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# The promise of a decentralized internet: What is Web3 and how can firms prepare?

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**Abstract** What is Web3, and what does it mean for established companies? Web3 describes a broad range of emerging internet applications for blockchain technology (i.e., a decentralized, public database that allows information to be securely recorded on a network of computers rather than verified and controlled by centralized entities). Central to this evolution of the internet are four distinct blockchain-enabled applications: fungible tokens (cryptocurrencies), nonfungible tokens (NFTs), decentralized autonomous organizations (DAOs), and metaverses. In this article, we define each of these applications and discuss their capacity to increase peer-to-peer interactions, decrease large companies' control of information and services, and facilitate access to user networks at a much lower cost than currently possible. These distinctions make Web3 both a natural evolution of Web 2.0 and a broader paradigm shift that may fundamentally alter the online interface, organizational structure, and business practices. We conclude by addressing how established companies can prepare for a more decentralized internet.


## 1. The burgeoning world of Web3

In February 2022, Budweiser unveiled a Super Bowl commercial titled "Zero in the Way of Possibility" to introduce its Bud Light Next beverage. In one scene, the commercial depicts a man in an art museum staring at a classical painting of a woman wearing an animated pair of blue glasses. For many, the glasses seemed out of place yet insignificant. However, for a small subset of the population, the glasses provided a high-profile example of an established company dipping its toes into the burgeoning world of Web3: the next generation of the internet built on blockchain technology and the futuristic applications it enables, including fungible tokens (cryptocurrencies), nonfungible tokens (NFTs), decentralized autonomous organizations (DAOs), and metaverses. Before elaborating on each of these technologies, we must first

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understand how a Budweiser commercial and an animated pair of glasses relate to what some consider the future of the internet.

Budweiser did not unilaterally decide to include the animated pair of glasses in its commercial. Instead, the decision stemmed from a partnership with Nouns DAO, an online organization with no formal managers or employees that oversees the Nouns NFT project—a series of unique digital artworks depicting pixelated characters wearing animated glasses. Before the Super Bowl, Nouns DAO owners voted on a proposal to buy back one of these unique digital artworks—a pixelated beer mug wearing glasses—for approximately $394,000 and gift it to Budweiser. In exchange, Budweiser agreed to change its Twitter profile picture to the image of the pixelated beer mug and feature a signature pair of Nouns glasses in its upcoming Super Bowl commercial.

This example illustrates the wild and uncharted world of Web3. In fact, several aspects of this transaction signify its increased adoption. First, the exchange of the pixelated beer mug was fully digital. It was executed on the Ethereum blockchain protocol, a new type of decentralized internet protocol that enables information to be transmitted between computers with greater transparency than the foundational internet protocols in use today, such as Transmission Control Protocol (TCP) and Internet Protocol (IP). Second, no U.S. dollars—or any fiat currency, for that matter—were exchanged. The transaction to acquire the digital artwork was realized via 127 Ether tokens, the primary currency for the Ethereum protocol (also referred to as a cryptocurrency). Third, the digital artwork was a Nouns NFT (i.e., a one-of-a-kind digital asset) that was created by the online organization, Nouns DAO. This NFT not only comprised the pixelated image of a beer mug, but it also granted its owner a vote on proposals for how to spend the organization's treasury of Ether tokens—worth approximately $58 million as of February 2022. Those who possessed Nouns NFTs in January 2022 could vote on whether to use Nouns DAO's funds to buy and gift the beer mug NFT to Budweiser. Finally, the NFT was electronically transferred from Nouns DAO to Budweiser entirely using the Ethereum blockchain in a transaction that can be verified by anyone.[1]

Consequently, after receiving the NFT, Budweiser not only possessed a token that represented a unique digital artwork, but it also obtained the right to vote on and put forth future Nouns DAO proposals. However, Budweiser's involvement in Web3 did not stop there: In February 2022, Budweiser launched its own set of 12,722 collectible NFTs that sell for $399 each and grant their owners exclusive voting rights on future Budweiser initiatives. As a result, Budweiser is now both an NFT-holding member of a DAO as well as an NFT-issuing company.

The Budweiser example is a lot to absorb, but it illustrates a potential future of the internet in which companies can readily engage with individuals and online communities who can, in turn, gain access and even influence large, established companies (Hackl et al., 2022). Though Web3 is still infantile, it is developing at a rapid pace, far faster than the growth of Web 1.0 and Web 2.0. As such, we provide a primer for managers who seek to understand the potential influence of Web3 on the future of business. To do this, we first trace the evolution and emergence of Web3, beginning with the early days of Web 1.0 in the 1980s and 1990s. We then provide an overview of key blockchain-enabled applications that coalesce to formulate Web3. Specifically, we discuss cryptocurrencies, NFTs, DAOs, and metaverses. Finally, we highlight several contemporary examples to articulate ways that established companies can strategically position themselves in a Web3 world.

