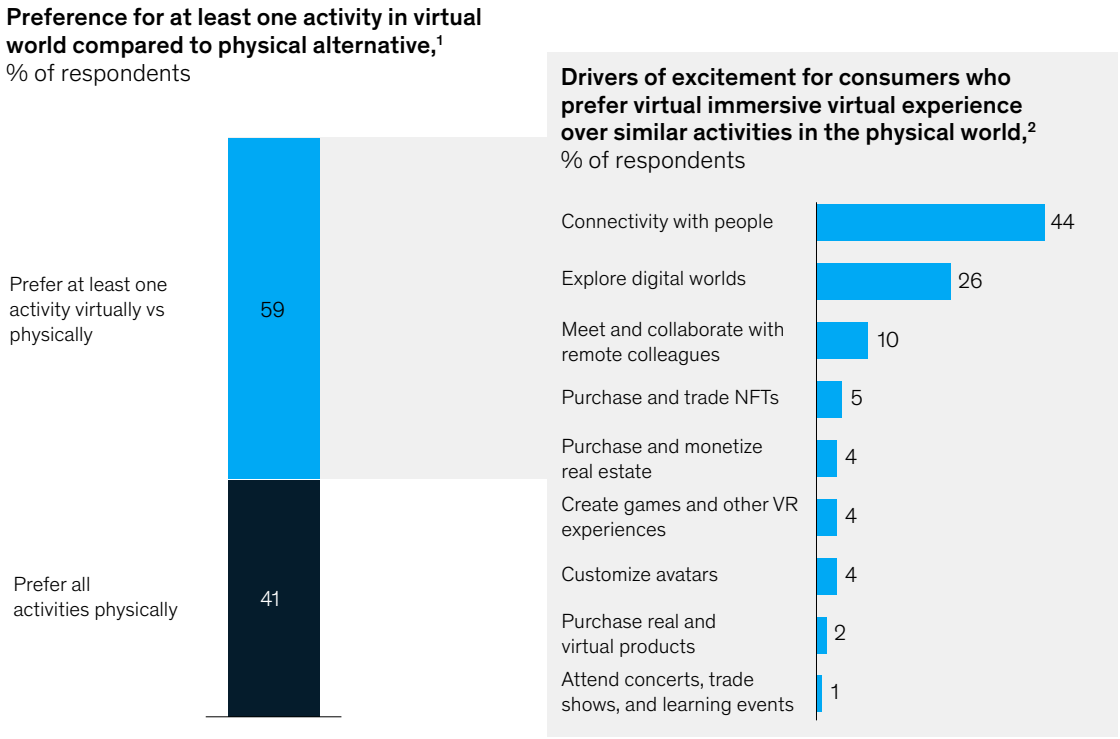
We have eagerly adopted technology for decades, both personally and professionally. In the past two years alone, many have rapidly and largely seamlessly adjusted to carrying out more daily activities virtually both on the job (videoconferencing) and in private (socializing, dating), while the pandemic also swiftly accelerated the adoption of e-commerce, and we relied more than ever on technology to live our lives. Our research finds consumers and executives are excited about what is next, with many already using and experimenting with the metaverse and eager to realize its potential. Yet even as many companies and industries push the digital frontier, others remain hesitant.

How consumers view the metaverse

Almost 60 percent of consumers we surveyed are excited about the transition of everyday activities to the metaverse (Exhibit 5), with connectivity being the number one driver of excitement. What kind of connectivity are we talking about? When we asked consumers what they hoped to be doing in the metaverse within the next five years, for many the answer was socializing and communicating with family and friends (see sidebar “Our research methodology”).

Exhibit 5

Approximately 60 percent of consumers are excited about the transition of everyday activities to the metaverse.



[1]Q: *When you participate in the metaverse, do you prefer that virtual experience over the same activities in the physical world?* (n=2,939).
[2]Only for respondents who preferred at least one activity in the immersive virtual world compared to physical alternative; Q: *What gets you most excited about participation in the metaverse?* (n=1,210).
Source: Intelli Metaverse Consumer Survey in Europe, the Middle East, and Asia (EMEA) and Asia–Pacific (APAC) (April 2022)

Our research methodology

Both quantitative and qualitative research informed this report. We surveyed more than 3,000 consumers spanning Asia, Europe, and the United States to gain insight from current users of the metaverse about their motivations, what they are doing, and what they expect to do. We also surveyed almost 450 senior executives across the Asia–Pacific and China, Europe, and the Americas to get a C-level view of the potential growth of the metaverse, as well as actions organizations have put in place or intend to in the years ahead. This was conducted partly to address gaps we identified in a literature review of business leaders' perspective on the metaverse. Finally, we conducted thirteen interviews with senior executives and experts in the metaverse space for deeper insight into how leaders think about this topic, both within their businesses and in their respective industries. Most interviews were conducted in May 2022. For more details on our research, see Appendix C.

Yet connectivity also encompassed a broad range of activities offering commercial growth opportunities, such as entertainment (66 percent of consumers responded they were “excited” or “very excited” about attending live events such as concerts and sports, as well as seeing movies and attending festivals and museums), gaming (66 percent), and shopping (64 percent).

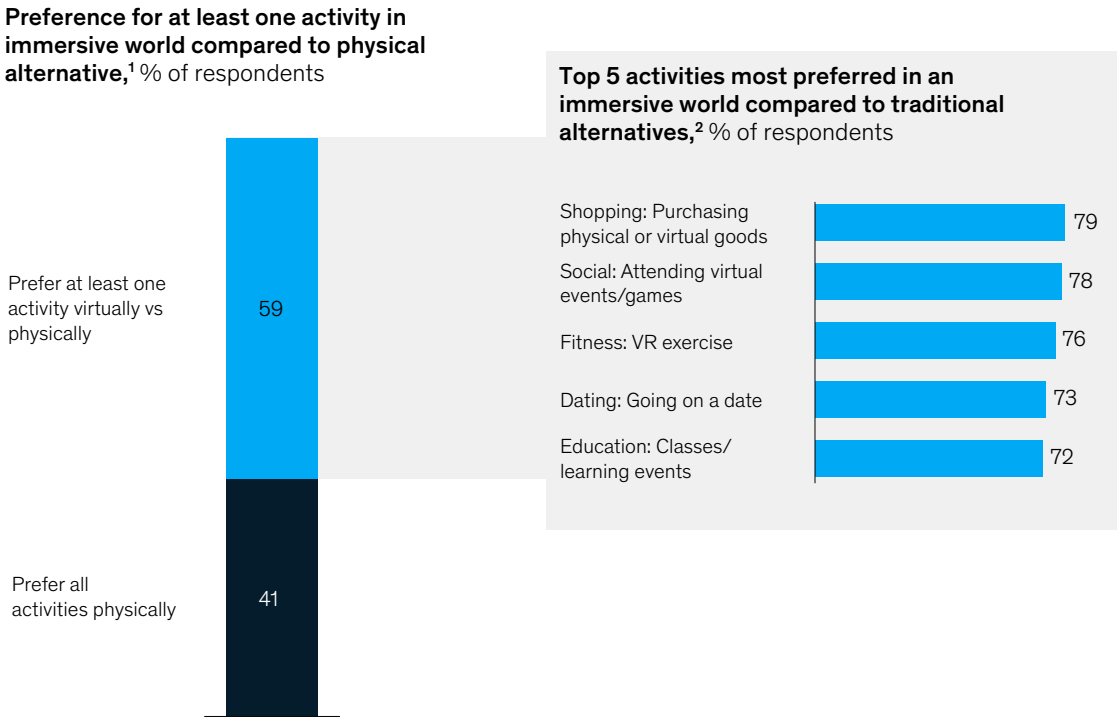
Travel is another activity respondents were “excited” or “very excited” about (62 percent). The main themes in metaverse-specific travel related to the possibility of going beyond the limits of the physical world: time travel, fantastical places, exotic places that are difficult to access, and space travel. The survey also identified strong demand for travel to hospitals and care homes, further underlining the desire for connectivity.

What consumers are doing already

Of the two-thirds of consumers who have experienced the metaverse, our survey found 80 percent appreciate shared virtual experiences with friends and family, 63 percent prefer virtual work meetings, and 59 percent enjoy virtual education sessions more than in-person ones.[77] We also found 62 percent of those using the metaverse had engaged with one or more branded virtual experiences, indicating the opportunity for companies to pursue those efforts.

Exhibit 6

Consumers are looking forward to shifting a range of their activities to the virtual world.



[1]Q: *When you participate in the metaverse, do you prefer that virtual experience over the same activities in the physical world?* (n = 2,939).
[2]Q: *Only for respondents who preferred at least one activity in the immersive virtual world compared to physical alternative; Compared to traditional, non-immersive digital events or activities, how much did you enjoy the following?* (n = 1,210).
Source: Intelli Metaverse Consumer Survey in Europe, the Middle East, and Asia (EMEA) and Asia–Pacific (APAC); Intelli Metaverse Consumer Survey in United States

In addition, the wide adoption of virtual tools has legitimized gaming and virtual socialization, with early metaverse platforms such as *Roblox*, *Minecraft*, and *Fortnite* experiencing accelerated popularity. The conventional core audience for gaming continues to solidify the central role of gaming in today's entertainment landscape: 81 percent of Gen Z have played video games in the past six months, averaging 7.3 hours per week.[78]

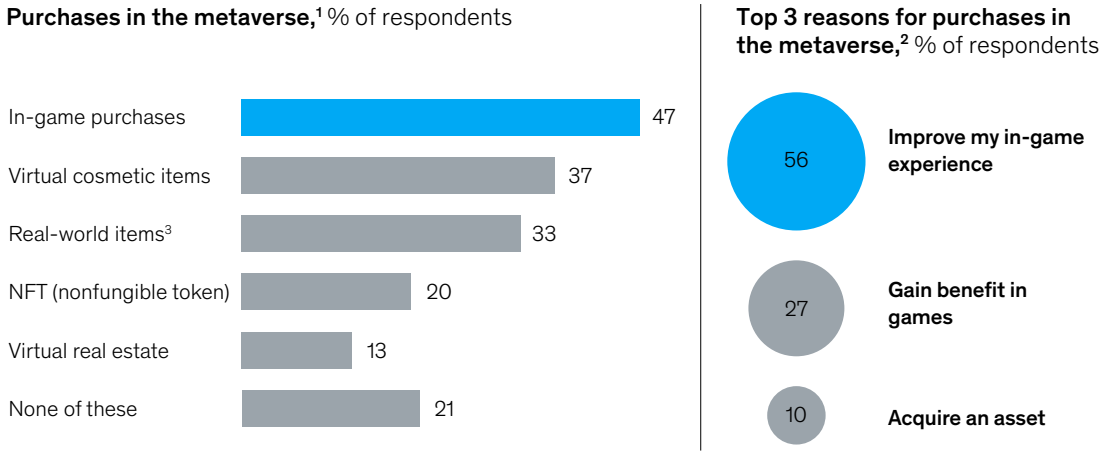
"You're at the point where everyone engages in digital experiences in some way, shape, or form," Activision Blizzard's Wee said. "COVID-19 accelerated it, but I view it as a secular trend that's only grown over the years. You look at our King mobile-gaming business,[79] the audience skews female and is far less likely to self-identify as a video gamer in the traditional sense of the word." That demographic expansion is reflected in the top five activities respondents most prefer in an immersive world compared with traditional alternatives (Exhibit 6).

Omnichannel commerce is now second nature to most consumers, with payment credentials often embedded in the devices and software they use. "Social commerce"—integrating commerce with social-media entertainment—is already estimated to comprise almost 15 percent of total retail in China, and is rapidly growing globally as well. For the three billion gamers in the world today, the virtual goods economy is estimated to comprise nearly 75 percent of global gaming revenues.

