Chapter 1
Predictions

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[A]ll information looks like noise until you break the code.
—Neal Stephenson, Snow Crash

The metaverse. Do you know what it is? Can you describe it? If anyone tells you that they can, at least within the next few years, they don't really know. Well, they might throw in an educated guess, but they don't *know* know. They might be basing their answer on what they read online, the history of technology, maybe on references in books, movies, or TV shows. Some might have a deep awareness of what's possible now with emerging technologies and may offer a good guess as to what's ahead. But it will always fall short, as technological developments and ramifications are many, and we're still in the early days of exploring them.

Mark Zuckerberg mentioned the word *metaverse* over 80 times in his Facebook Connect introduction speech on October 28, 2021. That one talk sparked a frenzy of discussion by the financial press around the definition of the metaverse. For those working with emerging tech and blockchain communities, this public acknowledgment of the topic's importance felt like validation of their vision and years of work, ourselves included.

Mainstream excitement was (finally) building around this technological vision of the future. Even though the biggest tech companies—like Apple, Snap, Niantic, and Alphabet—had been investing billions in creating it, the sparkling hype generated by this speech created the sensation that the metaverse seemingly matured overnight and (finally) seemed within reach, even if many weren't thrilled about Facebook taking public ownership of the word *meta*.

Yet still, that moment marked only one inflection point in an uncharted, new path ahead. But that was just Meta's vision of the metaverse. Other companies joined in the conversation with their particular take on the next wave of computing. But how can businesses prepare for it if it isn't consensually defined? How can we understand the opportunities and threats we will face? Some say that hindsight is 20/20; it feels like we all need some 20/20 foresight during this time of transition.

Think of it like the Internet. Could you have explained it to a modern-day Rip Van Winkle (the fictional legend who slept for 20 years and awoke to find his world had changed)? It's hard to do in layman's terms, unless you start talking about how you would use it and how it could help in your day-to-day life. Maybe two decades ago, you'd start by describing the kind of access and benefits email and texting gives you, or all the information you were able to find in less than a second. That said, who could have predicted how it birthed smartphones? Game worlds where players are constantly connected and interacting? What about the cloud and social media? Or even the current debates around privacy and truth?

This lack of understanding of a game-shifting technology's impact isn't new. It's happened several times and looking back to the 1990s, it also happened with the Internet. The leading TV morning show in the United States during 1994 was *The Today Show*. On one of the episodes, Bryant Gumbel, one of the hosts, asked, "What is the Internet, anyway?" His cohost then requests from the off-camera producer, "Allison, can you explain what the Internet is?" The answer is bungled as they try to name the @ symbol, calling it "about" or "around," and talk about how it's a "massive computer network."[1] This TV moment has gone viral multiple times as some

generations seem to laugh at people being awkward in front of new technology. It's almost an "OK, Boomer" meme in a TV clip.

The metaverse is a similar shift, only this time we're taking the Internet, bringing another dimension to it and setting it free in and on our physical world. Through several channels, we'll be living with digital and physical and sometimes hybrid elements simultaneously. It's almost impossible today to understand the full extent of this shift. We can start by identifying how technologies will interweave to create it. Also, now that we've witnessed the negative impact of social media, we need to determine how to mitigate the risks and challenges of bringing more technology to our businesses and to our lives.

For instance, if we want to go from digital screens to digital worlds that we are able to explore, then we'll need to consider moving from formats like text, images, and video into three-dimensional formats. It makes sense to use virtual reality (VR) and augmented reality (AR) technologies to view the metaverse, but not everyone is familiar with or comfortable using them yet. And what needs to happen with the current mobile Internet access so it grants users a metaverse experience?

It's not smooth sailing to begin any technology shift. Emerging technologies can make people uncomfortable, because any change causes discomfort. However, if users are convinced of the importance of the tech, they are willing to try to adapt. Just like on *The Today Show*, there was a similar verbal bungling of the description of metaverse right after Zuckerberg's speech at Facebook Connect. On CNBC's show *Squawk on the Street,* cohost and market pundit Jim Cramer attempted unsuccessfully to explain the metaverse. Note that Cramer's quote has been edited for clarity.