## 2. From Web 1.0 to Web3

Web 1.0—which many users first encountered in offices, libraries, and schools during the 1980s and early 1990s—was relatively decentralized. No single entity, or group of entities, controlled this iteration of the internet. Anyone could build directly atop its open protocols (i.e., TCP/IP for basic transmission of data on the internet, HTTP for internet applications such as websites, SMTP for email, IRC for chat, and FTP for file transfer). In the mid-1990s, improvements to chat rooms and instant messaging made real-time communication via the internet more accessible to a wider population. However, outside of emails, chats, and instant messages, many Web 1.0 users were in read-only mode because creating content (e.g., building websites) required technical coding skills. Moreover, a robust educational infrastructure describing how to develop content for Web 1.0 did not exist.

As internet adoption became more widespread, two glaring holes in Web 1.0 became increasingly apparent. First, Web 1.0 protocols were stateless, meaning they did not capture meaningful

[1] https://etherscan.io/tx/0x74aa318ce10f92b817149d561c79202b7363aa205bbaec38e289b9b50847560c

individual user data. For example, a stateless protocol, such as HTTP, cannot display a "welcome" message to a repeat visitor of a website. To address this problem, Lou Montulli—a programmer for the Web 1.0 internet browser Netscape—invented cookies (i.e., data that websites and browsers can locally store on users' computers to save certain pieces of state information). This innovation was widely adopted, enabling features such as shopping carts that preserve content if users navigate away from a webpage, and customized product recommendations for repeat visitors to e-commerce websites. Second, because Web 1.0 protocols were open and free, there was no inherent financial incentive for developers or creators to build atop them. Anything on the internet was essentially open and accessible. In other words, the early internet was not an environment in which content, applications, and services were naturally considered businesses as they are today. Together, given the technical challenges associated with building content on the internet, and the lack of financial incentives for those who had the capability to do so, Web 1.0 had a glaring content problem.

### 2.1. Web 2.0: Facilitating the content generation

Addressing the content problem was a key driver of Web 2.0—or a more dynamic internet in which all users are simultaneously consumers and creators, even if passively or unknowingly (Kaplan & Haenlein, 2010). The ability to store, analyze, and interpret user data using cookies— alongside other innovations—unlocked huge potential revenue sources for companies. This started with advertising and later moved to understanding user behavior to fine-tune product offerings and sell to other companies. Businesses started to generate profits from once-open protocols by aggregating data and services into platform ecosystems (Kretschmer et al., 2022; Subramaniam et al., 2019). For example, web browsing via HTTP became a battleground for companies that developed browsers and complementary software, such as Microsoft's Internet Explorer/Edge browser and Outlook webmail application and Google's Chrome browser and Gmail application. Further illustrating Google's robust Web 2.0 ecosystem, Gmail not only collects data on user behavior but also collaborates with other Google applications to lock users into its expansive suite of offerings. This allows Google to collect even more data and sell additional features, such as cloud storage, to users. Its model of collecting, employing, and selling user data aided the emergence of social media and created new contexts for businesses to interact with and advertise to customers (Hanna et al., 2011; Kaplan & Haenlein, 2010).

Yet, the perceived symbiotic relationship between platforms and users is not fully equitable. Instead, companies hold the power over these ecosystems, and only a small fraction of creators are compensated for the content they produce. Given the oceans of Web 2.0 content, it can also be difficult for creators to gain visibility for their work. What was once an open and generally free internet has become increasingly gated, with creators paying companies to publish their work and users paying companies for access to it.

### 2.2. Web3: Decentralizing the internet

Web3 promises a more decentralized online experience, allowing individuals to regain control over their data and information, monetize the content they create, and easily organize with those who share common interests and objectives (Cook et al., 2020; Hackl et al., 2022). This iteration of the internet is built on open blockchain technology—also referred to as distributed ledger technology. *Blockchain technology* is a decentralized, public database that allows information to be securely recorded on a network of computers rather than verified and controlled by centralized entities (e.g., Malhotra et al., 2022). Essentially, blockchain is a digital accounting system that records who owns what and maintains state changes over time.

Importantly, information recorded on a chain (i.e., on the blockchain) is decentralized because it is securely maintained on a network of computers rather than a single server. Data accuracy and integrity are then maintained via consensus or agreement among all network participants, thereby eliminating the reliance on a centralized entity (e.g., a firm or an organization) to record information and ensure its legitimacy (Lee, 2019). Many of the blockchains in use today are also open, meaning digital records of information are public and visible to all parties. As a result, information stored on an open blockchain is transparent, immutable, and traceable (Casino et al., 2019; Zheng et al., 2017). Regarding the evolution of the internet, these properties of blockchain technology address the statelessness gap in Web 1.0 and the centralization problem in Web 2.0, wherein companies effectively own access to certain subsets of the internet and use that power to generate profits from users.