That's one reason why we believe consumer spending on digital assets in the metaverse will only grow (Exhibit 7). Another reason? Excitement about the metaverse increases with income: 53 percent of those who identified as higher income were very excited compared with 32 percent of respondents with medium incomes and 25 percent among lower income earners.

Exhibit 7

About 79 percent of consumers active on the metaverse have made a purchase, mainly to enhance their online experience.



[1]Q: *When you are participating in activities in the metaverse, have you purchased any of the following products/services in past 12 months?* (n=2,093).
[2]Q: *What was the main reason for the purchase(s) you made?* (n=1,543).
Source: Intelli Metaverse Consumer Survey in Europe, the Middle East, and Asia (EMEA) and Asia–Pacific (APAC);Remesh Next Gen Consumer – Metaverse Survey in United States

How executives view the metaverse

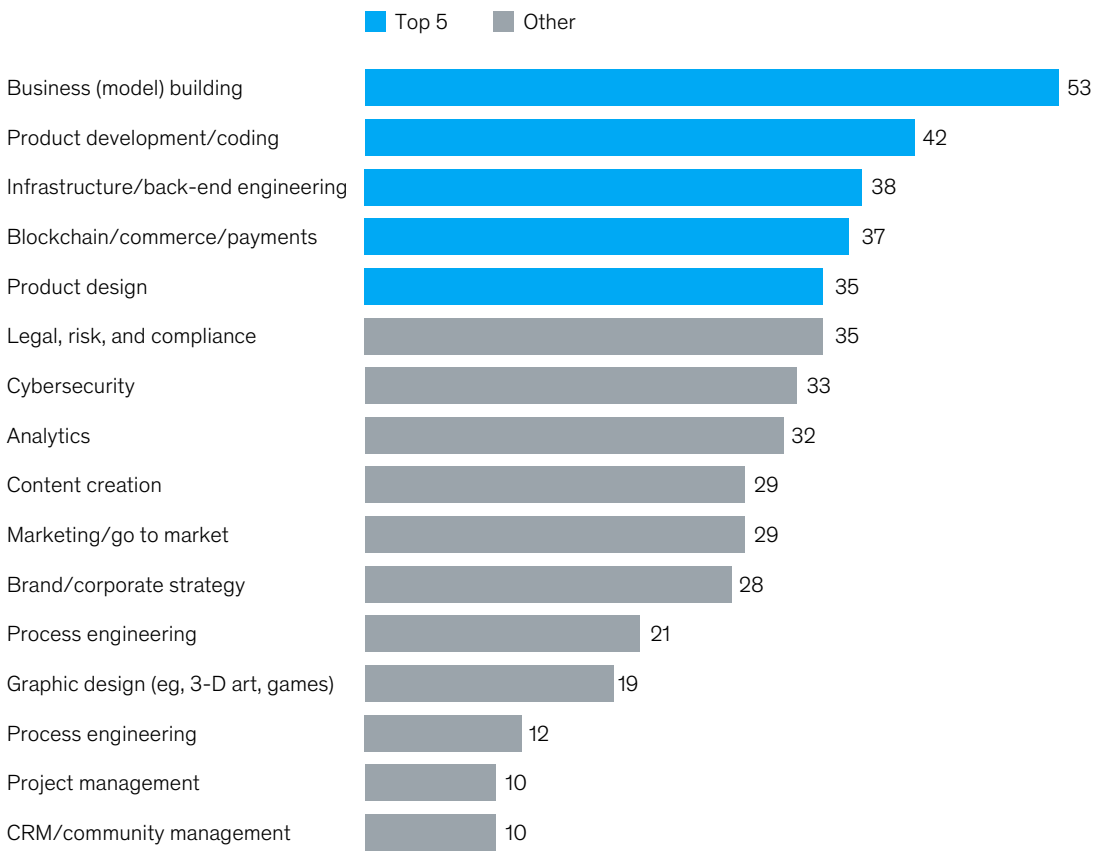
While the metaverse is still evolving, one thing seems clear: senior executives' belief in its potential. Our research found 95 percent of senior executives expect the metaverse to have a positive impact on their industry within five to ten years, and 61 percent expect it to moderately change the way their industry operates (just 7 percent expect no change). In addition, almost two-thirds (65 percent) of senior executives expect metaverse technology to drive more than 5 percent of their organization's total revenue in five years, while 24 percent of executives expect it to drive more than 15 percent of revenue.

While the degree of confidence varies by industry, the findings hint at the size and scale of the opportunity the metaverse presents. Indeed, we found companies with more proactive metaverse adoption were already reporting greater financial success—89 percent of early adopters reported positive operating margins of more than 5 percent, while 21 percent of companies still contemplating whether to become involved reported negative operating profit. And, not surprisingly, innovators were far more likely to expect further improvements in operating profit margins in the next three years.

Exhibit 8

Metaverse adopters are looking for a varied set of capabilities, including content creation, corporate strategy, and cybersecurity.

Top corporate capabilities needed to deliver metaverse strategy,[1] % of senior executives



[1]Q: *What are the top five capabilities that your company needs most in order to deliver your metaverse strategy?* Top 5 capabilities across industries were identified based on these most often mentioned within 'top 5' by executives (n = 448).
Source: McKinsey & Company Senior Executive Survey, April 2022

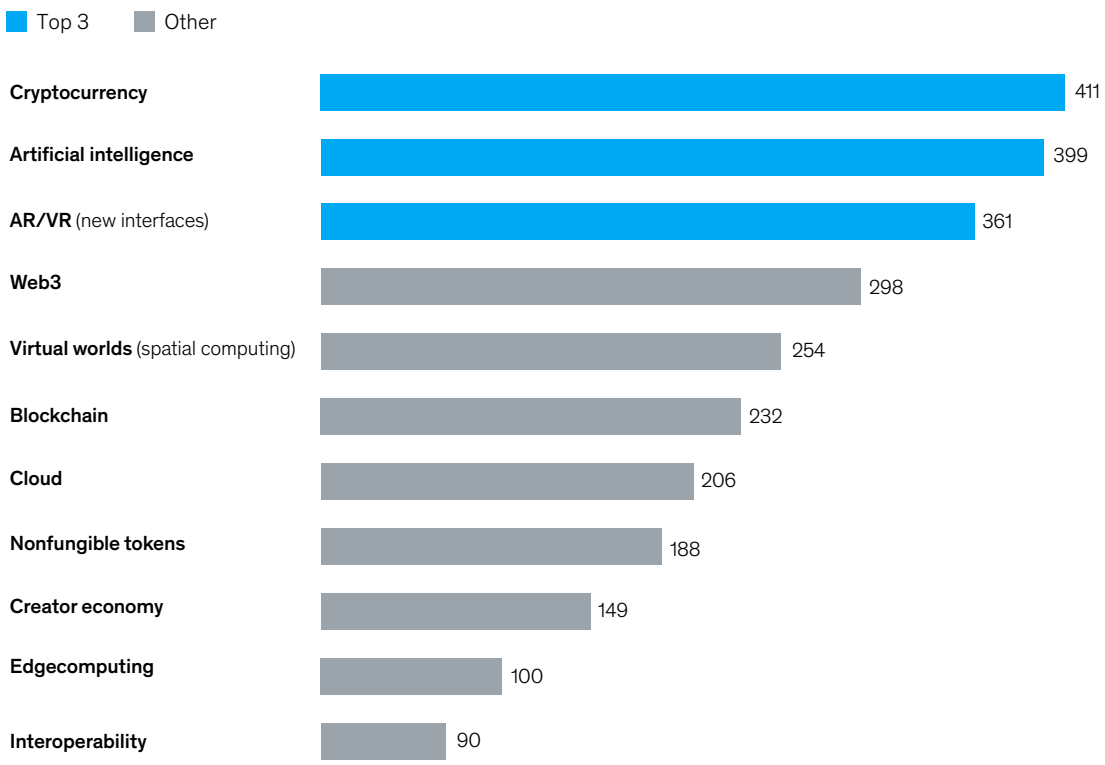
Early adopters are also seeking different capabilities compared with their peers (Exhibit 8). Early adopters are most interested in capabilities around building business models, infrastructure and back-end engineering, blockchain and e-commerce payments, product design, and branding and corporate strategy. Contemplators share building business models, infrastructure and back-end engineering, and product design among their top five capability needs, but also require legal, risk, and compliance expertise, as well as analytics.

While we found metaverse adopters have to date most commonly implemented marketing campaigns or initiatives, some 63 percent have undertaken learning and development for employees and 53 percent have held virtual meetings. The least-used metaverse initiatives were recruiting or on-boarding new employees (31 percent) and allowing customers to pay with cryptocurrencies (22 percent). Yet executives are most bullish about cryptocurrencies as a metaverse technology (Exhibit 9).

Exhibit 9

Looking ahead, executives consider cryptocurrency, AI, and AR/VR the top three metaverse technologies.

Top 3 metaverse technologies, points-based ranking[1]

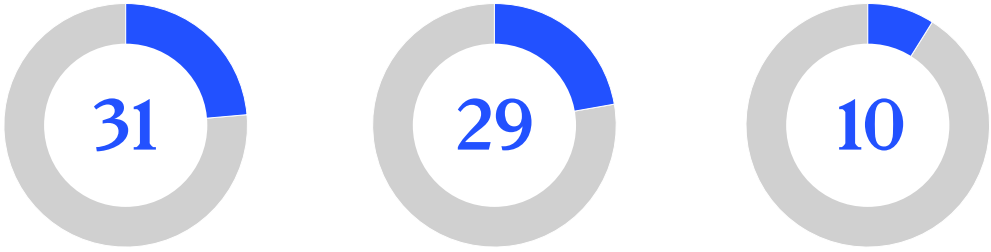


[1]Q: *What do you consider the top three metaverse technologies for businesses in the future?* (Rank top 3); Points ranking assigned with 3 points for every 1st ranked technology, 2 points for 2nd, 1 point for 3rd (n = 448).
Source: McKinsey & Company Senior Executive Survey, April 2022

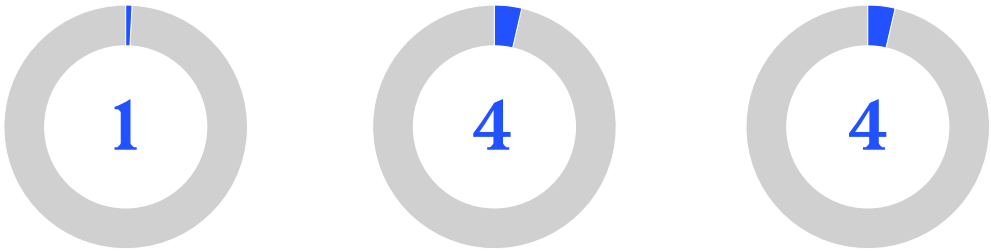
Exhibit 10

Executives highlight revenue uncertainty as a key barrier and worry less about the technology involved.

Top 3 barriers to entry, % of senior executives[1]



Bottom 3 barriers to entry, % of senior executives[1]



[1]Q: *What are the top three barriers for your company when adopting metaverse technology?* Top 3 barriers across industries were identified based answer most often indicated as top 1 barrier (n=448).
[2]Defined as core profit-making plan, or the way monetary value will be delivered.
Source: : McKinsey & Company Senior Executive Survey, April 2022

Senior executives with high confidence in the metaverse driving revenue impact are already building capabilities within their organizations. Yet respondents also cited several barriers to entry to the metaverse, despite expressing less concern about required technology (Exhibit 10). In addition, senior executives raised several risks that need to be addressed if the metaverse is to be successfully adopted. The top two were data privacy and cybersecurity (86 percent and 85 percent respectively), followed by ethics and regulatory compliance (60 percent), technological limitations (53 percent), brand image (45 percent), and payment safety (40 percent).