> [It's] the idea that . . . you can be in Oculus, whatever . . . It IS a hologram. . . . And . . . the typical way is to be able to sell something. Like what I said with . . . Unity, where you're looking at, what people are walking and you're looking at how people look and you're saying, you know what? I, and then you imagine yourself with it and you say, I went, you know, that's what size is that? And then . . . you press, you order . . . . There you go. Metaverse.[2]

As in 1994, a new technological shift is about to change everything yet again, but few are able to grasp the concept and even within the emerging tech industry, there isn't a consensus about what it is, its value, and how it will impact business and our personal lives, especially as the metaverse (or whatever we might call it in a couple years' time) is just being built. One thing we can all agree on is that no one who missed the last wave of computing wants to underestimate the upcoming's impact.

These are the challenges that we will address in this book. We will bring together the research, opinions of experts, numbers, and our own insights to get everyone as ready as we could ever be. We'll cover not only all the immediate opportunities, but also reflect on what's possible and on the needs and problems the metaverse can solve, as well as approach the concrete challenges ahead from a professional standpoint, as well as from a societal perspective.

Size Matters

First things first. How big will this metaverse be? Will it change your life and your business? Or is it just hype? It's believed that the metaverse can become bigger than the Internet, as theoretically it's a network that will connect every object, place, and person on the planet with almost all people, businesses, and organizations. . . eventually.

The continuous convergence of emerging technologies will bring additional utility and types of experiences that we can't yet fathom (the same way social media, messages, home banking, and so many other services keep on converging on our smartphone). The estimated size of the metaverse varies wildly, according to the reference we choose:

- $800 billion global market opportunity in 2024 (Bloomberg[3])
- Over $1 trillion in yearly revenues across "every sector" (JPMorgan[4])
- $8.3 trillion total U.S. consumer expenditure (Morgan Stanley[5])
- $8–$13 trillion total addressable market by 2030 (Citi[6])

So, it's more than fair to say the metaverse is greater than a trillion-dollar opportunity. That estimate alone puts it somewhere within the top 10 industries.[7] A market that is worth investing in and following, even if we can't quite define it unanimously. But don't worry, we will go into the specific business applications in a later chapter. For now, let's accept that the metaverse can become by itself a top 10 market and has the potential to impact every industry globally—maybe even more than the Internet and mobile computing transformed the way each of us does business around the world.

The Debate

There are many contradicting definitions of the metaverse. The simplest descriptions we found were "the next generation of the Internet" or "infinite worlds that connect the physical with the digital." Although seemingly easy to use in conversation, they are confusing to those who just have started to understand that technologies like AR and artificial intelligence (AI) are different in many more ways than one letter in their acronyms.

Other tech pundits use the term *Web3* to define the metaverse, focusing the discussion purely on the decentralized web and its model of governance, its blockchain, cryptocurrencies, and nonfungible tokens (NFTs). We'll get more into those in the following chapter, and how they are part of, but not all of, what we foresee as the metaverse. Still more people confuse it with Microsoft's term *mixed reality (MR)*, referring to a universe lying somewhere between VR and AR. Finally there's also those who mistakenly interchange the word with the Marvel Multiverse.

Although each definition of the metaverse has varying amounts of accuracy, none of them does justice to the promise of a new shared, 3D hybrid user experience that's so much more than the feeling of "presence" (which was probably the second most used term during Zuckerberg's October 28, 2021 keynote). Case in point, from his letter to investors after the rebrand: "The defining quality

of the metaverse will be a feeling of presence, like you are right there with another person or in another place. Feeling truly present with another person is the ultimate dream of social technology. That is why we are focused on building this."

Working Definition

To the authors, the metaverse is the next stage of the Internet and results from the evolution of a wide variety of emerging, exponential technologies maturing simultaneously, converging and enabling a new interconnected relationship between physical and digital. This long list includes VR, AR, 5G, cloud computing, Internet of Things (IoT), haptics, cryptocurrencies, blockchain, AI, machine learning, object recognition, computer vision, and conversational AI. This wave of new technologies will enable a full digitalization of the physical universe and a seamless symbiosis with all things digital, creating a new interactive dimension merged with our physical one. Makes sense? It's OK if it doesn't for now.

