

al6z

The web3 Landscape

October 2021

We believe that the next wave of computing innovation—along with entirely new sectors of the economy—will be built on decentralized technology.

This technology has rapidly evolved beyond its financial origins. The community encompasses constituencies ranging from musicians and artists to small business owners and government agencies. Smart regulation must reflect that diversity of potential users and use cases.

Decentralized technologies offer an alternative to a digital status quo that is increasingly dominated by big tech and oppressive regimes. Open, democratized systems can provide the infrastructure to power tomorrow's economy and institutions. Realizing that potential will depend on collaboration between government and the private sector to develop regulatory frameworks that encourage innovation while managing the risks inherent in different applications.

a16z is the largest investor in this space. Our team includes former officials drawn from across government, so we recognize the need for responsible regulation of this important new industry. As decentralized systems go mainstream, we look forward to working with regulators and lawmakers to set clear rules of the road that are good for consumers, entrepreneurs, and creators alike.

We recognize that this space is technical and fast-moving. That's why we've put together this primer to introduce some of the use cases about which we're most excited, each with additional readings for those interested in learning more. We hope this document will help demonstrate the incredible diversity and potential of this technology, and help policymakers better understand how to use these tools to deliver solutions on behalf of the communities they serve.



Contents

web3 Applications	4
Decentralized Autonomous Organizations (DAOs)	7
Decentralized Finance (DeFi).....	9
Stablecoins & Central Bank Digital Currencies (CBDCs).....	12
Privacy & Digital Infrastructure	14
The Creator Economy	16
Blockchain-based Games.....	19

web3 Applications





What is it?

During the first era of the internet—from the 1980s through the early 2000s—internet services were built on **open protocols** (e.g., TCP, IP, SMTP, HTTP). This created a stable, level playing field on which to build the ecosystem of the internet. It was during this period of innovation that many of the biggest web properties were started.

During the second era of the internet—from the mid 2000s to the present—businesses built a second layer of proprietary, **closed protocols** on top of the internet’s open protocols. This has been a period of centralization, as for-profit tech companies—most notably Google, Apple, Facebook, and Amazon—built software and services that rapidly outpaced the capabilities of open protocols. For example: Simple Mail Transfer Protocol (SMTP) is an open protocol that enables email. Google owns Gmail and Microsoft owns Outlook, but no one company owns the email-enabling protocol itself. However, in many cases, these closed protocols are not tech companies’ core business: individuals don’t pay Google to use Gmail, but instead Gmail feeds into Google’s core business of collecting data and selling ads. This is the world of **Web 2.0**. As the saying goes: “If you’re not paying for it, you’re not the customer. You’re the product.”

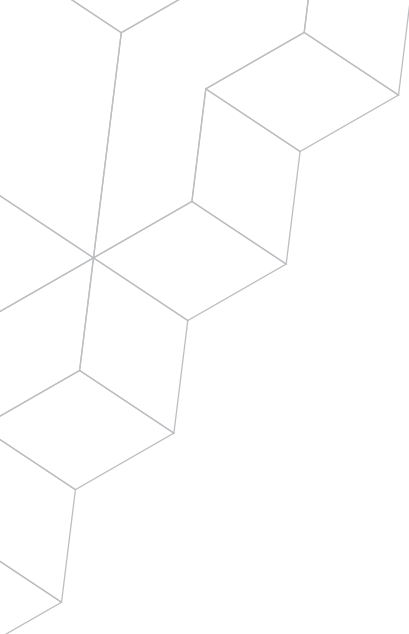
We are now in the early stages of developing **web3**, in which communities are incentivized and rewarded for maintaining and developing core infrastructure.

Why it matters

The decentralized networks of web3 offer an alternative to the broken digital status quo.

While centralization has helped billions of people get access to amazing technologies, many of which were free to use, it has also stifled innovation. Right now, companies that own networks have unilateral power over important questions like who gets network access, how revenue is divided, what features are supported, how user data is secured, and so on. That makes it harder for startups, creators, and other groups to grow their internet presence because they must worry about centralized platforms changing the rules and taking away their audiences or profits.

The classic challenge of decentralized networks is that they are public goods. Without a central entity to control decisions and capture profits, it is hard to incentivize their maintenance and development. Crypto helps solve this problem through decentralized coordination and providing economic incentives for development. web3 will put power in the hands of communities rather than corporations.