4

Envisioning the potential: How significant could the metaverse's impact be?

History has no shortage of revolutionary ideas that fail to materialize, or take much longer than expected. For all of the developments in AI technology in the past two decades—and its seeming ubiquity today—it took the better part of 80 years for AI to mature, having formally emerged as a concept during World War II.

The metaverse will likely be different. While it is in its early stages and far from its potential end state, the metaverse's underlying technology already exists. Users are accustomed to what it currently provides—and excited about what it could become. And, crucially, early metaverse adopters are organizing themselves differently to move at speed as it evolves.

A possible $5 trillion impact

A few years ago, investment in artificial intelligence was estimated at up to $10 billion. It is now $93 billion.[80] We expect the economic value of the metaverse to rise exponentially, driven by several factors: its appeal spans genders, geographies, and generations; consumers are ready to spend on digital assets (and are doing so already); they are open to adopting new technologies; companies are investing heavily

in the development of metaverse infrastructure; and brands experimenting in the metaverse are reporting positive consumer feedback. This adds up to substantial potential economic value for the metaverse. While estimates vary widely, we forecast it may generate up to $5 trillion by 2030 (Exhibit 11).

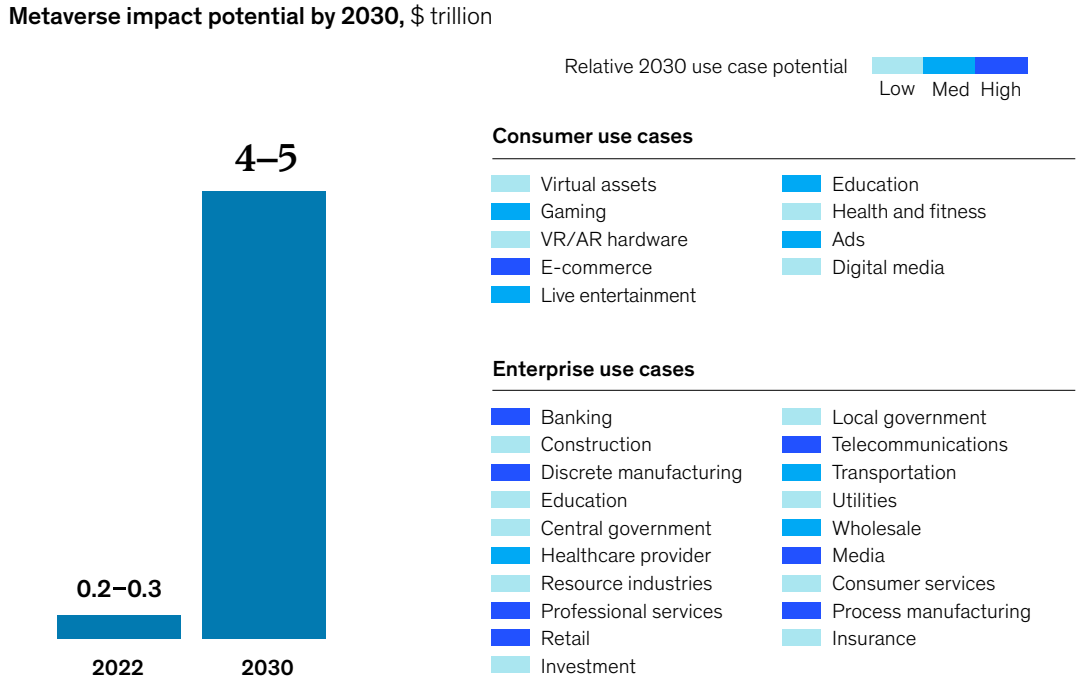
Our estimate of the metaverse's potential impact by 2030 is based on a bottom-up view of consumer and enterprise use cases, derived from discussions with around 20 internal and external experts. The most relevant metaverse use cases during the next decade were identified, with the overall enterprise IT share of spending dedicated to these metaverse use cases estimated and pressure-tested with experts. In short, our forecast is our best estimate given the very high levels of technical, regulatory, and societal uncertainty (for a detailed explanation of the methodology behind our sizing forecast, please refer to the Appendix[81]).

Potential sector implications

The metaverse is also emerging as the biggest new growth opportunity for several industries in the coming decade, given the sheer breadth of potential applications and uses and the degree of investment from large technology companies, venture capital, and corporations and brands. Industries are already implementing metaverse initiatives, although most efforts to date have been centered around marketing;

Exhibit 11

By 2030 the metaverse could generate $4 trillion to $5 trillion across consumer and enterprise use cases.



Source: McKinsey analysis; For a detailed explanation of the methodology behind our sizing forecast, please refer to Appendix B

learning and development for employees; virtual meetings, events, or conferences; and product design or digital twinning (Exhibit 12).

There is no shortage of examples of how companies are experimenting in the metaverse (see sidebar "Leading metaverse use cases"). In the following pages, we examine how five industries are already using the metaverse: apparel, fashion, and luxury; consumer packaged goods; financial services; retail; and telecommunications, media, and technology. We then explore broader societal implications and the metaverse's potential longer-term impact, both positive and negative. These industries are among those most likely to harness the metaverse for both consumer and business uses, where we believe it can generate impact across the value chain.

The opportunity to do this is captured in Exhibit 13, which examines four types of use cases:

— Net-new business models and revenue sources that project a company's penetration further into markets. An example would be retailers using the metaverse to drive the sale of physical products.

— Operations that produce higher productivity and collaboration, and lower costs. In the technology sector, for instance, that may be an efficient digital network of data centers in multiple locations at the same time.

Exhibit 12

Initiative preferences vary by industry; meetings and events are of particular interest to healthcare, and travel, transport, and logistics.

Metaverse initiatives implemented to date, by industry,[1] % of senior executives in each industry

Adoption level

High (>70%) | Medium (40–70%) | Low (<40%)

Industry	Marketing campaign or initiatives	Learning and development for employees	Meetings in the metaverse	Events or conferences	Product design or digital twinning	Recruiting or onboarding new employees	Customers can pay with crypto currency
Technology	68	64	54	64	54	39	23
Media and telecommunications	82	36	36	43	54	18	25
Advanced industries	64	55	36	64	64	36	9
Financial sector and insurance	67	63	56	49	56	25	31
Consumer, AF&L, and retail	95	56	59	41	50	41	14
Energy and materials	54	85	69	46	69	31	8
Healthcare and public sector	10	59	79	72	59	38	34
Tourism, transport, and logistics	56	78	56	78	56	44	22
Total sample	67	63	53	52	52	31	22

[1]Q: *What metaverse features or capabilities have you implemented in your company to date?* (n = 258).
Source: McKinsey & Company Senior Executive Survey, April 2022

Example use cases

Companies spanning industries are experimenting in the metaverse for everything from marketing to education and commerce. Here are some leading examples:

- **Product marketing:** Coca-Cola launched digital assets to support several marketing campaigns, such as auctioning NFT collectibles for International Friendship Day.[82]
- **Customer engagement:** Gucci launched its Gucci Garden on *Roblox*, a set of brand-themed rooms that aligned with the launch of a similar physical space.[83]
- **Next-generation commerce:** AnamXR uses game-engine technology to create cloud-based, virtual e-commerce platforms for 3-D immersive shopping experiences.[84]
- **Brand loyalty:** Adidas' Bored Ape Yacht Club NFT release provided access to physical streetwear drops, driving loyalty and creating a community around its virtual goods.[85]
- **Customer service:** Helpshift is rolling out solutions for customer-support tools in the metaverse, including user feedback, virtual identity verification, and VR support.[86]
- **Education:** The University of California at San Diego's Rady School of Management uses a virtual campus for real-time lectures, breakout spaces, and outdoor areas.[87]
- **Recruiting:** The Havas Group launched a village within *The Sandbox* that hosts recruitment services for improved candidate and onboarding experiences.[88]
- **Digital twins**: BMW is experimenting with creating digital twins of entire factories, and designing products using Nvidia's Omniverse technology.[89]
- **Public services:** Seoul's plan is to become the first city to host a metaverse platform for public services by 2023.[90]
- **Virtual tourism:** Ariva Digital's Wonderland platform is working to allow users to travel to imagined or recreated destinations.[91]

- Activities where companies promote themselves further with more engaging branding, marketing, and user-experience activities. For example, financial institutions created branches in the metaverse, offering immersive brand engagement.
- New products and services that provide seamless discovery, purchase, and post-purchase journeys. For manufacturers, that could mean fully personalized products given an XR layer, such as vehicles and devices.

Of all the potential drivers of the economic impact of the metaverse, e-commerce is the largest. We estimate it may have a market impact of $2 trillion to $2.6 trillion by 2030 depending on whether a base or upside case for the metaverse's development is realized, a contribution which dwarfs sectors such as academic virtual learning (an estimated $180 billion to $270 billion impact by 2030), advertising (a $144 billion to $206 billion impact), and gaming (a $108 billion to $125 billion impact). As you can see in Exhibit 13 and the industry examples in the following pages, realizing the potential for the metaverse to engage consumers and open new sales opportunities is critical to its overall development.

Exhibit 13

The metaverse can create impact across the value chain for sectors.

		Project	Produce	Promote	Provide
	Example use cases	**Innovating net-new business models and revenue sources**	**Operations with higher productivity and collaboration, and lower costs**	**Engaging branding, marketing, and user experiences**	**New products and services with seamless discovery, purchase, and post-purchase journey**
Apparel, fashion, and luxury	**Digital fashion & luxury goods** **Immersive brand engagement**	Monetize on existing intellectual property into new, immersive offerings (eg virtual assets or experiences)	Almost no production costs or supply chain issues for virtual assets Collaborative, XR-enabled product design and development	Immersive brand engagement and campaigns supported by experiences within virtual worlds (eg virtual events to connect with the community)	Branded virtual assets development with high profit margin Consumer products from static/offline to virtual/digital Next-level product personalization
Financial services	**New metaverse products and services (eg DeFi)** **Immersive brand engagement**	Trusted digital services including payments, digital IDs, and signatures Lombard lending with digital collateral, NFT financing, and other innovations	Further digitized payments and services infrastructure Decentralized financial (DeFi) structures driving efficiency	Contextual financial services, eg, for consumer lending or insurance Next-level digital customer acquisition Immersive, metaverse-enabled brand engagement	Revolutionized customer service reducing employee cost and improving customer experience (with virtual tools) Fully personalized financial offer enabled by metaverse data
Healthcare	**Metaverse-enabled telemedicine** **Collaborative R&D**	Significant shift of revenue streams to the next generation telemedicine	XR-enabled R&D Optimized hospital operations, now faster, safer, and more accurate Remote diagnostics and procedures	Fully immersive remote telemedicine e-healthcare services without physical distance barriers	Metaverse-data driven, fully personalized health consultations, with access to real-time data Metaverse-enabled robots treating patients solving for employee shortages
Manufacturing	**XR-enabled factory floor** **Collaborative R&D**	Offering XR-enabled manufacturing solutions - next level industrialization for customers Product personalization revenues	Software, robotics, platforms and apps to run and manage IoT manufacturing (eg, robot managed w/ digital twin) XR-enabled simulation for manufacturing and assembly, details up to "screw-level" XR-enabled, collaborative R&D with increased safety through remote work	Full client/user visibility into supply chain process Project real-time monitoring, collecting information and tracking data in MV that can later be analyzed	New manufacturing services leveraging interconnected robotics, IoT and tech via digital twins in the metaverse Fully personalized products given XR layer – eg vehicles and devices

Exhibit 13 (continued)

The metaverse can create impact across the value chain for sectors.