The current standard 2D imagery will be joined by 3D interactive elements. Instead of just using a computer screen or tablet for interactions with the Internet (2D), we will browse digital objects and environments that appear three-dimensional (3D). This means your interaction commands won't be limited to taps on your smartphone's screen (2D) or voice commands. Through glasses or headsets that understand your physical surroundings and track your location, as well as your eye movement and hand gestures, you'll be able to walk around 3D digital elements that you will see overlaid on top of the real world and that can be seen by other users, if you choose to. From this, you could navigate to a virtual world, which would occlude your eyesight and immerse you in VR.

If this is still hard to imagine, let's use a movie reference. The goal is to enable everyone to have a version of Iron Man/Tony Stark's and Spiderman/Peter Parker's E.D.I.T.H. glasses, which will act like high-powered VR/AR glasses. The *Star Trek* holodeck and

Star Wars holochess are also good fictional references for immersive technologies—in each case, the characters unlocked a new graphical experience of the real world.

We'll start to move from a primarily heads-down (mobile phone) experience to a heads-up (glasses) one. We will move from a sit-down interaction to a walk-around one. We won't be relying on computers or tablets nearly as much, or at all. We will be increasingly wearing our metaverse access technology and it will increasingly become a seamless part of our everyday lives.

Forecasts and Theories

"For a long time now, the line between 'real' life and 'digital' life has been blurring," says Martina Welkhoff of the WXR Fund. "The metaverse is a further realization of that trend."[8] This foundational transformative shift due to technology innovation has been forecast for the past 5–10 years, although the individual technologies started their development way before that.

In 2016, the concept of the Fourth Industrial Revolution was introduced at the World Economic Forum (WEF) by Klaus Schwab, the executive director of the WEF at the time. He outlined how the current amount of technology would again shift our world, in the same way that the Third (the digital computer revolution), the Second (technological revolution with railroads and telegraphs), and the First (with the introduction of steam and water power) have.

Schwab shared a very powerful statement:

> We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global policy, from the public and private sectors to academia and civil society.[9]

This came to be known as Industry 4.0 and, as you can see, it calls for the involvement of all stakeholders to collectively respond to the expected social effects it could bring. This triggered a rise in corporate social responsibility and there was even a shared statement signed by 181 North American CEOs in 2019 committing to that mindset.[10]

Other theories explored this upcoming shift in business and its impacts on our life. The Sixth Wave of Innovation stated that companies needed sustainable business practices in order to survive and that the most likely way to accomplish this was through the use of technological processes such as digitalization, automation, and robotics.

Discussions of the coming metaverse often refer to speed and processing power of computers doubling every two years (Moore's Law) and the increase in power of networked elements (Metcalfe's Law). This is the law behind the term *network effects*, an oft-used buzzword in Silicon Valley that dictates a system's value increases based on the number of people using it. The metaverse offers the potential for a super-network effect, unlike what we have seen before.

This uber-network resembles the Internet of Everything (IoE), a research concept that aims to seamlessly interconnect a massive number of worldwide sensors, objects, animals, people, processes, and data through the Internet. Smaller items like doorknobs and tiles will share information about your house's inside and outside conditions; bracelets and other wearables will analyze the healthiest diet for that day. Satellites will not only map and survey geographical areas, but they'll be connected with city equipment and services, allowing citizens to sync with online services.

Trends

It's not only a technological evolution that is driving the creation of the metaverse. This transition is taking place against a backdrop featuring multiple and simultaneously developing, but fundamentally distinct, social trends:

Remote School and Work In the past few years, the pandemic accelerated the adoption of new remote work solutions.

Great swaths of people began to socialize in purely digital spaces. Work, learning, and entertainment experiences became remote. The force of circumstances led us to normalize a behavior that would otherwise take years to disseminate and be adopted. As Andy Liu of Unlock Venture Partners told GeekWire: "[The] worldwide pandemic has really changed and advanced people's perceptions on how work, study, commerce, and life in general can be done in a compelling digital/hybrid format."[11] This ongoing trend toward hybrid interactions began with the launch of the Internet, then email, and most recently, social media and smartphones.

Social Media Economy Social media as we know it began in 1997 when the Six Degrees platform launched. It grew to almost one million users before it ceased operations, but not before convincing tech companies that there were business opportunities to be leveraged by connecting people on the Internet on public platforms. Next followed Friendster, LinkedIn, and Facebook. With advancements in server processing power, mobile message formats shifted from plain-text messages, to being illustrated by photos and videos, to becoming photos and videos. This led to the appearance of new platforms like Instagram, Pinterest, YouTube, and, afterward, Snapchat and TikTok. Entering our current decade, 3D formats are changing our digital interactions. Games like Minecraft, Roblox, and Fortnite are main stages, but social media filters are also decorating our faces during video calls. As 3D technology improves, our avatars and digital humans will also start playing a central role in social networks and on virtual and augmented reality platforms.