Decentralized networks are an important counter to the fragility of centralized applications. For example, in June 2021, internet users were unable to connect to top websites—including The New York Times, the Guardian, Twitch, Reddit and the British government’s homepage—because a single company, Fastly, was crippled by a software bug. Decentralized systems avoid single points of failure.

Decentralized networks can also neutralize the unilateral control exerted by centralized platforms. For example, the decentralized, permanent data storage blockchain platform Arweave was used by activists in China to permanently upload copies of Hong Kong’s Apple Daily before it was blocked by censors, and to save criticism of the country’s coronavirus response before it was deleted from the social media platform Weibo.

Further reading

1. [Why Decentralization Matters](#) by Chris Dixon (OneZero)
2. [Blockchain Can Wrest the Internet From Corporations’ Grasp](#) by Chris Dixon (WIRED)



Decentralized Autonomous Organizations (DAOs)





What is it?

Decentralized Autonomous Organizations or **DAOs** are online member-owned communities governed by the consensus of their members instead of centralized leadership. DAOs represent exactly what they're called, because they are:

- **Decentralized**—rules can't be changed by a single individual or centralized party.
- **Autonomous**—votes are tallied and decisions implemented based on logic written into a smart contract, without human intervention.
- **Organizations**—entities that coordinate activity among a distributed community of stakeholders.

While it sounds complex, there are real-world corollaries all around us. Employee-owned businesses like Publix grocery stores, or even the Green Bay Packers, are examples of public ownership structures without centralized leadership.

DAOs are examples of what is known as “on-chain governance.” In traditional corporate governance, for example, companies have bylaws that dictate certain policies, such as how a board is elected. A DAO extends this concept into the digital world by encoding these policies into smart contracts.

A **smart contract** is a persistent computer program that runs on a blockchain network. Like legal contracts, smart contracts are commitments, except they're written into computer code that executes automatically and autonomously.

Why it matters

DAOs are an emergent governance model for new kinds of organizations built around transparency and inclusion. The principles can be applied to a wide variety of organizations, including non-profits, collectives, cooperatives, and investment funds.

Governance structures determine how an organization makes decisions that align the interests of participants. The challenges with many existing organizational forms, such as corporations, are that decisions are not made in a transparent way and often stakeholders face high barriers to entry to participating in governance.

Further reading

1. [A Beginner's Guide to DAOs by Linda Xie](#)

Decentralized Finance (DeFi)





What is it?

Decentralized Finance or “**DeFi**” refers to decentralized applications for finance, such as saving, lending, and exchange.

Decentralized applications or “**dApps**” are computer applications whose code is written in a series of related smart contracts. These contracts are often referred to collectively as “protocols.” What distinguishes dApps from regular applications is that they are typically **permanent**—they will exist as long as the blockchain hosting the protocol exists and cannot be changed or manipulated by malicious actors. They are also **open**, meaning that any computer can participate in the network, and access is not limited to a single or pre-defined group.

Payment blockchains enable peer-to-peer digital transactions. Prior to bitcoin, digital payments had to rely on centralized record-keepers, like banks and credit card companies. Even when you send money through a service like PayPal or Venmo, what you’re actually sending is an “IOU” that depends on bank infrastructure.

Cryptocurrencies are like money—they can be considered as a unit of account, store of value, and medium of exchange within the system—and can transfer actual value digitally without a centralized third party.

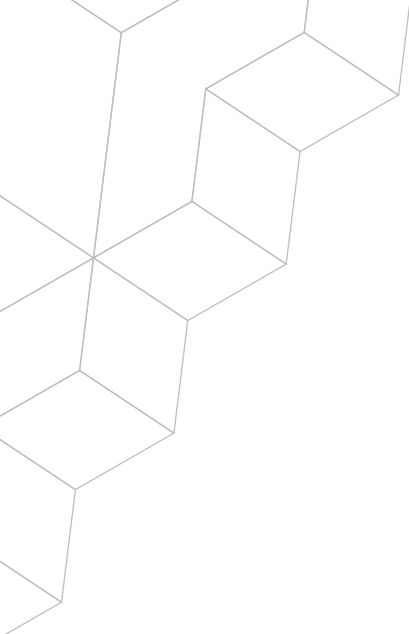
Why it matters

Cryptocurrencies allow for low cost, nearly instantaneous, borderless, peer-to-peer transfers of actual value. They aren’t subject to the business hours of mainstream financial institutions. Most importantly, they have low barriers to entry.