Retail	**XR[1]-enabled retail** **Metaverse-to-offline conversion**	New revenue from of branded virtual asset sales in the metaverse as an intermediary Using metaverse to drive physical product sales	Reduced need for physical stores and associated costs - driven by virtual-world only stores on metaverse platforms and XR-store enhancements	Enhanced in-store experience with tailored surroundings, eg ski shop on the slopes; XR-enabled try-on Customization of in-store experience	Direct-to-consumer shopping services regardless of physical distance
Technology	**Immersive digital media and experiences** **Hardware and interfaces**	New net revenue through share of virtual asset sales (eg commission basis) New ad-based revenue streams Profit from metaverse tech stack and content provision	Efficient digital network of data centers at multiple locations at the same time	Immersive content delivery experiences within the virtual space, leveraging the metaverse for the next level of digital media engagement	New, immersive media/content offering Devices enabling next-level immersive experience regardless of platform of technology (not only VR headsets) Metaverse-tailored software and tech stack

[1]1XR: Extended reality - Virtual Reality (VR) and Augmented Reality (AR).
Source: Expert interviews, McKinsey analysis

Apparel, fashion, and luxury

Shoppers already spend much of their day using digital screens and intend to spend the majority of their daytime in the metaverse within the next five years.[92] Is this where they will look to buy and wear fashion?

The signs are promising. *Decentraland*'s Metaverse Fashion Week in March received far more industry attention than any digital fashion event before it, attracting a wide variety of brands and creatives including Dolce & Gabbana, Estée Lauder, and Etro, although some notable players in the metaverse such as Gucci and Ralph Lauren did not participate. The experience was blockchain-based, created on "land" and sold as NFTs, with digital fashion bought and worn as NFTs.[93]

It also underscored the extent to which the sector has evolved. In 2000, some believed e-commerce could never be a luxury experience, yet today there is a deeper understanding that digital can lead to enhanced client experiences. If luxury is about being part of a community, the metaverse has the potential to enhance that. "There is probably an underestimation of the value being attached to individuals who want to express themselves in a virtual world with a virtual product, [through] a virtual persona," Gucci's executive vice president and chief marketing officer Robert Triefus said in our recent *State of Fashion 2022* report. "The idea that everything has to be physical is very quickly being disproven."[94]

Because of the fashion industry's ability to be both virtual and physical, we believe it will be at the forefront of the metaverse shift. Many brands are already embracing the opportunity to launch virtual clothing to tap into their consumers' increasing appetite for creating digital identities. Consumers see the unique value of fashion within these digital worlds, where creativity, status, exclusivity, and—most

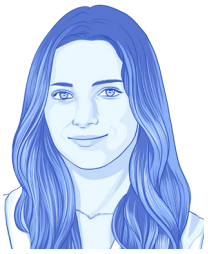
importantly—self-expression play essential roles for all users. In fact, around 70 percent of US consumers already say their digital identity is as important as their real-life identity,[95] which is why fashion is the one of the industries perhaps most uniquely positioned to shape the metaverse. It makes business sense too: the gaming skins market reached about $40 billion in 2020,[96] and platform reinventions could make the metaverse the biggest growth opportunity for fashion since e-commerce.

"Consumer behavior has largely shifted toward adopting digital personas, yet many brands have yet to provide a solution," AnamXR cofounder and CEO Irene-Marie Seelig told us. "This opens up a whole new revenue model for brands who can supply digital assets like clothing, for example."

How companies currently use the metaverse

The fashion industry's early experiments with virtual worlds have largely been via launches of virtual clothing (in games such as *Roblox*, for instance, it's normal for players to update their avatars daily). Several apparel companies have flexed their creative muscle: for example, Balenciaga dropped a line of virtual gear and apparel in *Fortnite* together with a physical collection, resulting in a more than 40 percent increase in searches for its brand two days after launch.[97] And fellow luxury-goods retailer Gucci sold a virtual version of its Dionysus bag for the equivalent of $6 on *Roblox*, which later led to bids of more than $4,000 per bag when resold on the second-hand market, which is higher than the price of the physical bag.[98]

Much of the frenzy about fashion metaverse launches has centered around NFTs—for instance, Adidas' NFT collaboration with Bored Ape Yacht Club resulted in sales of more than $100 million.[99] We believe the longer-term opportunity for fashion brands is engaging consumers with NFTs for more pragmatic purposes, such as loyalty tokens or digital twins. NFTs from Gucci, Adidas, and The Hundreds, among others, trigger loyalty benefits like early access to new NFT drops and physical products, essentially serving as a membership program. NFT digital twins can host information about a physical or digital product's history, authenticity, and ownership—especially beneficial to luxury retailers battling counterfeiting.



'Consumer behavior has largely shifted toward adopting digital personas, yet many brands have yet to provide a solution. This opens up a whole new revenue model for brands who can supply digital assets like clothing, for example.'

—Irene-Marie Seelig, cofounder and CEO of AnamXR

Embracing the virtual world

Virtual experiences in various formats have also been popular. For example, Gucci launched the Gucci Garden—a two-week art installation on *Roblox* that attracted 20 million visitors.[100] Louboutin partnered with the Korean gaming app *Zepeto* to launch a virtual "Loubi World," where VIPs and press were able to see its spring-summer 2021 collection while discovering Paris landmarks—and interact with a digital twin of Christian Louboutin.[101] Marni's Wear We Are metaverse experience, powered by AnamXR, was an immersive digital journey with interacting 3-D scanned models from Marni's spring-summer 2022 fashion show.[102]

"For luxury brands, the metaverse provides a gateway to offer unique experiences for holders," AnamXR's Irene-Marie Seelig said. "We are transforming our luxury metaverse platform to be a more evergreen, always available experience for brands that are starting to venture beyond one-off campaigns, and we have recently also introduced 'token-gating' for brands seeking to extend the sense of exclusivity to the metaverse."

Gamified experiences have also proven a powerful channel. Vans' "Vans World" on *Roblox*—where users can skateboard and dress their avatars in Vans Apparel—tallied around 60 million visitors in the year since it was launched in April 2021.[103] Similarly, Nike launched NIKELAND on *Roblox*, attracting more than ten million visitors from December 2021 through April 2022.[104] Some companies have even developed video games outside existing virtual worlds, such as Louis Vuitton releasing a game last year where players could acquire NFT art while experiencing the life journey of the brand's founder.[105]

What could come next

The creation of their own platforms and virtual worlds—which risks further fragmentation and issues with interoperability—could be the next step for fashion and luxury brands in the metaverse. So far, companies have been treading lightly, choosing less resource-intensive ways to enter the space. One exception is virtual-only incumbents such as Fabricant, which has already partnered with various apparel companies including Adidas, Under Armour, and Tommy Hilfiger.[106] DressX, another virtual fashion start-up, features more than 100 designers and 1,000 created items, and has partnered with well-known fashion brands including H&M.[107]

As mentioned, luxury brands are developing immersive virtual spaces—as Australian designer Daniel Avakian has. Customers can visit no matter where they are and have a boutique experience in a virtual representation of his New York store, while staff can also work across both metaverse and physical locations—when one is quiet, they can tend to the other.[108] It is an early example of the kind of new experience that can be developed.

There are significant challenges, however. While pioneers have shown the metaverse provides opportunities that echo or even improve those in the real world, their potential remains unclear—and most companies are proceeding carefully. There is also concern about brand dilution, especially within luxury, as companies contemplate association with digital items and how that may derail their image from core, luxury brand positions. An additional consideration is the maturity of AR/VR technology, in which glitchy applications can undermine the user experience of luxury goods, presenting an image and consumer engagement threat. Brands should consider what is necessary to strike the right balance between testing and learning, and ensure they are rigorous in thinking through potential outcomes of actions taken in this new, exciting, and seemingly limitless space.

There is also the issue of what a metaverse venture means organizationally. Generating sustainable revenue from virtual worlds will require entirely new capabilities and an almost diametrical talent shift in the creative design process as well as digital execution. Brands may need to review existing

organizational structures and skills, update their recruiting strategies, likely establish innovative partnerships with metaverse platforms, and acquire start-ups in the space.

Yet the level of connectivity in the metaverse for certain users already shows how the virtual world could have a significant influence on consumer habits and trends in the physical world, not to mention how this may inform which physical designs are ultimately produced and sold.[109]

Consumer packaged goods

Consumer packaged goods (CPG) companies may face challenges in the metaverse as their products are traditionally connected with practicality and usability in the physical world. In virtual spaces, day-to-day consumer activities such as eating, drinking, or cleaning will be replaced by immersive experiences. Yet consumers seem excited to see CPG brands entering virtual worlds, which indicates there's an opportunity for companies to actively shape their destinies.

How companies currently use the metaverse

Metaverse offerings may present high-margin revenue streams for CPG companies, which typically operate under significant margin pressure. While it would likely remain far smaller than core revenue streams and be more focused on marketing and consumer engagement in the near-term, we see opportunities for CPG brands across two of the metaverse's layers: content and experiences, and platforms.

Digital assets and virtual experiences have so far been the most popular play. For example, Hasbro's popular toymaker Nerf launched Nerf Hub in *Roblox*, selling virtual in-game items,[110] and Coca-Cola launched a digital jacket to be worn in the 3-D virtual world *Decentraland*.[111] Companies have also launched NFTs, using them as an innovative way to foster customer loyalty by extending unique privileges to NFT holders.

With regard to virtual experiences, CPG brands are increasingly active. For example, P&G Beauty entered the metaverse with a virtual storytelling world called BeautySphere[112] and, in February this year, L'Oréal filed 17 patents related to NFTs and the metaverse—a testament to its ambitions. More CPG brands are likely to follow if consumers shift more experiences to the metaverse, especially considering companies' known engagement with events and sport sponsorships. As virtual worlds evolve and customer attention increases, parts of capital devoted to sponsorships are likely to flow into virtual worlds, fueling virtual experiences.

What could come next

Just as Web 2.0 and social media were successors to offline marketing, these early virtual initiatives are to some extent simply a new generation of promotional tools. CPG brands should consider how they can use their brand power to venture into new business-building opportunities in the metaverse. And it will be especially important if, as many believe, the digital world becomes even more dominant in our lives.

It is not necessarily simple. As it has been noted, the metaverse vision is especially challenging for CPG brands whose business models are deeply rooted in physical consumption. So far, they are exploring digital assets and virtual experiences as promotional vehicles. There may come a point where they either continue to focus on branding and promotion that drives metaverse-to-offline conversion, or explore the opportunity to build virtual offerings creating long-term value independent of physical products.

In the short term, it seems likely big-name brands will enter the metaverse first to secure their position, with others following as the commercial use case is proved over time. In deciding when to enter, CPG companies should carefully weigh potential first-mover advantages (including short-term promotion and

learning early lessons) against the inherent uncertainty this new opportunity entails. And in deciding how to enter, CPG leaders should consider the organizational capabilities required to make their metaverse plans a reality, especially if these extend to undertakings such as developing experiences, games, or worlds. The preferred strategy may be to collaborate with established tech providers, as LEGO did with Epic Games to shape a metaverse space for young players.[113]

One big question surrounds the resources CPG companies should direct to the metaverse. Many hold immense advertising budgets: P&G's global marketing spending was around $8 billion in 2021, for example, while Unilever spent about $7 billion.[114] Leaders will need to balance maximizing additional customer engagement from the metaverse while maintaining a healthy ROI, especially when deciding whether to explore high-investment, less proven options such developing their own gamified experiences or virtual worlds.

For brands and retailers in the medium to longer term, the metaverse will be about adding a new sales channel to the omnichannel mix. This is also critical to unlocking the metaverse's ultimate potential. It will succeed in the consumer sector if it further blurs the line between the concepts of "online" and "offline" to create a unified experience. And it may not only create rich, intense, and seamless customer experiences that can span the physical and digital worlds, but also collect valuable new data points for understanding customers in a cookie-less world.