Critical for the functionality of many Web3 applications is blockchain technology's ability to store and run smart contracts, or computer

programs that reside on the blockchain and automatically execute using transparency, immutability, and traceability when predetermined conditions are satisfied (Murray, Kuban, et al., 2021). Smart contracts ensure that the encoded rules of the applications that developers build atop blockchain protocols (e.g., Ethereum, Solana) will execute autonomously for perpetuity, even if the people behind the protocol disappear. Taken together, it is possible to think of blockchain protocols as massive shared global computers upon which any user can immediately and directly interact with others, write programs, and create accessible applications. Combined with the ability for anyone to deploy and use a smart contract on a blockchain once it is active, blockchain-enabled smart contracts—and the applications they enable—are game changers.

For example, Modum is a startup company that integrates smart contracts into pharmaceutical supply chains to track shipments of perishable medicine and ensure coded conditions, such as temperature, are satisfied in transit. Not only does Modum evaluate shipment conditions without relying on human actors, but it also sends real-time updates during transit to flag instances in which conditions deteriorate to undesirable levels (Huang et al., 2020). This allows Modum to automate supply chain transactions based on real-time, immutable data rather than human interpretations of data, which generates more seamless and reliable transactions between supply chain partners (Murray, Rhymer, & Sirmon, 2021).

The openness and decentralization enabled by blockchain technology are also part of the broader cultural movement supporting Web3. Many believe incorporating blockchain into the core functionality of the internet will transfer more power to smaller organizations, thereby reducing the trend toward consolidation and centralization. The technological differences of blockchain protocols that allow websites and applications to easily collect payments from users could also reduce companies' reliance on harvesting and selling user data to extract profits from the internet. Others see significant opportunities for innovation and competition because the barriers to enter and scale are likely to be reduced on open blockchains due to the accessibility of blockchain user networks. Still, others see a more decentralized internet as a renaissance of peer-to-peer interactions, enabling a new generation of user-developed content, applications, and services that are supercharged by the existing infrastructure of the internet. In this way, more decentralization has the potential to shift power and influence into the hands of smaller online communities that can now form, communicate, and organize more efficiently than ever— allowing them to have an even greater impact on business and society.

The breadth of purported applications offered by Web3, combined with a global pandemic that sparked a wave of interest in internet innovation, signals the need for businesses to learn and explore in preparation for the future of the internet. Moreover, the speed with which users can discover and adopt new applications, and the ease with which they can interact online due to existing Web 2.0 capabilities, means that Web3 will likely develop even faster than previous iterations of the internet. While the advent of a new internet era offers opportunities for companies to change existing competitive structures and standards, it also means companies must cope with uncertainty as they seek to understand the knowledge, resources, and capabilities necessary to adapt, survive, and thrive.

## 3. Web3 applications

The investment, development, and activity within Web3 are rapidly accelerating. Individuals are learning to code smart contracts atop blockchain protocols, while platforms such as Aragon and DAOstack are assisting individuals—even those with little to no technical coding skills—to develop a host of blockchain-based applications. In this section, we discuss four key blockchain-enabled applications that converge to create the backbone of Web3: cryptocurrencies, NFTs, DAOs, and metaverses.

### 3.1. Cryptocurrencies and decentralized finance (DeFi)

*Cryptocurrencies*, which are digital assets denominated in virtual tokens, are likely the most well-known blockchain application. By market capitalization, many of the largest and most recognized cryptocurrencies primarily serve as the native token of a blockchain protocol (Chen, 2018). A helpful analogy might be to think of native tokens, sometimes referred to as digital coins, like physical tokens that were once widely used to pay fares for public transportation systems. Similar to physical tokens that are tied to specific transit systems (e.g., New York Subway tokens that could not be used to ride the DC Metro), native tokens are tied to specific blockchain protocols and have no inherent external utility.

Native tokens are one of the most important ways that Web3 protocols differ from the free internet protocols of Web 1.0 and Web 2.0. Essentially, any activity that requires information creation on a blockchain subsequently requires payment via its native token. This payment is known as a transaction fee—sometimes referred to as a gas fee—and is primarily used to compensate the people and organizations (validators) who run the physical hardware (computers) that comprise the decentralized network for a given blockchain. These essential stakeholders are known as *network validators* because their computing hardware is responsible for performing the computational tasks necessary to add new blocks of data to the blockchain.

However, as blockchain protocols grow and more applications and services develop, native tokens begin to function more like national currencies, serving as the principal store of value and medium of exchange for citizens within a blockchain network. Not only is the native token required to pay transaction fees, but it may also be used for digital goods and services. Just as we need to exchange currencies when we travel to other countries, users must also exchange or otherwise acquire different cryptocurrencies if they want to partake in different blockchain protocols. In other words, different blockchains (e.g., Bitcoin, Ethereum) are akin to different countries on the internet. Yet unlike many countries' fiat currencies, native tokens have a transparent and fixed supply, as well as clear rules that are automatically facilitated via smart contracts and dictate whether new tokens are issued or existing tokens are removed from circulation. For example, Bitcoin ($BTC) is the native token of the Bitcoin blockchain protocol, and there will only ever be 21 million bitcoins (tokens) in circulation as determined by its underlying protocol.