This opens extraordinary opportunities to help underserved communities in regions around the world. Payment blockchains could open up access to financial services for over two billion unbanked people worldwide. Mobile wallets make it cheaper and easier for migrant workers to send money home to their families in another country. Cryptocurrencies can provide a safer store of value in countries experiencing hyperinflation.

Most people think sending money online is as easy as sending an email, but that’s only the case for those who are fortunate to have access to the right financial services. For the more than 20% of Americans who are unbanked or underbanked, the existing options are slow, expensive, and limited—locking millions out of economic opportunities.

Payment blockchains have the potential to improve current payment systems. For those who don’t have a bank account to receive digital deposits, cryptocurrencies can be used to distribute aid efficiently, securely, and at low cost, while utilizing the transparency of the blockchain to fight waste, fraud, and abuse.



If fintech companies like PayPal or Venmo revolutionized the frontend of consumer finance, DeFi revolutionizes the backend—laying new pipes and rails that are easier to use, access, audit, upgrade, and build on. Making it cheaper and easier to participate in the financial system will inevitably lead to greater financial inclusion. And, like credit unions, giving consumers control over and membership in the consumer finance products they use will lead to better outcomes.

Decentralized financial services embrace the core values of the open internet, including:

1. Open access to anyone in the world;
2. Commitment to open source code;
3. Permissionless adaptation by third-party developers;
4. Lower fees;
5. Encryption-backed security and privacy; and
6. Transparent, accountable governance.

Further reading

1. [Decentralized Finance: What It Is, Why It Matters](#) by Marvin Ammori (Future)
2. [Decentralized Finance \(Ethereum\)](#)
3. [A Beginner’s Guide to Decentralized Finance \(DeFi\)](#) by Sid Coelho-Prabhu (Coinbase)
4. [Cryptocurrencies Can Enable Financial Inclusion. Will You Participate?](#) by Christine Moy and Jill Carlson (World Economic Forum)
5. [Emerging Technology for Banking the Unbanked](#) (Cryptopedia)

Stablecoins & Central Bank Digital Currencies (CBDCs)





What is it?

A **stablecoin** is a privately-issued cryptocurrency that maintains a stable value relative to another asset, such as the U.S. dollar or Euro, over time. **Fiat-collateralized** stablecoins—such as those pegged to the U.S. dollar—maintain fiat asset reserves to match the value of each token issued. Other projects are collateralized by digital assets or algorithmically stabilized through the automatic execution of smart contracts.

Central bank digital currencies (CBDCs) are digital currencies that are issued by governments and that represent sovereign obligations.

Why it matters

Stablecoins offer the advantages of cryptocurrencies without the volatility. Where cryptocurrencies like bitcoin and ethereum might experience huge price swings in a single day, stablecoins are designed to maintain a constant price. This helps stablecoins serve as an effective medium of exchange.

As low-volatility assets, stablecoins help enable on-chain transactions, including modernizing global payment systems and unlocking broader access to financial services for the unbanked. They are the basic building blocks for a host of important innovations.

CBDCs offer many of the benefits of stablecoins, although they raise certain privacy and security concerns. Stablecoins and CBDCs do not need to be mutually exclusive. Giving people a choice between stablecoins and CBDCs creates the competition that drives innovation, leading to new features and improved functionality.

Further reading

1. [Don't Let China Mint the Money of the Future](#) by Niall Ferguson (Bloomberg)
2. [50 Years After Going Off Gold, the Dollar Must Go for Crypto](#) by Niall Ferguson (Bloomberg)
3. [Thinking Big on Fed Accounts, Digital Dollars and Financial Inclusion](#) by Chris Brummer
4. [China lays down challenge to the west on crypto](#) by Mohamed El-Erian (Financial Times)

Privacy & Digital Infrastructure





What is it?

One of the limitations of many existing blockchain networks is that they are fully transparent by design. But cutting-edge research in new areas of cryptography make it possible to mathematically prove the validity of certain information, without providing the information itself. For example, a user could prove to a website that they know their password, without the website having to store the user's password in a database vulnerable to attack. This set of solutions can therefore address both privacy and scalability problems.

Why it matters

Privacy is important as a feature, not just because it protects users' personal data, but also because it fundamentally extends the design space for applications. Particularly given the backdrop of massive data breaches that have proliferated during the Web 2.0 era, data protection must be central to the next wave of tech innovations. Privacy infrastructure will enable a more protective suite of applications.