Creator Economy In early 2022, "the creator economy" was all the rage. Like the gig economy, which had its momentum a decade before, the creator economy movement was essentially carved out of social media. At first, social media timelines were filled with cat videos and pictures of your meals. But as users spent more time and became more and more sophisticated, so did content creators, which started to attract millions of followers. That led to the rise of semi-professional and professional writers, artists, actors, or video producers and a whole generation that now considers being an *influencer* or a *YouTuber* a potential career path. In fact, in 2019, *Business Insider* found that U.S. and UK children ages 5–12 chose

being a YouTuber as a top career choice, over being a musician, athlete, or astronaut.[12]

According to SignalFire, there were 50 million creators in 2021, among TikTokers, YouTube video producers, Instagram influencers, Twitch streamers, Spotify musicians, Teachable trainers, and GitHub-sponsored developers and podcasters who published their original content to their subscribers. There are also AR filter creators, 3D designers, and NFT artists are carving out their space as the creator economy grows toward the metaverse.

Decentralization In recent years there has been a growing distrust of central governments, political parties, and corporate tech by millennials and Gen Z. Radical and populist political options started raking in an increasing number of followers searching for solutions to today's social, economic, and climate challenges. A movement started to create a new decentralized governance model for the web, reclaiming that all content done inside web platforms, namely the ones in Big Tech companies, should become decentralized. First we saw a financial decentralization with the rise of Bitcoin, other cryptocurrencies and other decentralized finance services; afterwards new decentralized business organizations like DAOs (decentralized autonomous organizations) appeared and Web3 communities—and enthusiast numbers keep on growing. We will see during the book how these trends play out in a bit more detail.

Characteristics

In spite of these glimpses and forecasts, we still need to find—or better yet, outline—a set of characteristics of the metaverse, so we can focus the discussion and planning.

It starts with a distinction between the benefits from each individual technology versus from their convergence. So it won't be just $1 + 1 = 3$. It will be an iterative $1 + 1 + 1 + 1$ and so on, as multiple layers of each technology bring in their own traits and features to

weave into the mix. And that's why it's so hard to envision such a growingly complex ecosystem.

Some consistent characteristics are already present though, of which we selected the following ones that we see as unavoidable:

Phygital Interactivity There's a belief there will be a digital twin of each person, place, and object and that these twins will be able to sync with the many digital worlds and layers available. This allows for an actual merge between everything physical and everything digital—an immense digital twin of the entire physical world assets allows these assets to prolong their existence and characteristics digitally and even to create hybrid elements, that are half-physical and half-digital. This reality continuity is what enables new, transformative services.

This creates a digital and physical connection (aka "phygital"), which is often discussed as one of the greatest values of the metaverse. (Yes, the name doesn't quite roll off the tongue.) Data and relevant information will be available on location according to your needs (for example, a construction worker and a historian likely would retrieve different details about a building). These digital twins of the world allow for elements to interchange between realities such as interactive digital people or creatures (like avatars or virtual assistants), fully digital places based on physical venues or objects (such as 3D graphically designed tools or art pieces). Activating equipment such as machines or cameras in the physical world could be done by pressing a button on a virtual one and the other way around too.

A Persistent Universe The metaverse doesn't go away when you take off your headset. A digital twin of the world—along with a plethora of virtual ones—will be available to all of us whenever we want. Like the World Wide Web, these worlds will be persistently available and in motion even when a user is offline. However, that doesn't mean the metaverse won't stop working for users during that time. For example, your wearable's predictive algorithms will leverage your historical data and past behavior to create a balanced diet and exercise plan, in order to improve your day-to-day life.

Your closet will remind you of your upcoming meetings. Your car will know that you have a doctor's appointment and set your journey accordingly. Your glasses will remember the person whose name you always seem to forget. Your identity, your data, and your custom toolkit of personal and professional assets will be available to you 24/7, wherever you are. All there when you pick up your metaverse glasses again.