The idea of digital currencies within internet ecosystems is not new. People often attribute value to Web 2.0 ecosystems by converting fiat currency (e.g., U.S. dollars) into value that is stored within a platform ecosystem, such as the Apple App Store or the Google Play Store. Yet digital value stored in these platforms suffers three critical limitations:

1. Digital value within nearly all Web 2.0 ecosystems is centrally governed by the platform owner. What someone owns within a Web 2.0 platform, such as the app store, is solely dictated by what Apple says they own.

2. Digital value is captive. Once someone puts money into a platform ecosystem, it cannot be removed unless authorized by the platform owner.

3. Stored value or digital purchases (e.g., music, movies) cannot be freely transferred or sold—not even to other users of the same platform. In most cases, users do not really own anything at all on Web 2.0. Instead, they pay for a platform owner to grant access to stored value and/or other digital goods that are captive and locked to a specific platform.

All three of these limitations are largely addressed by blockchain and cryptocurrencies. With blockchain, there (1) is no centralized authority that governs native tokens, (2) are ways for cryptocurrencies to be easily exchanged for fiat currency, and (3) are no restrictions on exchanging cryptocurrencies between users on a given blockchain. These properties make it easy for individuals to create new applications and get paid directly from other users, which, in turn, drastically reduces the need for intermediaries to secure, insure, and mediate digital transactions.

While transactions using native tokens form the basis of financial activity on Web3, there is also another crucial innovation that elucidates the growing financial systems on blockchain: decentralized finance (DeFi). DeFi allows any individual or organization to easily create their own currency atop a blockchain protocol. And because these user-created tokens use the same blockchain protocol as a native token, they can be easily transacted with one another. As such, Web3 comprises a multitude of cryptocurrencies that can be exchanged within projects, applications, and organizations.

Some of the most noteworthy applications built atop blockchain protocols to date are decentralized exchanges (DEXs), such as Uniswap or Sushiswap. DEXs support a robust DeFi system because they enable users to convert native and nonnative (i.e., user-created) cryptocurrencies on a blockchain. This is possible because users can directly create liquidity pools to exchange different currency pairs. For example, the company Yuga Labs recently created a token called Ape Coin on the Ethereum blockchain to serve as the token for its planned ecosystem of applications. Liquidity pools that comprised pairs of Ape Coin and Ether were available almost immediately, enabling users to transact between the two tokens. In other words, any user-created token can theoretically receive a valuation in terms of another token or cryptocurrency. Even though DeFi can have broad implications for the future of Web3 businesses and

economies, it should be noted that it does not offer any of the protections afforded by existing financial institutions and can be used to defraud unsuspecting users.

A robust DeFi system supports the growth of other Web3 applications and services by allowing lower-cost scaling and reducing reliance on centralized intermediaries such as banks and payment processors. As Web3 continues to grow, protocols and platforms are also emerging to enable activity between different blockchains (i.e., cross-chain), as well as applications that enable Web3 benefits in the analog world. For example, the Aave Protocol, built atop the Ethereum blockchain, is a DeFi service that facilitates borderless peer-to-peer lending without credit scores or accredited lenders. This application makes it possible for individuals to receive quick and automatic loans using cryptocurrency as collateral and/or receive interest on peer-to-peer loans without relying on centralized intermediaries.

Acquiring cryptocurrencies for new users is consequential and represents one of the most acute growing pains of Web3. Specifically, the most common way for new users to obtain cryptocurrencies today is by purchasing them on centralized cryptocurrency exchanges. These businesses sell cryptocurrencies to users in exchange for fiat currencies. As such, the primary on-ramp to Web3 and a decentralized internet is controlled by a small number of centralized firms. Businesses will need innovative methods to ease user integration with Web3.

### 3.2. Nonfungible tokens (NFTs) and digital ownership

*NFTs* are noninterchangeable tokens recorded on a blockchain (Chohan & Paschen, 2022; Wilson et al., 2021). Unlike native tokens and user-created cryptocurrencies that are interchangeable (fungible) and can be fractionalized (e.g., sending Bitcoin in fractions of a whole token), every NFT is distinct. Thus, only a single user can own a given NFT at a time. NFTs can be programmed to store information and traced with a level of specificity that is not possible with fungible cryptocurrency tokens. For these reasons, NFTs offer a critical step in the evolution of digital property: legitimate and verifiable ownership of digital assets no longer requires a third party.

To date, NFTs have been used in the provenance and exchange of several creative products, such as digital artwork, music, and collectibles (Chalmers et al., 2022). In March 2021, a piece of digital art entitled "Everydays: The First 5000 Days" by the artist Beeple became the first digital artwork sold at Christie's auction house. While most of the media coverage focused on the digital artwork—a collage of 5,000 different digital works—and its $69,346,250 price tag, an actual image file was not transacted. Instead, Beeple minted a specific NFT by using a MakersPlace smart contract. This NFT is associated with metadata linked to the digital image file hosted on the decentralized InterPlanetary File System (IPFS), and its value is derived from its digital provenance (i.e., its indisputable record of digital ownership). In other words, this NFT has a transparent, verifiable, and immutable record of being minted on February 16, 2021, and its owner possesses a singular token associated with the artwork's creation on the Ethereum blockchain, not the intellectual property rights of the artwork.