Financial services

The metaverse brings together online social networks, gaming, cryptocurrencies, and increasingly diverse digital assets to enable novel services and experiences. Financial services companies have joined peers across industries in exploring the potential opportunity in the metaverse, though few are yet attempting this at scale. The likely future extent of the impact of the metaverse on the sector depends on the evolution of the underlying technology (especially utilizing Web3) and on the degree to which platforms are adopted as part of our daily interactions.

How companies currently use the metaverse

There is already a clear distinction between how financial institutions have been engaging with the more traditional Web 2.0 metaverse and experimentation in Web3-enabled metaverse venues. In the context of Web 2.0, we see financial services companies utilizing the technology for employee training (for example, Bank of America VR training[115]); creating virtual "financial towns," telecommuting centers, and interaction spaces (such as South Korea's KB Kookmin Bank[116]); and offering virtual investment advisory services (for instance, NH Investment & Securities[117]). While these applications are quite mature, their impact on the fundamental business model in financial services has been only modest.

In the Web3-enabled metaverse, we are starting to see more creative models of engagement. For example, HSBC has purchased virtual land in *The Sandbox* dedicated to engaging with e-sports enthusiasts.[118] As London-based fintech Sokin is building infrastructure for processing metaverse payments, transactions, and investments,[119] neobank Zelf is launching embedded banking for metaverse gamers via its MetaPass in Discord.[120] Several companies including North American technology company TerraZero are providing back-end support for virtual real estate financing in the metaverse.[121]

There is no shortage of financial services companies exploring the utility of the latest evolution of the metaverse. As its function transitions from primarily consumer entertainment to more commercial applications—and from niche social interactions to become a social network—the opportunities for the sector will only expand, including the following examples:

— **Marketing:** Institutions may create digital branches in the metaverse to build their brand and credibility with users, demonstrate their ability to innovate, and even offer client interactions in a hybrid way with more traditional digital or even physical channels.

— **Infrastructure:** Financial institutions, especially more traditional ones, are uniquely positioned to bridge the trust gap that has traditionally held back wider adoption of services such as digital IDs, digital payments, or custody for NFTs, cryptocurrencies, or other digital assets.

— **Emerging products and services:** As cyber insurance for companies and similar services become more commonplace, insurers and cybersecurity companies are well positioned to capture parts of this emerging value pool, maybe even in novel collaboration and models.

What could come next

As the metaverse potentially captures a larger share of day-to-day human interactions, digital versions of more sophisticated banking services could emerge to serve these users. Examples could include:

— embedded bank-like services for wallet owners in native metaverse venues, such as multicurrency cash management

— back-end servicing for financial services, like virtual real-estate mortgage origination and warehousing

— funds and investing services for metaverse projects, such as metaverse-specific investment funds

— customer engagement enhancements, like gamified credit education and unique loyalty experiences

— financialization of everything, as more digital assets get created with utility in a metaverse context, such as being employed as collateral for loans

Growth in these use cases will depend on the extent to which the metaverse is adopted. And the value and convenience of financial services in the metaverse must exceed the current utility of online or bricks-and-mortar servicing. If engagement in the metaverse gains momentum, more and more financial service companies will need to decide between investing and entering at scale, establishing a minimal position, or doing nothing for now. It's a decision that depends on four factors: the willingness to bet on the future value of the metaverse; the talent, capacity, and capability to develop a relevant position; the scale of potential metaverse customers and relevance for the existing and future customer base; and the extent to which the metaverse vision fits with the strategy and culture of a company and its employees.

Not entering the metaverse is also a strategic choice. But while widespread metaverse adoption and the development of significant revenue pools in financial services may take time, many companies may decide an early investment is an appealing strategic hedge, especially with the increasing integration with digitally native assets.

Retail

Traditional retailers have in recent decades felt the squeeze of technological change, especially in the past two years as physical retail has been forced to evolve into an omnichannel environment. Strong competitive advantage is likely to now flow to retailers who understand how to use the metaverse to enhance their stores and engage customers, build experiences, and foster their brand community. That may require shopping concepts very different to those used traditionally, especially those used in bricks-and-mortar stores.

How companies currently use the metaverse

The idea of virtual and digitally enhanced retail is not new. With experiments such as Farfetch's Store of the Future in 2017,[122] among many others, the concept of merging the worlds of physical and digital for stores is established. After all, 25 percent of consumers have shopped in a virtual store today—and about 70 percent of them made a purchase.[123] Now the emergence of the metaverse has made the opportunity clearer than ever.

A range of metaverse-powered approaches and applications can be deployed in-store. Brands can leverage VR/AR to offer a new level of experience: 3-D, navigable, and branded spaces allowing customers to experience and buy virtual or physical goods, while also leveraging the technology to enable customers to try out products not available in store. There is also another advantage: in addition to more sales, there may also be fewer returns as consumers have a clearer sense of products being purchased. Appliance company Dyson, for example, launched a digital store accessible through a VR headset, allowing customers to "walk" through and test its products virtually.[124] Meanwhile, multiple US furniture retailers such as Crate & Barrel, Walmart, West Elm, and Wayfair have partnered with Pinterest to use AR to enable consumers to see how furniture will look in their living rooms.

The development of online, virtual worlds also allows retailers to expand their footprint. Instead of having stores in every city, a brand can build one in the metaverse for customers globally. Some are already exploring this path. Samsung launched a virtual store in *Decentraland* at the beginning of this year, modeled on its physical Samsung 837 store in New York City, enabling customers to complete different quests to earn NFT badges.[125] Retailers including Ralph Lauren, Urban Outfitters, and Walmart have filed trademarks related to opening virtual world stores,[126] while a parcel of land within *Decentraland* was sold for almost $1 million for the establishment of an online shopping mall.[127]

Finally, like apparel, fashion, and luxury-goods companies, retailers can use the metaverse for advertising, brand activation, and recruiting purposes. For example, Chipotle established a virtual restaurant in *Roblox* for a Halloween campaign, giving a voucher for a real-life burrito to any visitor wearing a costume. And Carrefour even launched a metaverse-based recruitment effort as it pursues its goal of hiring 3,000 data experts by 2026 to drive its digital transformation.[128]

What could come next

The metaverse presents an opportunity for retailers to reimagine and personalize the store environment for individuals and groups of customers. For example, using VR technology, customers at a sporting-goods retailer could shop in settings matching the specific sport they are buying equipment for, such as shopping for ski equipment in a virtual version of the Alps and even trying skis in virtual reality.[129] Metaverse malls are also being created, featuring storefronts where users can interact through their avatars. Boson Protocol, for example, has a mall in *Decentraland* allowing users to explore digital items and buy an NFT voucher that can be redeemed for the item in the real world.[130]

The success of the metaverse in retail depends on the creation of a virtual world in which to engage, such as stores and shopping malls. Consumers increasingly see their digital shopping experience becoming a rich ecosystem across multiple online channels, and the metaverse may be a natural expansion of that. The key is not just bridging the gap between the physical and digital, but creating a consistent customer experience. Already, we see research showing that such multichannel formats and marketplaces will drive the vast majority of sales growth in Europe and the United States during the next five years.[131] In this context, personalized promotions and privileges may be powerful marketing strategies for retailers in the metaverse, with the potential for deeper relationships with customers.

Despite the substantial promise of the metaverse, the emergence of a new channel means retail executives also have significant challenges and questions they will have to tackle. They will need to consider how the metaverse could impact physical stores, for example, by further shifting consumers' preferred shopping channels. Retailers will need to seek the right balance between their existing physical retail network and virtual-world offerings, aiming to develop a seamless connection between the two to drive real-world sales. For example, Forever 21 recently opened a store on *Roblox* and capitalized on a popular trend among metaverse users: the idea of "twinning" with your avatar, buying the same clothes and accessories for your real-world self. The result? A best-selling virtual-only item on *Roblox*, a black beanie hat, made its way to the company's physical stores.[132]

Yet retailers need to carefully monitor how the metaverse develops. While its promise is incredibly exciting, reality currently trails imagination. Retailers could bet on realizable use cases and customer-friendly experiences, while continuing to scale their investment in in-store technology. Finally, while the metaverse can be a boon to retailers, they need to ensure the maturity of the technology does not pose risks to their brand. Already, pioneers experimenting with virtual stores have encountered technical difficulties: for example, many customers were unable to access a high-tech company's virtual store during a launch event.

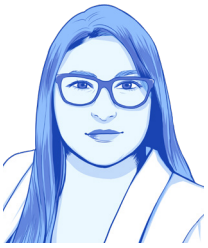
Technology

The metaverse presents a massive opportunity for technology companies, both existing and yet to be born. The metaverse technology stack consists of four core components made up of ten layers (as described in Exhibit 1 on page 16), and reaching its full potential will require a broad range of technology innovations. There are three areas in particular that are emerging as control points likely to capture the lion's share of value created:

— **Infrastructure:** Metaverse environments need to deliver real-time 3-D experiences at scale to millions (or even billions) of individuals. Latency is generally seen as the hard problem in delivering these immersive and interactive experiences. Additionally, these experiences will require computational efficiency to improve by two to three orders of magnitude, along with innovation across devices, edge computing, and cloud capabilities.

— **Developer tools and platforms:** Building 3-D experiences requires a very different set of developer tools and platforms than the current developer stack on web and mobile. This ranges from design tools (such as 3-D modeling, animation, and audio) to core engines and rendering to back-end services (for example, LiveOps, multiplayer services). AI will also play a critical role in the metaverse, from tracking and predicting motion to real-time rendering of worlds, content creation, and optimizing operations.

— **Virtual worlds and content:** Today, there are more than 100 virtual worlds, most of which are focused on gaming or social experiences and with wide variation in graphics fidelity, immersivity, and centralization. While a few major platforms will emerge, we expect continued fragmentation, with higher levels of interoperability. We also expect platforms attracting creators and optimizing creator economics will have a significant competitive advantage. On the content side, there will be at least three archetypes that will populate the metaverse: first-party content, developer content, and user-generated or creator content. Brands are also likely to become creators and participate in the metaverse in a very different way from traditional advertising models.



‘We don’t want to escape reality but rather embrace and augment it with virtual content and experiences that can make things more fulfilling and make us feel more connected to our loved ones, more productive at work, and happier people.’

—Cathy Hackl, chief metaverse officer and cofounder of Journey

Four technology enablers

Four key technology enablers will also be required for the metaverse to reach its full potential. The first is devices across AR/VR, sensors, haptics, and peripherals. Devices are critical to driving adoption of the metaverse and we are already seeing an accelerating pace of innovation. There are around ten major AR/VR devices in the market today—ranging in price from about $300 to $3000—and up to ten more major device launches are expected in the next year or two. Yet significantly more progress is needed across display quality, usability factors such as weight and battery life, and computing power. While many of these capabilities can be delivered in isolation today, balancing all of them in the right form factor is a problem that will likely require years of innovation.

The second technology enabler is interoperability and open standards. Interoperability is a nuanced problem with user-facing components like identity and ownership as well as elements facing developers and creators such as cross-platform development, file formats, the consistent behavior and physics of objects in 3-D environments, distribution, and monetization. Web3 infrastructure potentially unlocks some of these, as do emerging standards like USD, glTF, and OpenGPU. However, as with devices, we are in early days and likely a few years from overcoming interoperability hurdles.

The final two major enablers are platforms to facilitate the metaverse economy as well as tools for building a safe and secure metaverse. For the economy we will need a new set of access and discovery tools, as well as platforms that facilitate payments and monetization, including advertising. Security, identity, and privacy concerns in the metaverse are greatly magnified given the increase in the level and complexity of data collected, as well as increased risks around impersonation, harassment, and the potentially increased need for content moderation in 3-D environments.