Interconnected and Interoperable The vision of an open metaverse, similar to the World Wide Web, is one where users can easily move around without logging in and out and putting on new headsets or downloading new software. It's a place where you manage your digital currency and properties through a single channel, like the way a crypto wallet works. It is a vision shared by many experts, but not necessarily by Big Tech corporations, which nowadays base their businesses on gathering and analyzing external data present in platforms and content. They want to rule over as much of the metaverse as they can. But connecting all people, objects, and places is a daunting task. Even Big Tech companies publicly acknowledge that they can't do it alone. Elisa La Cava of Madrona Venture Group has analyzed the large number of companies and technologies involved in creating it: "No one company will be able to tackle everything by itself, and that gap is what creates opportunity for innovation and startups to excel and grow over time."[13]

Contextual Allowing our avatars, digital and physical items, private and public services to become available across a possibly infinite number of worlds is a process we still don't know how will happen. And remember, we all want the user experience to be as intuitive as possible and that information changes according to the context we're in. We all should be able to share digital goods, experiences, and even your very own custom world with friends, family, or coworkers, and it could be customized for each relationship.

Decentralized Blockchain is considered by several pundits to be one of the fundamental technologies that will enable the metaverse. Its promises of a new governance model enable a shared property of the metaverse by the users, where they can own

stakes and establish contracts in a quicker and more transparent way. Again, no one believes that large corporations investing billions and national governments will just hand over the reins. Still, there are already levels of decentralization in place in several services and some decentralized market pockets showing that decentralized services are sought and can be a solution.

Community-Based Several visions of the metaverse foresee it as being driven by users, by all of us. Whether or not this proves to be true, the metaverse brings users more tools to connect among themselves and collect funds for causes and act on their behalf collectively. Indeed, these communities will empower their users to transcend their original role as they become owners, investors, and the drivers of the metaverse economy.

Gamified Online games are evolving into social spaces. Gamers are used to interacting online with a large number of users in real time, carefully selecting and customizing their avatars and selecting the best digital items and fashion that reflects their identity or in-game achievements. The metaverse allows for a similar experience to be extended to every digital world, as well as to the physical one, and play to earn and other gaming dynamics open new ways for consumers to engage with brands and volunteers to engage with causes.

Immediate Gone are the times of lengthy downloads. *Real time* will be the operative words, as there's almost no latency in the metaverse. 3D, data, and interactivity opportunities will be at your disposal right away when you need them. So, no technical delays or frustration can occur while billions jack into the metaverse simultaneously.

Plan Ahead

So yes, the metaverse does not exist yet. How can you understand the metaverse without experiencing it? For now, it's about learning about the vision and where we are today, as we are currently setting

the stepping stones toward it. Add also the multiple technological building blocks, analyze their individual impacts, and then realize how leaders in the field have begun to set the infrastructure and integrate these technologies. You need to be aware of each of the 1s of the 1 + 1 + 1 + 1 + 1, even if the collective sum of the metaverse will be more than its parts.

The metaverse won't be perfect, and, given the high expectations and degree of challenges, topics like safety, privacy, interoperability will need to be handled. According to CNET's Scott Stein, "Everyone's promising interoperability, but history suggests it will be multiplatform, semi-compatible and half- broken,"[14]

However, the fact that the metaverse is not built yet presents a unique opportunity. For the first time in history, we have a chance to discuss a massive game-changing technology and socially disrupting platform prior to the fact. No one asked us how social media, search engines, or the World Wide Web itself could be designed in the easiest, safest way—and truth be told, we never thought how much we needed that until things went wrong.

Now, within a relatively short period of time, we know the benefits and drawbacks that come with such a disruptive tech shift. That's one of the main reasons why it's so important to understand the metaverse and widen the discussion outside of just the tech industry. Together, we can create a more inclusive blueprint for the metaverse. Moreover, the challenges we're about to face will need a multidisciplinary effort. Business professionals from all areas, teachers, lawyers, scientists, historians, and sociologists, everyone can contribute with their experience and knowledge so we can start preparing for this tremendous shift.

We don't know yet whether this metaverse will change our lives over time or if it will happen overnight—and how much of an impact we will feel in our personal and professional lives. Will it be a disruption, an evolution, or a refoundation of the existing stage of the mobile Internet? No matter what, we'll need to learn how to live in this hybrid world and make the most out of it.