Following this record-breaking sale, the use of NFTs boomed for digital artwork, collectibles, music, videos, and text-based works. In August 2021, more than $3 billion worth of NFTs were transacted on OpenSea, an Ethereum-based, decentralized marketplace. Collectible projects—in which a fixed number of tokens are linked to digital content—imbued such growth. For example, the CryptoPunks NFT collection, an early NFT project created in 2017 by LarvaLabs, is a set of 10,000 computer-generated pixel avatars with randomly assigned attributes, such as facial hair or sunglasses. Today, a single Punk is valued at more than $100,000, with some of the rarest valued in the millions.

Several others, including businesses, have also jumped aboard the NFT bandwagon. Established artists, such as Damien Hirst and Tom Sachs, launched original NFT art projects, and companies such as Adidas, Nike, Dolce & Gabbana, Prada, Visa, Mastercard, and McDonald's invested in NFTs to generate excitement among consumers. For instance, in November 2022, McDonald's released a limited number of NFTs to honor the anniversary of its McRib sandwich. Professional sports leagues, such as the National Basketball Association (NBA), also launched collectible NFTs to commemorate players and game highlights. Even smaller companies, such as California streetwear brand The Hundreds, have invested in NFTs. The Hundreds launched an NFT collection titled the Adam Bomb Squad (ABS) and—in collaboration with Shopify—became the first major brand to integrate token-gating into e-commerce (i.e., restricting access to purchase limited edition products to owners of certain NFTs).

Despite the activity and interest in NFTs as creative projects and collectibles, the far-reaching benefits of verifiable, traceable, and immutable

tokens are only just emerging (Angelis & Da Silva, 2019). For example, groups and organizations are beginning to use NFTs as digital keys and membership tokens to define boundaries and grant levels of access based on token privileges. NFT projects are even experimenting with ways to use tokens as access passes to offline events, such as networking events, parties, and sports competitions. In addition, NFTs are also spurring more diverse usage via registration and ownership documents, supply chains, controlled substances, and patient medical records (e.g., Montecchi et al., 2019). Overall, the use of NFTs is still in its infancy and has the potential to unlock new forms of exchange, ownership, and interaction.

### 3.3. Decentralized autonomous organizations (DAOs)

DAOs are organizations "managed entirely through protocols that are encoded and enforced via smart contracts rather than human managers" (Murray, Kuban, et al., 2021, p. 623). Specifically, DAOs enable key aspects of organizational structure, governance, and activities that are programmed into smart contracts and reside on a blockchain (Lumineau et al., 2021; Vergne, 2020). For example, smart contracts can grant DAO membership to those who hold certain NFTs, thereby allowing these individuals to present proposals and vote on proposals put forth by other members. Much like enterprise software in more traditional organizations, blockchain-based smart contracts enhance security, increase transparency, and reduce the ability for individuals or small groups to break policies or rules via automation. Yet unlike traditional organizations in which people must interact with digital systems to approve and verify certain actions, smart contracts allow DAOs to automate a host of actions if certain conditions are satisfied. For example, if a DAO is formed to facilitate a collaborative project, each member's contribution(s) can be tokenized and assigned a unique NFT. In return, when the group-developed innovation is later commercialized, each member can be compensated based on the NFTs they possess, which indicate individual contributions. In addition, smart contracts can facilitate a more secure and fair governance process by ensuring only members who possess specific NFTs are able to vote.

DAOs also create opportunities for individuals to quickly and securely organize, raise funds, and govern themselves while maintaining anonymity or pseudonymity. These advantages may result in DAOs becoming the next generation of online communities, subreddits, and forums. To date, many DAOs have formed based on a shared interest in developing and governing Web3 applications. For example, Nouns DAO was formed to create and support the Nouns NFT project. Similarly, the SushiSwap DEX is governed by a DAO. Another prominent example of a DAO that rapidly formed in pursuit of a shared interest was ConstitutionDAO, which raised $47 million over a few days in November 2021 to collectively acquire a copy of the U.S. Constitution at auction. When ConstitutionDAO failed to win the auction, it returned all funds to the original contributors and disbanded as quickly as it formed. Overall, DAOs provide a way to define membership in an online collective and facilitate increasingly decentralized forms of virtual collaboration (Levis et al., 2021; Lumineau et al., 2021).

### 3.4. Metaverse(s)

Metaverses are online worlds that give three-dimensional form to individuals' digital lives. Metaverses allow users to create, outfit, and use digital avatars to represent versions of themselves in online social spaces. There, users can interact with others in a dynamic, quasirealistic manner contrary to posts and news feeds on Web 2.0's social networking platforms. What was once a mere science fiction trope is rapidly becoming a reality into which investors and firms are pouring billions of dollars, as evidenced by Facebook's evolution into Meta in 2021, signifying the company's plans to establish itself as a Web3 leader.