Potential broader implications

The best intentions can have unintended consequences. Stakeholders need to be mindful of the broader implications of their actions and, at a minimum, learn from past generations of online community and platform builders to define a roadmap toward an ethical, safe, and inclusive metaverse experience. The intent should not be to build another social web, but a societal-scale construct that puts people first.

“Much of what we’ve read about the metaverse from sci-fi has been pretty dystopic, but I do think we need to envision what it will look like so we can build toward a more positive view of the future,” Cathy Hackl, chief metaverse officer and cofounder of Journey, told McKinsey’s *At the Edge* podcast. “We don’t want to escape reality but rather embrace and augment it with virtual content and experiences that can make things more fulfilling and make us feel more connected to our loved ones, more productive at work, and happier people.”

Maximizing the human experience

One filter through which all decisions around a company's involvement in the metaverse should pass is to ask: how will this augment and elevate the human experience? "The conversation needs to be about the kind of platforms we want to create, and what we can learn from the past 15 years of mobile platforms," the VP of Epic Games' Unreal Engine Ecosystem, Marc Petit, said. "If we want a creator economy—if we want our kids to have jobs that we could not even dream of ourselves—how do we think about those platforms as citizens, companies, and regulators? Because they are going to be hugely important for the future, and we've already learned a lot from the social-media era that we need to factor in."

As the opportunities and challenges of the metaverse continue to evolve, we anticipate an evolving set of design principles to help guide the creation of experiences that consider the needs of people from the start. Designers often define a set of principles to establish an agreed-upon approach and boundaries within which to ideate. We believe five design principles should guide initial iterations of the metaverse:

1. **Build a people-first experience,** always considering the needs of people and how outcomes can potentially impact them.

2. **Shift from social to societal,** moving away from tools that simply allow communication to those emphasizing relationships between people, places, and brands.

3. **Design responsibly,** creating stellar experiences for people that ensure they're not disconnected from reality.

4. **Make accessibility and inclusivity a feature,** enabling all people everywhere to participate and fully express themselves.

5. **Reduce the physical and mental friction** by adapting decades of 2-D and 3-D user-experience design to ensure we engage with each other in a more human way across worlds.

Focusing on the human experience within the metaverse is a must, not an option. To reap the full benefits and opportunities of the metaverse, brands, companies, and agencies have a responsibility to design positive experiences for consumers, end-users, and citizens. "One of the biggest hurdles that the metaverse is going to need to overcome to move forward is helping people see what they couldn't see before, know what they didn't know before, and feel what they couldn't feel or didn't know to feel the day before," Salesforce's global innovation evangelist Brian Solis said. "What the metaverse is really all about is community. The value of belonging to this community. The role you can play as a user in this community so that you feel like a stakeholder and not as a 'user.' These are some of the human-based hurdles that I'm not hearing discussed enough."

Broader implications

There are clearly significant societal implications stemming from the development of the metaverse. It will connect people not only to each other but to everything from brands, places, cities, governments, and services in new, meaningful, and profound ways. Thinking of the metaverse through a societal lens imbues the user experience with a sense of belonging *and* responsibility to one another. This mindset is crucial to building worlds within the metaverse that are human and strengthen bonds to each other, to real places of belonging, to agencies, and brands. "From a cybersecurity perspective, it's not just about servers, nodes, or networks anymore," XR Safety Initiative's Pearlman told us. "The attack surface has expanded to our human brain and our living spaces because we can now extend screens and activities into our real-world surroundings."

Relying on the goodwill of those participating in the metaverse may not be enough: social media, for example, has become one of the most influential forces of our time, for good and ill. “The internet was an extremely decentralized concept from the beginning by design,” Niantic’s Hanke said. “But it evolved in a certain direction, and it’s evolved so far in that direction that people are recognizing the limitation of that. My feeling is it is swinging back towards a more open model, where people will attain more sovereignty and control over their data and information.”

Areas we believe may require guidelines include:

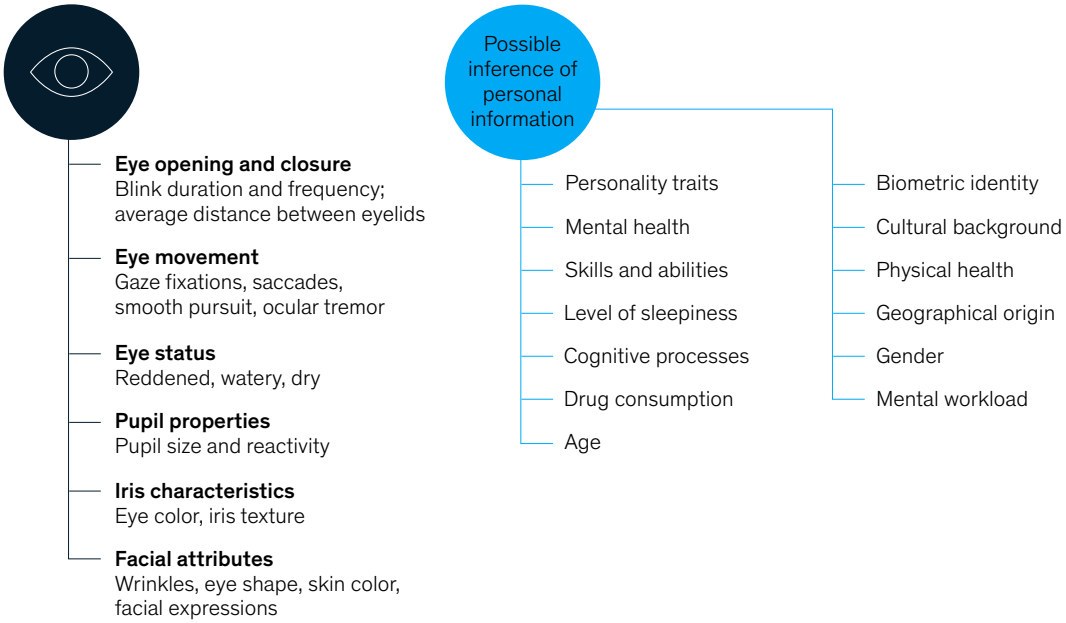
— Data privacy, notably to ensure individuals retain control over their personal data. The metaverse promises new types of personal data (such as eye tracking, sensor data, and room mapping) tied to an identity which, with underdeveloped security capabilities, may endanger personal identity and privacy (see Exhibit 14 for some potential uses of eye-tracking data able to be collected by XR technologies).

— Security, not only in relation to cybersecurity but also to payments.

— Ethics and regulatory compliance to ensure the metaverse is a safe environment, such as by moderating content and addressing the use of online anonymity to commit crimes.

Exhibit 14

There are multiple possible uses of eye-tracking data collected by XR technologies.



Source: Pearlman, Visner, Magnano, and Cameron, "Securing the Metaverse - Virtual Worlds Need REAL Governance," XR Safety Initiative, 2021, retrieved from https://www.sisostds.org/

‘This is the right time to be thinking, okay, in real life, you have playgrounds and schools. And very clearly, they’re fun, playful spaces. But, equally, in the same way that you wouldn’t have a child walking alone after midnight in the middle of Soho, you wouldn’t want the same thing to happen in the metaverse.’

—Rob Lowe, managing director of Digital Play at LEGO Ventures

— Physical health, such as measures to mitigate the risks of addiction, protect physical and mental wellbeing, and promote outdoor activity (even potential issues such as vertigo need to be considered in a VR environment).

— Sustainability, as the metaverse’s computing infrastructure is resource intensive; this applies to multiple elements, from state-of-the-art VR—which may create about 2,000 pounds of carbon emissions over five years—to the massive amount of computing power (and energy) required to process blockchain transactions; as the United Nations Environment Programme notes, policymakers may “need to adjust regulations to spur the development of future energy systems while mitigating environmental risks.”[133]

— Equity and fairness, seeking to eliminate bias in metaverse-driven decisions and promote diversity and inclusion; today, fewer than a third of creators of interactive experiences are women, which affects the types of experiences being created; also, women are also three times more likely to experience VR nausea.

The metaverse may bring extensive societal change. People could be working in a virtual world, playing games together, owning virtual assets, consuming virtual land and goods, socializing in virtual spaces, and creating worlds and items. We are not suggesting holding back from experimenting in the metaverse until the road map seems clear—that could place organizations at a competitive disadvantage that might be hard to recover from. Rather, organizations should take care to develop products responsibly, taking the opportunity to embed and engender digital trust while the metaverse is still in its formative stage. We are already seeing allegations of disturbing behavior within metaverse worlds,[134] underscoring the need to address emerging issues before they potentially become systemic problems.

“This is the right time to be thinking, okay, in real life, you have playgrounds and schools. And very clearly, they’re fun, playful spaces,” LEGO Ventures’ Rob Lowe said. “But, equally, in the same way that you wouldn’t have a child walking alone after midnight in the middle of Soho, you wouldn’t want the same thing to happen in the metaverse. So, how can we build that in a way that allows kids to have these creative, social experiences that they deserve and want to have, but build it in a way from the ground up so we’re not trying to layer over it and fix it in the future?”

5

Moving at speed: How do you capture value, and what can you do today?

Those who spend time researching the nascent metaverse will understand its appeal. The question for leaders then becomes two-fold: what role do you want your company to play, and how should you prepare? Companies have various ways they can participate in and capitalize on the metaverse, ranging from what we call “world builders” (building and orchestrating a proprietary digital world and platform) to providing products and services to metaverse users or building hardware and software. Yet defining your metaverse ambition is the just first step toward developing a strategic stance.

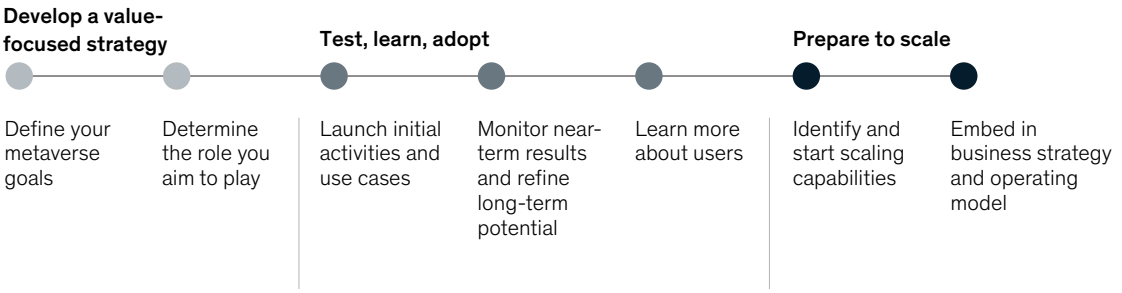
Developing a business strategy for capturing value

It is always an option to simply not participate in the metaverse. In our view, that may result in a significant competitive disadvantage: customers are moving toward the metaverse and, while the degree of any company’s involvement may vary, it is important to consider how it may impact your business both positively and negatively and formulate a strategy.

Consider a step-by-step approach (Exhibit 15) to prepare your business:

Exhibit 15

Steps to prepare your business for the metaverse.



— **Develop a value-focused strategic stance** in two steps:

1. *Define your metaverse goals*, such as whether you want to generate demand across existing and new segments, build communities, and create new revenue streams.

2. *Determine the role you want to play*, from building experiences to facilitating interactions and enabling infrastructure.

— **Test, learn, and adopt** in three steps:

1. *Launch initial activities and use cases*, exploring opportunities such as NFTs, immersive experiences, native advertising, and having a metaverse presence.

2. *Monitor near-term results to refine long-term potential* by identifying the right metrics for initial activations and testing long-term monetization options.