As you continue reading this book, we will attempt to pass on the awareness of what's coming and avoid falling behind. We won't teach you how to code, but you will be able to have a business

meeting with metaverse specialists and make your decisions in a more informed way. So, in that Rip Van Winkle situation, you won't be a business owner dismissing the Internet and not investing in a company website. Instead, the following chapters will support you to know better what's at stake, the building blocks of the metaverse, envision opportunities for your company's growth and professional advancement. We'll also cut through the hype and lay out the challenges ahead in the clearest way possible. A transformation this size comes with a lot of responsibility and, because of that, we'll cover topics like safety, privacy, and, regulations—all of this to ensure that you, your business, your family, and yourself can take full advantage of this seismic shift.

Notes

1. "'What is internet?' Katie Couric, Bryant Gumbel are puzzled." *Today*, June 20, 2019. www.today.com/video/-what-is-internet-katie-couric-bryant-gumbel-are-puzzled-62308421624
2. CNBC, "Jim Cramer explains the 'metaverse' and what it means for Facebook." *Squawk on the Street*, July 29, 2021. www.cnbc.com/video/2021/07/29/jim-cramer-explains-the-metaverse-and-what-it-means-for-facebook.html
3. Matthew Kanterman and Nathan Naidu, "Metaverse may be $800 billion market, next tech platform." *Bloomberg Intelligence* (blog), *Bloomberg Professional Services*, December 1, 2021. www.bloomberg.com/professional/blog/metaverse-may-be-800-billion-market-next-tech-platform
4. Christine May and Adit Gadgil, *Opportunities in the metaverse*, (JPMorgan Chase, 2022). www.jpmorgan.com/content/dam/jpm/treasury-services/documents/opportunities-in-the-metaverse.pdf
5. Morgan Stanley Research, "Metaverse: more evolutionary than revolutionary?" *Morganstanley.com*, February 23, 2022. www.morganstanley.com/ideas/metaverse-investing
6. Kathleen Boyle, "Metaverse and money: Decrypting the future." *City GPS: Global Perspectives and Solutions*, March, 2022. https://ir.citi.com/gps/x5%2BFQJT3BoHXVu9MsqVRoMdiws3RhL4yhF6Fr8us8oHaOe1W9smOy1%2B8aaAgT3SPuQVtwC5B2%2Fc%3D

7. Trish Novicio, "5 biggest industries in the world." *Lists - News* (blog), *Insider Monkey*, March 24, 2021. www.insidermonkey.com/blog/5-biggest-industries-in-the-world-in-2021-925230/5
8. John Cook, "We asked seven venture capitalists if the metaverse is the next big thing or just a lot of hype." *GeekWire*, November 23, 2021. www.geekwire.com/2021/we-asked-seven-venture-capitalists-if-the-metaverse-is-the-next-big-thing-or-just-a-lot-of-hype
9. Klaus Schwab, "The Fourth Industrial Revolution: what it means, how to respond." *World Economic Forum Global Agenda*, January 14, 2016. www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond
10. Business Roundtable, "Business roundtable redefines the purpose of a corporation to promote 'an economy that serves all Americans.'" *Business Roundtable*, August 19, 2019. www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans
11. John Cook, "We asked seven venture capitalists if the metaverse is the next big thing or just a lot of hype." *GeekWire*, November 23, 2021. www.geekwire.com/2021/we-asked-seven-venture-capitalists-if-the-metaverse-is-the-next-big-thing-or-just-a-lot-of-hype
12. Paige Leskin, "American kids want to be famous on YouTube, and kids in China want to go to space: survey." *Business Insider*, July 17, 2019. www.businessinsider.com/american-kids-youtube-star-astronauts-survey-2019-7
13. John Cook, "We asked seven venture capitalists if the metaverse is the next big thing or just a lot of hype." *GeekWire*, November 23, 2021. www.geekwire.com/2021/we-asked-seven-venture-capitalists-if-the-metaverse-is-the-next-big-thing-or-just-a-lot-of-hype
14. Brian Cooley, "The metaverse isn't what you think it is, because we don't know what it is." *CNET*, January 2, 2022. www.cnet.com/tech/computing/the-metaverse-isnt-what-you-think-it-is-because-we-dont-know-what-it-is