The initial metaverses of Web3 are predominantly virtual games in which users own and exchange land, clothing, and other digital assets (e.g., NFTs). Though online video games have traditionally been closed, highly centralized experiences in which developers created fixed content for players, future metaverses will increasingly rely on user-generated content. In these virtual worlds, users' avatars can interact with one another using voice or text chat. For example, Decentraland is a functional metaverse accessible via web browsers that allow avatars to interact, buy land, and exchange digital goods. In addition, The Sandbox is a Web3 reboot of an online video game in which users create their own worlds and games. Additional metaverses, such as Meta (formerly Facebook), are expected to incorporate virtual and augmented reality technologies to develop more robust artificial worlds. Numerous major technology companies will likely expand into metaverses, serving as extensions of existing social media and networking platforms in the future (Balis, 2022).

Beyond virtual worlds for online video games, the array of metaverse possibilities includes robust economies for the exchange of digital assets, exclusive events, and interactive communities. Since these alternative realities are more open, businesses can participate by creating and selling digital clothing and experiences. In March 2022, Decentraland hosted a fashion week in its Luxury Fashion District which garnered 108,000 unique attendees over four days. Established brands, such as Esteé Lauder, gave out NFTs that could be worn by users' avatars, while Dolce & Gabbana showcased its new line of virtual pieces. Moreover, many companies (e.g., video game developers, fashion brands, and celebrity enterprises) have acquired large plots of land in Decentraland and The Sandbox in anticipation of new virtual marketplaces—sometimes purchasing this real estate for millions of dollars. While many see these investments as speculative in nature, the rapid acceptance of the metaverse as a concept has made digital real estate an attractive prospect. Imagine having a digital storefront that is passed by millions of user avatars each day.

## 4. The current status of Web3

Despite the flurry of Web3 development, much of the new internet still resembles the old one. In many cases, Web3 applications still require a Web 2.0 interface (i.e., a website), and most of the Web3 applications look very similar to those of Web 2.0, if not worse. Furthermore, most of the internet's critical functions—such as email, chat, and social media—currently have no comparable Web3 alternatives. However, many Web3 applications are currently in a passable phase in which many disruptors begin (Christensen, 2013). While these applications do not yet match the usability, performance, or cost of Web 2.0, they are advantageous to small, growing niches.

For Web3 applications to achieve mainstream status, developers must enhance the user experience (UX) and lower costs. These challenges are apparent in many of the Web3 applications on the Ethereum protocol. The UX is often confusing for all but the most seasoned users, while the gas fees associated with Ethereum (i.e., the cost to conduct a transaction using the Ethereum blockchain) are high—approximately $1.53 to process and validate low-speed transactions and $1.64 for high-speed transactions, as of March 2022. Along with such considerations, developers are increasingly focused on facilitating a more robust Web3 ecosystem—via interoperability, data control, and access—as more blockchains emerge (e.g., Solana, Avalanche, Fantom). These key considerations, as well as the current Web3 projects attempting to address them, are described in Section 4.

### 4.1. Interoperability

Interoperability across blockchain protocols is essential. Mainstream users are not typically concerned with which blockchain they use, as they simply want intuitive and easy applications such as those on Web 2.0. Different blockchain protocols are currently differentiating themselves on the dimensions of speed, security, and functionality, and several projects are creating protocols to connect them. Polkadot (DOT)—one of the most prominent projects—aims to provide a scalable and secure network protocol for Web3. If its protocol successfully enables interoperability, the barriers to cross-chain utilization will likely become negligible, reducing the need for fees, mitigating the complexity of transferring assets, and promoting a less centralized internet. As protocols improve and interconnect, new possibilities will emerge due to improved decentralized applications and organizations.

### 4.2. Data control

While Web 2.0 creates and uses an extraordinary amount of consumer data, many users are blissfully unaware that their data is constantly mined and monetized. Moreover, those who are aware are nearly powerless to do anything about it since they cannot utilize many of the most popular Web 2.0 websites and applications without this implicit trade of data for services. In contrast, many Web3 applications are being designed to restore autonomy and privacy to users by reducing the need for companies to collect and sell user information. In this vein, protocols such as Cirus are emerging to provide ways for users to monetize their data as they see fit. In addition, many Web3 applications no longer require users to create separate accounts for each website or program they use. Instead, a blockchain-specific user identity—referred to as a wallet—can be used universally to access various applications on a given protocol. Perhaps more importantly, users can revoke access to specific applications or websites at any time, as the data about their interaction history is stored in perpetuity on the blockchain rather than with the actual application or website.