3. *Learn more about users*, examining behavior on different platforms and undertaking primary research.

— **Prepare to scale** in two steps:

1. *Identify and start scaling capabilities* through sourcing the talent required and establishing the necessary technology infrastructure and tooling.

2. *Embed the metaverse in your business strategy and operating model*, while clearly identifying who will drive the initiatives in your organization.

Actions for executives to consider

The metaverse is likely to impact not only how businesses interact with customers, but how companies operate. Human resources will have new ways to undertake learning and development and recruiting. Strategy teams will be able to examine new revenue streams and business models. Marketing is already tapping the metaverse's potential. Sales teams will be able to host and attend events and conduct consultations and negotiations. Customer support may use the metaverse for service calls or to directly demonstrate actions. Research and development will be accelerated through the use of digital twins and new design tools. Even the operations function could leverage the metaverse for general and administrative tasks.

There is no avoiding the fact that if you want to both understand consumers and opportunities that may be available to your organization, you need to be familiar with the metaverse. Make an effort to explore *Roblox*, *Fortnite*, *Minecraft*, or a similar gaming experience. Explore *The Sandbox* or *Decentraland*—and connect a MetaMask wallet.[135] Join a Discord server or spend time on a Twitch channel. Check out the NFT marketplace. Strap on a VR headset and try a new experience. Have a virtual meeting or event on a platform such as *Gather Town*. You will be better armed for making informed decisions.

"What I've seen over the past year is that a lot of companies and brands have begun to dip their toes in the metaverse, maybe it was a marketing effort, but now they're taking a step back and asking, 'What does it really mean?'" said Cathy Hackl, chief metaverse officer and cofounder of Journey. "They're really wondering what this means for their company, for their brand DNA, for everything that they stand for. Some of those early assumptions and pilots might fail, but the brands might still get a pass. But if you wait a year and a half or two years to do something, to have a clear strategy, and to start testing these assumptions, it might be a little bit too late."

Actions for policymakers to consider

The challenges of regulating technology today will also exist in the metaverse—and some may be amplified. The role of technology in all aspects of our lives—especially during COVID-19—has led to renewed discussion around how regulation needs to evolve. As Charlie Bell, Microsoft's executive vice president of security, compliance, identity, and management, pointed out in a recent blog post: "The problems of yesterday's and today's internet—impersonation, attempts to steal credentials, social engineering, nation-state espionage, inevitable vulnerabilities—will be with us in the metaverse."[136]

There is already debate on a number of critical topics, including open access to the metaverse; competition and promoting innovation; intellectual property rights; commerce, monetization and distribution models between stakeholders; promoting diversity, equity, and inclusion; securing user safety and awareness; and ensuring data privacy. Policymakers will benefit from planning ahead and defining the legal, policy, and governance of the metaverse and its broad implications in these discussions. This includes addressing these issues, building the capacity to evolve policymaking while keeping up with metaverse developments, and executing the policies in the market. For example, local government bodies may define policies in line with local regulations, while collaborating with global government bodies on standards and policies and engaging leading corporations and private groups to proactively guide metaverse development.

Public-sector entities also have an opportunity to reimagine public services and infrastructure in the metaverse. For example, the metaverse opens new avenues to providing government-related and other public services like education and healthcare, creating employment, and planning community spaces. One key challenge will be enhancing the talent base in the public sector so it can shape priorities and a road map for the greatest social good, and execute against them in partnership with technology providers.

Early examples are already emerging of city governments outlining their metaverse strategies and bringing their first initiatives live. As mentioned earlier, Dubai aims to increase the contribution of the metaverse sector to its economy to $4 billion by 2030,[137] and its Virtual Assets Regulatory Authority announced plans to establish Metaverse HQ in *The Sandbox* platform.[138] And the government of the city of Seoul plans to spend at least $32 million on a metaverse ecosystem to improve city services as well as planning, administration, and support for virtual tourism.[139] "We want to create a free space for participants to flexibly come together and communicate with one another," the CIO of Seoul's Smart City Policy Bureau, Jong-Soo Park, said. "We then wish to provide custom administrative services without restrictions of time and space."

National and local governments will need to define for themselves the right time to act. On one hand, policymakers may find it difficult to develop detailed regulatory frameworks for governing the metaverse while it remains so fluid. But, on the other, governments can already plan ahead and build the structures and capacity to be able to stay abreast of changes and respond quickly when needed. This will also allow them to engage with private-sector stakeholders, and proactively guide the development of the metaverse—even outside of concrete regulation.

Conclusion

What will the metaverse be? And what will it do? Consumers and businesses are already beginning to explore ways it can deepen connectivity and complement everyday activities. And, within a decade, the metaverse has the potential to drive a very different world.

By 2030, it is entirely plausible that more than 50 percent of live events could be held in the metaverse. More than 80 percent of commerce could be impacted by something consumers do there, from discovering brands to visiting a virtual store. Most learning and development could happen in a metaverse environment, as could most virtual or hybrid collaboration. Asset-heavy enterprises such as manufacturers and telecommunications companies may have virtually all assets and processes represented in a digital mirror, and the same applies to the simulation of physical products and spaces to aid their design. We expect the average internet user to spend up to six hours a day in metaverse experiences by 2030.

Such generational changes rarely happen overnight. They tend to take years and are the result of an accumulation of incremental advances, driven by an ethos of experimentation on platforms that allow creativity to flourish. And because they ultimately result in fundamental changes to our lives, they may also present risks for individuals and society. In describing an earlier era of technological disruption, then-Senator John F. Kennedy in 1960 described automation as "a revolution bright with the hope of a new prosperity for labor and a new abundance for America—but it is also a revolution which carries the dark menace of industrial dislocation, increasing unemployment, and deepening poverty."[140]

Stakeholders have an opportunity to shape the metaverse in a way that fosters greater social cohesion, reduces inequality, widens access to education, and acts as a catalyst for social mobility. The metaverse should not be a substitute for the real world or the in-person connections that bind us. It should complement what people do and, like virtual and in-person offices, allow free movement between the virtual and physical worlds in a way that expands our range of experiences rather than limiting them. But ensuring that happens requires collective leadership to ensure the actions taken responsibly shape the evolution of this revolution.

In the end, with its potential to generate up to $5 trillion in value by 2030, the metaverse is simply too big to be ignored. It will have a major impact on our commercial and personal lives, which is why businesses, policymakers, consumers, and citizens are well advised to explore and understand as much as they can about this phenomenon, the technology that will underpin it, and the ramifications it will have for both our economies and wider society.

Appendix A: Estimate of investment in metaverse technology

Investment flows into metaverse technology were divided into two major categories: external investments by funds and corporations, and internal corporate investments.

The external investment category captures annual investment in metaverse-technology-related companies by venture capital (VC) and private equity (PE) funds, as well as merger and acquisition (M&A) activity by corporations. The values provided are estimates of the annual investment in the metaverse, based on data available in the Capital IQ, Crunchbase, and PitchBook databases. These data were then triangulated with press research on leading acquisitions, and further pressure tested with internal and external experts across both metaverse technologies and industry. The estimate assumes all registered deals were completed within the year of transaction. For VC and M&A deals, only metaverse companies whose core technology is metaverse-related were included. This notably includes Microsoft's planned $69 billion acquisition of Activision Blizzard. For PE investment, target companies needed to be strongly related to metaverse or virtual technology. Deals announced but not completed by the end of 2021 were excluded.

The internal investment category includes expenditure on all corporate activities both for developing metaverse-based products, services, or experiences and for building and leveraging a company's metaverse capabilities. It excludes M&A. The estimate of internal corporate investment is based on a metaverse budget average for 30 major companies making strong plays in the space. The top 30 metaverse adopters with publicly announced investments were consolidated. This notably includes the $10 billion annual corporate investment announced by Meta. Companies that disclosed information on internal metaverse expenditure were then used to estimate a cross-sector average for metaverse adopters. For those enterprises that are known metaverse adopters but have not yet publicly shared an exact investment amount, corporate investments were extrapolated using the average among players who are metaverse technology adopters.

Appendix B: Impact model and investment

To forecast the potential value that may be created by metaverse technology by 2030, a bottom-up assessment of the most relevant consumer and enterprise use cases was conducted across a set of industries and sectors. The focus was on thinking through top use cases and the potential for value creation. Given the uncertainty, these are inherently hard to predict. However, we believe this gives a directional view of the potential and value at stake from metaverse technologies.

In that calculation, the potential value of the metaverse results from expected market sizes and key assumptions about industry-specific metaverse market penetration in 2030, informed by primary research and subject-matter experts. The primary research conducted in May 2022 covered three categories:

1. A global metaverse consumer survey (n = 3104) from countries across North America, Europe, and Asia

2. A survey of C-level executives from 448 companies spanning geographies and company sizes

3. Internal and external industry and technology expert interviews

For each future scenario of consumer and enterprise use cases, the impact analysis draws a conservative base case and an optimistic upside potential. This credits the inherent uncertainty about the metaverse across dimensions such as consumer adoption, technology, and regulations. The estimate of potential total value will almost certainly be incorrect in 2030 in either a conservative or optimistic direction, and can, by definition, only be an estimate based on assumptions made today about future market conditions and developments.

The potential enterprise value from the metaverse is estimated by modeling the average annual enterprise technology spend per sector and the future metaverse penetration rate in 2030, as a share of metaverse-related corporate technology spending. Data for the innovation and technology spending was derived from sources including Magna, Crunchbase, and IDC. Sector-specific penetration rates were derived from and pressure-tested through 20 interviews with internal and external technology and industry experts. The derived enterprise value calculation considers 19 industry sectors: banking, construction, discrete manufacturing, education, federal and central government, healthcare providers, insurance, media, personal and consumer services, process manufacturing, professional services, resource industries, retail, securities and investment services, state and local government, telecom, transportation, utilities, and wholesale.

The potential consumer value potential is split between existing and net new and emerging metaverse use cases. For existing consumer use cases, the value potential from the metaverse was estimated based on the overall market size and expected future metaverse penetration in each industry in 2030. The penetration rates were derived from expert consultation and internal extrapolation informed by technology

and industry journal articles. Calculations considered the most important consumer uses cases across ten sectors: gaming, e-commerce, live entertainment, education, health and fitness, advertising, digital media, AR/VR hardware, virtual real estate, and non-fungible tokens (including virtual fashion). Market sizes were derived from a number of sources including Magna and IDC. The emerging use-case potential was extrapolated based on assumptions and pressure tested with internal and external industry and technology experts.

The potential value of the metaverse is a bottom-up estimate based on assumptions about future market conditions and developments. Our estimates are to be treated as directional rather than precise at this stage, given the nature of the metaverse and the wide range of uncertainties involved (such as developments in technology, the regulatory environment, and changes in consumer behavior). We have triangulated these estimates across consumer and enterprise verticals, and will continue to refine them in the future. Our team welcomes every challenge and input to refine the calculations. Please write to metaverse.estimate@McKinsey.com to engage in the ongoing sizing discussion.