Privacy also has the potential to allow greater regulatory compliance. With existing systems, a user may be reluctant to give their personal information to a service provider or application on the blockchain, because that information could be used to see every single transaction the user had ever completed. Privacy layers help allay these concerns. They enable users to disclose certain information to specific parties, such as regulators, while preventing that information from becoming fully public. This means that regulatory compliance would be easier to achieve without corresponding privacy risks.

Further reading

1. [How the Coming Privacy Layer Will Fix the Broken Web by Howard Wu \(Future\)](#)

The Creator Economy





What is it?

The **Creator Economy** refers to emerging communities of creators—artists, musicians, game developers—who connect directly with their supporters and collaborate without intermediaries, enabling them to develop independent income streams.

Fungibility means that a unit of a good is indistinguishable and mutually interchangeable. For example, a \$1 bill is interchangeable with any other \$1 bill. Meanwhile, **non-fungibility** is a property of unique goods such as artwork, collectibles, and real estate.

A **non-fungible token (NFT)** is a digital asset that is non-fungible, therefore attaining value due to its uniqueness. For example, an NFT might represent a piece of unique digital artwork, a Mickey Mantle baseball card, or a share of physical North Carolina real estate. NFTs can be exchanged in the same manner as any other token, such as bitcoin.

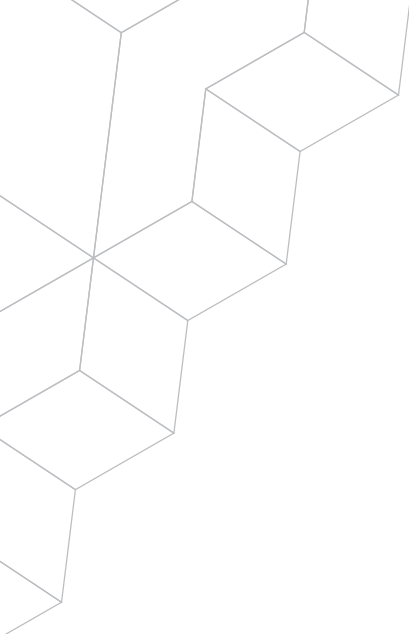
Why it matters

For many people, and especially younger people who are spending more and more time online and in digital spaces, it is becoming increasingly popular to own digital versions of physical assets. Books, music, movies—like photographs—exist as digital files saved on hard drives or in the cloud.

When you purchase an NFT, it's yours to control as you see fit, similar to when you buy a physical good. You can transfer it, sell it, collateralize it, lend it, or keep it for yourself to admire. Early use cases for NFTs include digital art, games, sports memorabilia, and collectibles.

NFTs offer creators new ways to monetize, bypassing traditional gatekeepers and giving fans a direct stake in their success. They're better for creators, who can sell their work directly without having to rely on middlemen (for example, artists who used to sell their artwork in galleries that took a cut or charged a fee). And they're better for fans because they become owners, giving them an increased stake in the artists and creators they support.

Artists are already benefiting from this new distribution model. Longtime artist Matt Kane used to sell his oil paintings in local galleries; last year, he sold a piece of digital artwork on the blockchain for the equivalent of more than \$100,000. Photographer Justin Aversano earned more than \$130,000 selling 100 portraits from his “Twin Flames” collection as NFTs. Former MLB player-turned-artist Micah Johnson sold over \$1 million worth of NFTs representing a painted sculpture as well as \$305,000 for the physical sculpture itself.



NFTs offer the additional unique benefit of using blockchain technology to track them so artists can earn a commission on secondary sales. 21-year-old artist Robbie Barrat sold a piece of digital artwork in 2018 for \$176; when it resold in 2021 for 100 ethereum, he made about \$11,000—or more than 62 times what he earned on the original sale.

NFTs exploded in popularity during the spring of 2021, particularly as more well-known participants entered the space. NBA Top Shot—officially licensed collectibles from the NBA—generated \$200 million in gross sales while spending very little on marketing. Musician Katy Perry and NFL player Rob Gronkowski have launched NFTs for fans. Some, like Ellen DeGeneres and the band Kings of Leon, have sold NFTs to raise money for charitable causes during the pandemic shutdown. And in April 2021, Sotheby’s partnered with renowned digital artist Pak for its first NFT auction.

Since NFTs are verifiable digital property rights, they also have many potential applications beyond the Creator Economy.