### 4.3. Access

One function of NFTs that has yet to be fully unlocked is their use as access keys. The digitization of certain keys (e.g., event tickets, reservations, coupons) has emerged as a way to reduce paper waste and mitigate the eventuality of losing a physical key (e.g., a paper ticket) in the Web 2.0 world. However, NFTs take this a step further due to their programmability. Imagine if a ticket to see Ariana Grande perform also had built-in properties, such as priority tickets for the next concert, exclusive access to merchandise, or a chance to win a digital raffle for a meet-and-greet event. Consider if a coupon had a code that automatically reactivated whenever its owner spent enough money at the grocery store. The possibilities of NFTs are only limited by those coding them. In this vein, Lit Protocol aims to work with Web 2.0 businesses to offer blockchain-defined access to events and services such as Zoom, Google Docs, and Shopify. This would allow Google users to create documents that require others to hold certain NFTs for access and editing privileges. In organizational settings, NFTs also offer a way to grant limited and controllable access to certain documents and accounts.

## 5. How can companies prepare for a Web3 world?

As developers build and improve Web3 applications, the buzz around the next generation of the internet continues to grow. For some, Web3 promises a decentralized online experience in which no single entity controls access to essential services or information, such as private and behavioral data that individuals exchange for connecting, learning, and sharing on Web 2.0. They believe Web3 will create an internet that is less reliant on centralized firms to intermediate and extract value from communication and exchange. For others, Web3 promises a renaissance of peer-to-peer interactions, which enables a new generation of user-developed content, applications, and services that are supercharged by the internet's existing infrastructure. Importantly, the ability for creators and developers to immediately access users on public, decentralized blockchain networks means that ecosystems will rely less on single firms that act as gatekeepers to deploying and enjoying content.

Web3 does not demonetize the system. Instead, it reallocates some of the value to those who use, maintain, and improve the network. It also reduces some of the value that can be captured by simply facilitating certain interactions, since intermediating features are built into blockchain protocols. Web3 also provides users with behavioral data and records of what they create and own, thereby enabling them to profit from their digital ownership across Web3 applications. In other words, the notion of user-owner is critical to the vision of the new internet. Overall, a robust, decentralized internet entices individuals who seek to capitalize on the content they produce, as well as startups that adopt the ethos of decentralization. Yet it begs the following question: How will established companies succeed in a Web3 world? In Section 5, we address how companies can prepare for this potential paradigm shift.

### 5.1. Reconsider the role of network effects

Web3 has the potential to undermine the business models of large, centralized platforms that follow predictable lifecycles. These platforms recruit users and third parties—such as developers, businesses, and media—to make their services more valuable via network effects (Afuah, 2013). As platforms become widely adopted, their power over users and subordinates steadily grows as both groups increasingly depend on the platform's offering(s). Then, as platforms mature, their relationships with network participants shift from positive-sum to zero-sum, as obtaining and extracting profits from user data is the primary way for them to continue growing. In contrast, Web3 networks exist on public blockchains and cannot be controlled by a single entity. For example, anyone can build a decentralized application atop the Ethereum blockchain and, as a result, access individuals who possess $ETH tokens. As such, competitors or alternative platforms can immediately access and benefit from the same user base and network effects that established players enjoy.

While companies like Amazon and Google have traditionally capitalized on strong network effects, Web3 will likely shift competitive dynamics since new entrants will be able to immediately access large networks of potential users. Specifically, as more users possess a blockchain's native token, companies can capture more value from a blockchain's native token holders. As a result, business models based primarily on network effects may become less viable since users' switching costs will be drastically lower given that they can own more of their data and take it with them when they move between applications or services on a blockchain protocol. However, network

effects will likely continue to be a source of competitive advantage—perhaps becoming more valuable than ever—given the ease of monetizing users. Overall, businesses must devise new and creative strategies to protect their user networks by actively sharing the value created with users.

### 5.2. Tokenize intellectual contributions

Web3 applications promise to more effectively coordinate user-developed content, applications, and services compared to Web 2.0 infrastructures (Dahlander & Frederiksen, 2012; O'Mahony & Ferraro, 2007). For example, rLoop is a decentralized organization comprised of more than 1,600 engineers who collaborate virtually on an array of projects (e.g., a pod for the Hyperloop and a personal flying machine). To coordinate collaborative efforts, rLoop uses blockchain technology to issue tokens associated with individuals' intellectual contributions. Once contributions are tokenized, smart contracts can then be used to automatically divide revenues between members based on their individual contributions, thus enabling more precise compensation.

Using blockchain in this way will have profound implications for companies that attempt to maintain human capital within a firm's boundaries. If individuals can be compensated based on their direct contributions to multiple DAOs, centralized firms will need to adopt a similar model while embracing their ability to contribute to multiple firms. Otherwise, firms will be forced to pay a premium for knowledge workers who agree to terms of exclusivity.

### 5.3. Reconsider organizational hierarchy (to a degree)

The hierarchical structures of most businesses are designed to effectively delegate tasks to individuals in designated roles. While some companies are more horizontal—with the lowest employees on the totem pole only a few steps away from the CEO—others are so vertical that the top is hardly visible from an entry-level position. Structure varies across companies, as positions are ideally filled by those best suited to meet shareholder needs, and classified information is only accessible to those in certain roles. As such, DAOs have the potential to reshape delegation, hierarchy, and structure by quickly and efficiently defining roles and permissions via access coins (i.e., specific NFTs that indicate an individual's permissions, responsibilities, and points of contact).