Metaverse sizing methodology: Forecasting potential value by 2030

Consumer	**1**	**Gaming software**	Discussions with Senior Executives of three globally leading consumer technology and gaming companies
			A significant share of gaming can evolve towards the metaverse - more immersive, massively multiplayer expereinces that venture towards broader digital entertainment - leading to increase in time spent, and new monetization avenues
	2	**eCommerce**	Discussions with eCommerce experts across McKinsey's Digital and Analytics practice globally
			eCom has been venturing towards socially-driven (incl. UGC) commerce already, and will become immersive in the future - offering a more compelling end-to-end experience (search, browse, purchase, post-purchase), introducing new digital/virtual assets, and becoming increasingly personalized
	3	**Live entertainment**	Discussions with Head of Media & Entertainment Technology at leading Hollywood entertainment consultancy; and former Digital Media Practice Leader at a global Tech Services firm
			Live Entertainment can leverage the metaverse for more immersive online+offline experiences, and at greater scale (catering to global audiences concurrently) and frequency
	4	**Education**	Discussion with Senior Executive at globally leading educational products and toys brand
			Education within the metaverse can scale access to virtually 'limiteless' participants (as hardware becomes more ubiquitous), and enhance education delivery and quality, including for adult training/learning experiences
	5	**Health & Fitness**	Discussion with Head of Strategy & Operations at leading technology company
			Health and Fitness can continue to evolve towards remote (and in the case of fitness - social) settings - and improve quality through becoming more immersive (e.g., for service delivery) and collaborative (e.g., in R&D)
	6	**Advertising**	Discussions with Head of Strategy & Operations at leading technology company; and Media and eCommerce expert within McKinsey's Digital and Analytics practice
			The metaverse is expected to assume a higher share of advertising placements and budgets as consumers spend more time in metaverse per day (up to 4-6hrs/d converting from online time spent) and popular gaming worlds expand to broader digital entertainment use-cases (e.g., concerts); with new, more immersive metaverse-native ad-types emerging (e.g., visual search, virtual billboards)
	7	**Digital Media**	Discussions with Head of Media & Entertainment Technology at leading Hollywood entertainment consultancy; and former Digital Media Practice Leader at a global Tech Services firm
			The metaverse can accelerate digital media via net-new revenue streams (e.g., share of virtual asset sales), additional monetization of existing IP, and larger-scale events - and finally, building infrastructure required for the metaverse
	8	**AR/ VR Hardware**	Discussion with Head of Strategy & Operations at leading technology company
			Metaverse device/ interface sales driven by widening appeal for and access to more immersive experiences; with a number of large tech companies ramping up production and expecting decreasing costs over time

	9	**Virtual Real Estate**	Discussion with Metaverse and NFT experts within McKinsey's broader partner ecosystem
			Virutal Real Estate is expected to become more popular alongside XR, with an increasing number of use-cases, e.g., increasing users and events/ activitiy in metaverse worlds; NFTs of office buildings or architectural designs; and potentially as part of asset diversification strategies for institutions over time
	10	**NFTs (inc. Pure Virtual Fashion)**	Discussion with experts within McKinsey's Apparel, Luxury and Fashion (AF&L) practice
			Popularity of NFTs driven by more than just novelty over time, e.g., traceability of IP ownership (artist), certification of originality (fashion, sustainability), utility tokens; and the overall move of physical consumer products to online+offline 'twinned' products
Enterprise	11	**Banking**	Discussions with experts within McKinsey's Financial Services practice
			Banks can scale use-cases in the metaverse for new B2B products/ services (e.g., insurance, payment systems, infrastructure); DeFi structures driving efficiencies and improved user engagement/ service on new products (e.g., contextual finance)
	12	**Construction**	Discussion with Founder/ CEO at leading AI supported construction and manufacturing software company
			The metaverse can transform the constrution process through data, management, and development. Data: Project real-time monitoring, collecting information and tracking data in metaverse that can later be analyzed; Management: Central coordination and project management of disparse locations (e.g., via IoT/ digital twins); Development: Collaboraiton of dispersed units or suppliers, XR-enabled simulation of planning, details up to “screw-level” (e.g., building architecture)
	13	**Discrete Manufacturing**	Discussion with Founder/ CEO at leading AI supported construction and manufacturing software company
			Manufacturing will see next-gen industrialization from central coordination, maintanance and service of even locally dispersed units (e.g., via IoT/digital twins); increase in collaboration on R&D; and XR-enabled simulation of manufacturing and assembly- able to plan details up to “screw-level”, while data collection allows project real-time monitoring and ex-post analysis
	14	**Education**	Discussions with McKinsey's North American Education and Technology experts
			Education within the metaverse can scale access to virtually 'limiteless' participants (as hardware becomes more ubiquitous), and enhance education delivery and quality, including for adult training/learning experiences
	15	**Government (Central/ Federal)**	Discussion with Senior Executive of leading Asian Metropolitan Government Institution; and with McKinsey's experts in the public sector practice
			Government adoption of metaverse is driven by new avenues to enhance government sector performance and productivity; provide enhanced public services at scale; and the need for new regulation and governance for the metaverse
	16	**Healthcare Provider**	Discussions with McKinsey's healthcare experts across geographies
			Healthcare improvements can be driven by efficiency gains (e.g., optimized hospital operations, now faster, safer, and more accurate); and improvement in remote diagnostics and procedures; and in remote collaboration

	17	**Insurance**	Discussions with experts within McKinsey's Financial Services practice
			Insurance will see efficiencies from decentralized structures; as well as increased demand for new products (e.g., virtual real estate)
	18	**Media**	Discussions with Head of Media & Entertainment Technology at leading Hollywood entertainment consultancy; and former Digital Media Practice Leader at a global Tech Services firm
			Media will adopt metaverse for new ad-based revenue streams (e.g., applications/ platforms for the creator economy); and for efficiencies in managing distributed networks (e.g., data centers)
	19	**Personal/ Consumer Services**	Discussions with experts in McKinsey's Consumer/ Retail practice
			Personal and Consumer services can profit from more immersive experiences; access at a larger scale, and efficiencies from reduced production costs (and supply chain constraints) for virtual assets
	20	**Process Manufacturing**	Discussion with Founder/ CEO at leading AI supported construction and manufacturing software company
			Manufacturing will see next-gen industrialization from central coordination, maintanance and service of even locally dispersed units (e.g., via IoT/digital twins); increase in collaboration on R&D; and XR-enabled simulation of manufacturing and assembly- able to plan details up to “screw-level”, while data collection allows project real-time monitoring and ex-post analysis
	21	**Professional Services**	Discussion with experts within McKinsey's Technology, Media and Telco (TMT) practice
			'Utilities' can profit from optimized operations (e.g., faster, safer, and more accurate) and overall project real-time monitoring; and from information and data collection metaverse that aids in optimization
	22	**Resource Industries**	Discussion with Founder/ CEO at leading AI supported construction and manufacturing software company
			'Utilities' can profit from optimized operations (e.g., faster, safer, and more accurate) and overall project real-time monitoring; and from information and data collection metaverse that aids in optimization
	23	**Retail**	Discussions with experts in McKinsey's Consumer/ Retail practice
			Trade (retail and wholesale both) can adopt metaverse to enhance shopping/in-store/product experience; capture efficiencies; and explore net-new revenue streams (e.g., virtual goods and services)
	24	**Securities/ Investment**	Discussions with experts within McKinsey's Financial Services practice
			Securities and investment can leverage metaverse for new B2B products/ services (e.g., investment systems); DeFi structures driving efficiencies; and improved user engagement on new products
	25	**Government (Local/ State)**	Discussion with Senior Executive of leading Asian Metropolitan Government Institution; and with McKinsey's experts in the public sector practice
			Government adoption of metaverse is driven by new avenues to enhance government sector performance and productivity; provide enhanced public services at scale; and the need for new regulation and governance for the metaverse

	26	**Telecommunication**	Discussion with Head of Commercial at leading telecommunications Firm; and experts within McKinsey's Tech,Media,Telecoms practice
			Telcos expected to benefit from the need for and monetization potential of enhanced infrastructure (e.g., 5G); as well as productivity improvements in internal operations; and improvements in customer experience (e.g., employee training, service center operations)
	27	**Transportation**	Discussions with McKinsey's logistics and infrastructure practice experts
			Transport sector can benefiy from central coordination and project management (e.g., via IoT/digital twins), especially in logistics; and real-time data collection for optimization
	28	**Utilities**	Discussion with Head of Commercial at leading telecommunications Firm; and experts within McKinsey's Tech,Media,Telecoms practice; and experts within McKinsey's Technology, Media and Telco (TMT) practice
			'Utilities' can profit from optimized operations (e.g., faster, safer, and more accurate) and overall project real-time monitoring; and from information and data collection metaverse that aids in optimization
	29	**Wholesale**	Discussions with experts in McKinsey's Consumer/ Retail practice
			Trade (retail and wholesale both) can adopt metaverse to enhance shopping/in-store/product experience; capture efficiencies; and explore net-new revenue streams (e.g., virtual goods and services)

Appendix C: Consumer and executive surveys

We conducted two global surveys designed to understand trends in metaverse adoption, use, and business implications by sector, geography, type of company, technology, and application. One focused on global end-consumer adoption, the other corporate adoption.

The consumer survey was conducted in May 2022. The final survey sample, after quality checks, consisted of 3,104 end consumers. The survey targeted respondents who indicated, at a minimum, basic understanding of the metaverse and had at least heard of or used one or more metaverse platforms from the following list: *Roblox, Fortnite, Decentraland, Second Life, The Sandbox, Somnium Space, Stageverse, Spatial, World of Warcraft, Pokémon Go, Rec Room, VR Chat,* Facebook *Horizon Worlds,* Microsoft *Altspace,* Microsoft *Mesh, Zepeto, Minecraft,* and *Animal Crossing*. The survey sample covered 11 countries (from Europe, North America, and Asia), excluding respondents working in the marketing, research, or media/advertising industries due to professional focus on innovation and new technology beyond private consumer use cases.

In addition to basic information about respondents and their households, the survey consisted of four groups of questions:

— The first asked respondents about their awareness, excitement, and adoption of activities using metaverse technologies or applications today, and expectations for the future.

— The second asked about current and future user behavior of metaverse-related technology and applications with regard to duration, preferences, and underlying motives. It also asked about purchasing behavior, spending, and engagement with branded experiences.

— The third investigated the usage of avatars, asking respondents to report current and future customization efforts as well as spending on the metaverse for digital assets or awareness of digital influencers.

— The fourth addressed respondents' satisfaction with metaverse experiences and underlying drivers and barriers (risks) for engagement in virtual versus real-life activities across different domains in the respondent's life.

The senior executive survey was conducted in May 2022. The final survey, after quality checks, consisted of C-level executives from 448 companies. The survey targeted respondents who indicated, at a minimum, basic understanding of at least two or more metaverse technologies or applications and their use in business from the following list: cryptocurrencies, non-fungible tokens, the creator economy, Web3, virtual world, edge computing, blockchain, AR/VR, and the cloud. The survey sample covered 15 sectors of the economy, ten countries (from Europe, North America, and Asia), and companies with workforces ranging from fewer than ten people to more than 10,000 employees.

In addition to basic information about the company and the respondent, the survey consisted of four groups of questions:

— The first asked respondents about their awareness and adoption rates of metaverse technologies or applications.

— The second asked about the current and future impact of the metaverse in the respondent's sector, including the most important metaverse technologies. It also asked about parts of the business in which the metaverse was being deployed, and drivers and barriers for metaverse deployment in the respondent's business.

— The third investigated the financial impact of the metaverse, asking respondents to report current and future operating profit margins as well as spending on the metaverse as a share of digital investment.

— The fourth addressed the organizational impact of metaverse technologies, specifically on levels of employment and skills requirements.

Finally, we interviewed 13 senior executives and metaverse experts for their insights into the current state of the metaverse and its potential.

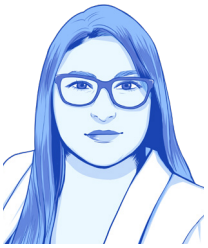
Thanks to all interviewees

Matthew Ball

managing partner of EpyllionCo and McKinsey knowledge partner

Kavya Pearlman

founder and CEO of XR Safety Initiative



Cathy Hackl

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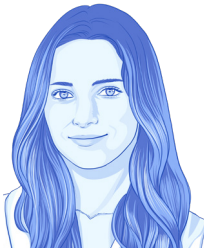

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