Further reading

1. [NFTs and a Thousand True Fans](#) by Chris Dixon
2. [Designing Internet-Native Economies: A Guide to Crypto Tokens](#) by Patrick Rivera (Future)
3. [What Critics Don’t Understand About NFTs](#) by Jonathan Zittrain and Will Marks (The Atlantic)
4. [A Beginner’s Guide to NFTs](#) by Linda Xie
5. [The Furry Lisa, CryptoArt, & The New Economy Of Digital Creativity](#) by Scott Belsky

Blockchain-based Games





What is it?

Blockchain-based games are games built on blockchain technology. A key difference from popular games such as Fortnite, Roblox, or Minecraft is that the games can be bona fide economies in which players actually own the objects they work hard to acquire, giving players the ability to buy or sell these objects, or take them to another game entirely. And this is only the beginning: we expect blockchain-based games to lead to the development of whole new digital worlds and economies.

Why it matters

Blockchain games are one example of how decentralized technology creates new ways for creators to monetize. The items in blockchain video games—like tools, skins, upgrades, avatars, and experience points—are NFTs that are owned by the players and can be sold for real-world money, traded on secondary markets, and transferred between games.

Blockchain gaming has also facilitated the development of “play-to-earn” models. With games like Axie Infinity, people can earn real-world money for playing video games. During COVID-19 pandemic, many people in the Philippines relied on play-to-earn games like Axie Infinity as work to ease economic hardships brought on by lockdowns.

While we’re a long way from experiencing the boundless digital world originally described by science fiction writers as the metaverse, the pandemic did accelerate people’s familiarity with immersive virtual experiences. For example, parties or meetings attended by virtual avatars, or conferences held in a virtual convention hall, offer a hint of what the metaverse may be like. Or for people who are familiar with Fortnite, they understand in-app purchases for their avatars and may have even joined Travis Scott’s concert in Fortnite that was attended by more than 12 million users. These games and platforms are still centralized platforms controlled from the top-down by the developer, but they start to paint a picture of a future metaverse that is borderless and where everyone can contribute to its development.

Further reading

1. [The Creator Economy Comes for Gaming by Joost van Dreunen \(Future\)](#)
2. [People in the Philippines are Earning Cryptocurrency During the Pandemic by Playing a Video Game by Christian Nunley \(CNBC\)](#)



Disclosures

The views expressed here are those of the individual AH Capital Management, L.L.C. (“a16z”) personnel quoted and are not the views of a16z or its affiliates. Certain information contained in here has been obtained from third-party sources, including from portfolio companies of funds managed by a16z. While taken from sources believed to be reliable, a16z has not independently verified such information and makes no representations about the enduring accuracy of the information or its appropriateness for a given situation.

This content is provided for informational purposes only, and should not be relied upon as legal, business, investment, or tax advice. You should consult your own advisers as to those matters. References to any securities or digital assets are for illustrative purposes only, and do not constitute an investment recommendation or offer to provide investment advisory services. Furthermore, this content is not directed at nor intended for use by any investors or prospective investors, and may not under any circumstances be relied upon when making a decision to invest in any fund managed by a16z. (An offering to invest in an a16z fund will be made only by the private placement memorandum, subscription agreement, and other relevant documentation of any such fund and should be read in their entirety.) Any investments or portfolio companies mentioned, referred to, or described are not representative of all investments in vehicles managed by a16z, and there can be no assurance that the investments will be profitable or that other investments made in the future will have similar characteristics or results. A list of investments made by funds managed by Andreessen Horowitz (excluding investments for which the issuer has not provided permission for a16z to disclose publicly as well as unannounced investments in publicly traded digital assets) is available at <https://a16z.com/investments/>.

Charts and graphs provided within are for informational purposes solely and should not be relied upon when making any investment decision. Past performance is not indicative of future results. The content speaks only as of the date indicated. Any projections, estimates, forecasts, targets, prospects, and/or opinions expressed in these materials are subject to change without notice and may differ or be contrary to opinions expressed by others. Please see <https://a16z.com/disclosures> for additional important information.

andreessen.
horowitz

About Andreessen Horowitz

Andreessen Horowitz (known as “a16z”) is a venture capital firm in Silicon Valley, California that backs bold entrepreneurs building the future through technology. We are stage agnostic. We invest in seed to late-stage technology companies, across the consumer, enterprise, bio/healthcare, crypto, and fintech spaces. a16z has \$18.8B in assets under management across multiple funds, including the \$1.4B Bio funds, the \$3.1B Crypto funds, and the Cultural Leadership Fund.

Menlo Park | San Francisco | New York City | a16z.com