More research, development, and experimentation are needed to create DAOs that offer a sufficient competitive advantage for existing companies to shift entirely from centralized to decentralized structures. Perhaps a more likely way for established companies to do this would be as centralized semi-autonomous organizations (CSOs). This kind of centralization would facilitate a company's strategic initiatives according to its vision and mission statement while enabling workers at lower levels of the organization the semiautonomy to delegate authority to themselves within the bounds of their responsibilities—so long as said actions are not vetoed by higher-ups. Such a structure would likely provide the centralized authority required to set and implement overarching goals and empower employees to work when and how they want, to a degree (Murray, Kuban, et al., 2021).

### 5.4. Double down on stakeholders and communities

Web3 will likely grow and develop at a much faster pace than Web 2.0. First, Web 2.0 can already disseminate information and facilitate communication. Second, Web3 development is now, and will continue to be, global. Talent and knowledge are distributed across the world, and there are clear economic incentives to building in the Web3 space—especially for individuals from smaller economies that can potentially leapfrog existing Web 2.0 companies. While companies may be enticed by Web3 projects that secure a slice of the Web3 pie, they should not proceed blindly or expect business as usual on the next-generation internet. Instead, given the heightened power of users and small communities and the broader cultural movement of decentralization that underlies Web3 development, user outreach and engagement will be paramount. For example, the fast-food chain Wendy's has become widely known for its Twitter feed that roasts other fast-food chains. It could leverage its social media capabilities in its Web3 strategy by creating NFTs that engage and activate followers while using the broader Web3 infrastructure to enable stakeholders to profit from their engagement with the company.

The rise of digital and decentralized ownership emphasizes stakeholder management, increasing the importance of shared success or win-win value systems. Revenue- or value-sharing will be much easier to achieve on blockchain protocols, becoming a way for organizations and firms to strategically attract users and build tighter relationships with stakeholder communities. Furthermore, companies are unlikely to retain the same data privileges they have now. Users will have much more control over how their information and behavioral patterns are

monetized and distributed, and firms will be forced to devise creative solutions that incentivize users to share proprietary data. One possible solution is the use of transparent incentive programs, such as offering coupons for those who voluntarily share their information with a company. Another possible solution is the pursuit of community-based strategies, wherein companies foster social identification among users to strengthen brand loyalty (Fisher, 2019; Murray et al., 2020).

### 5.5. Exercise caution when investing in Web3

Web3 has even fewer barriers to entry than Web 2.0; anyone can create a blockchain, DAO, or cryptocurrency. Open-source code abounds, and it is easier than ever to copy, paste, and edit smart contracts to create new, custom applications. In contrast, the cartels of Web 2.0, such as Amazon and Google, have created an anticompetitive space in which new players are discouraged by their overwhelming scale and expansive partnerships. Combined with the resources it takes to flesh out a professional website, it becomes clear why new entrants have difficulty garnering market share. However, blockchain technology allows developers to take complete control of their creation(s), offering many ways to source cash flows, edit protocols, and remain competitive. More importantly, public networks make network effects harder to keep from competitors via centralized control of user data, which levels the playing field. In other words, competition will be fierce, imitation will be expected, and protecting valuable strategic positions will require different approaches due to the openness and decentralization of Web3 protocols.

Businesses seeking to strategically position themselves vis-à-vis Web3 should also consider the potential for future regulation. As more people migrate to cryptocurrencies, more regulation will likely follow. Today, regulations are too broad, unenforceable, or ignored, giving developers free rein over this Wild West of the internet—yet governmental oversight could limit the current advantages for entrants. Moreover, Web3 presents multiple areas of vulnerability: cryptocurrencies, DeFi, NFTs, and DAOs. Of course, businesses will benefit from legal and compliance capabilities that monitor (or influence) the rapidly changing regulatory environment, which is far behind that of Web3 development. Legal and compliance teams' interpretations of regulations and risk tolerance will also play a crucial role in shaping strategic business decisions.

## 6. Entering the metaverse(s)?

Web3 offers enormous opportunities for creative products, entrepreneurial ventures, and existing companies. It has the potential to usher in a new generation of the internet—one that serves as a platform for new types of businesses and alters the ways in which people interact with one another. Of course, there is the possibility that after an early deluge of projects (e.g., the booming market for NFT artwork and collectibles in 2021 and the metaverse landgrab in 2022), there will be a shakeout and consolidation in the Web3 space. Existing companies should exercise caution when investing in Web3 yet recognize the considerable opportunity to create value in innovative ways. New forms of digital ownership and organization suggest the possibility of new markets that companies—both new and old—can embrace. While a Web3 internet may be more fragmented, diverse, and rewarding for users than previous iterations, we expect to see increased Web3 interest and entry from existing companies across numerous industries as they learn about blockchain technology, experiment with the applications it enables, and identify novel opportunities.

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