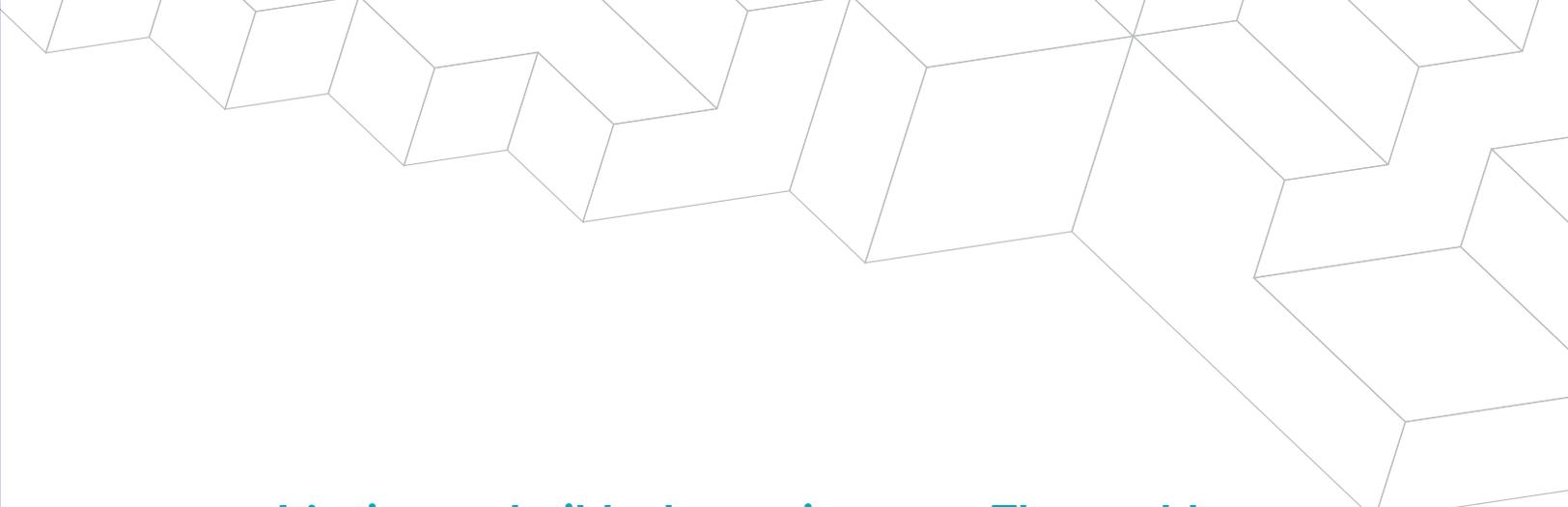a16z

How to Build a Better Internet: 10 Principles for World Leaders Shaping the Future of Web3

January 2022

It's time to build a better internet. The world deserves technology that can unlock opportunity for the millions on the margins of the innovation economy and enable people to take control of their digital lives.
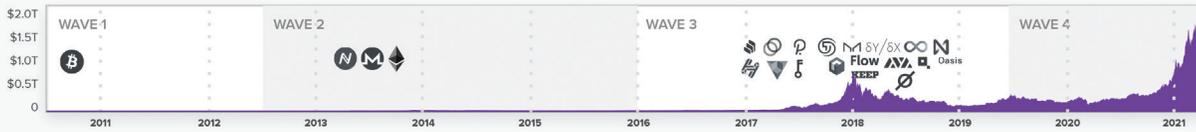
This is web3—a group of technologies that encompasses digital assets, decentralized finance (DeFi), blockchains, smart contracts, tokens, and decentralized autonomous organizations (DAOs). Together, these tools enable new forms of human collaboration. They can break through the stalemates that define too many aspects of public life and help communities make better collective decisions about critical issues such as how networks will evolve, what behaviors are permitted online, and how economic benefits are distributed. Web3 is a successor to the internet that will coexist with it. Just as the internet changed the way people communicate and exchange information, web3 is defined by infrastructure that changes how value moves around the world.

After the internet itself, the emergence of web3 is the largest global technology project ever undertaken. The first generation of the internet was incubated from within government and civil society before slowly making its way into the world. Web 2.0—today's big tech platforms—started out as small companies incorporated in a handful of geographies, and within a few short years became the largest arbiters of expression and commerce in human history. Web3, meanwhile, has emerged from everywhere all at once.

Among the countries with the most people participating in DeFi today are the United States, Vietnam, Thailand, China, the U.K., the Netherlands, and Ukraine; the top adopters of crypto include India, Pakistan, Ukraine, Kenya, Nigeria, Venezuela, and Argentina. China is actively grappling with its relationship to web3; the State Council's ban on bitcoin mining has put all web3 projects in a tenuous position in the country. Meanwhile, Venezuela is a case study for how the financial applications of crypto can fill in the gaps for countries in economic turmoil.

But web3 is much more than its financial origins, and this is becoming apparent around the world. The leading web3 applications, marketplaces, and game studios are geographically dispersed, and many projects are now being built by globally decentralized teams operating as DAOs. International developer communities are growing at an unprecedented rate.
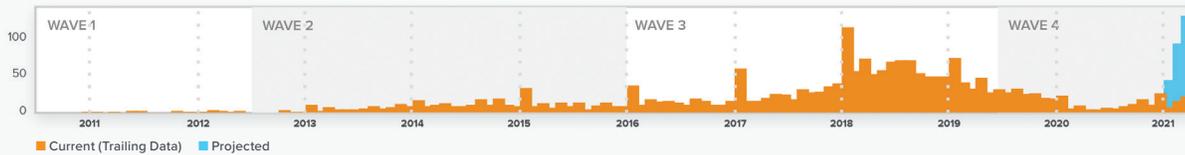
Crypto Market Cap

	WAVE 1	WAVE 2	WAVE 3	WAVE 4
$2.0T				
$1.5T				
$1.0T				
$0.5T				
0	2011 2012	2013 2014 2015	2016 2017 2018 2019 2020	2021

Developer Activity[1]

	WAVE 1	WAVE 2	WAVE 3	WAVE 4
60,000				
40,000				
20,000				
0	2011 2012	2013 2014 2015	2016 2017 2018 2019 2020	2021

Startup Activity[2]

	WAVE 1	WAVE 2	WAVE 3	WAVE 4
100				
50				
0	2011 2012	2013 2014 2015	2016 2017 2018 2019 2020	2021

■ Current (Trailing Data) ■ Projected

Social Media Activity[3]

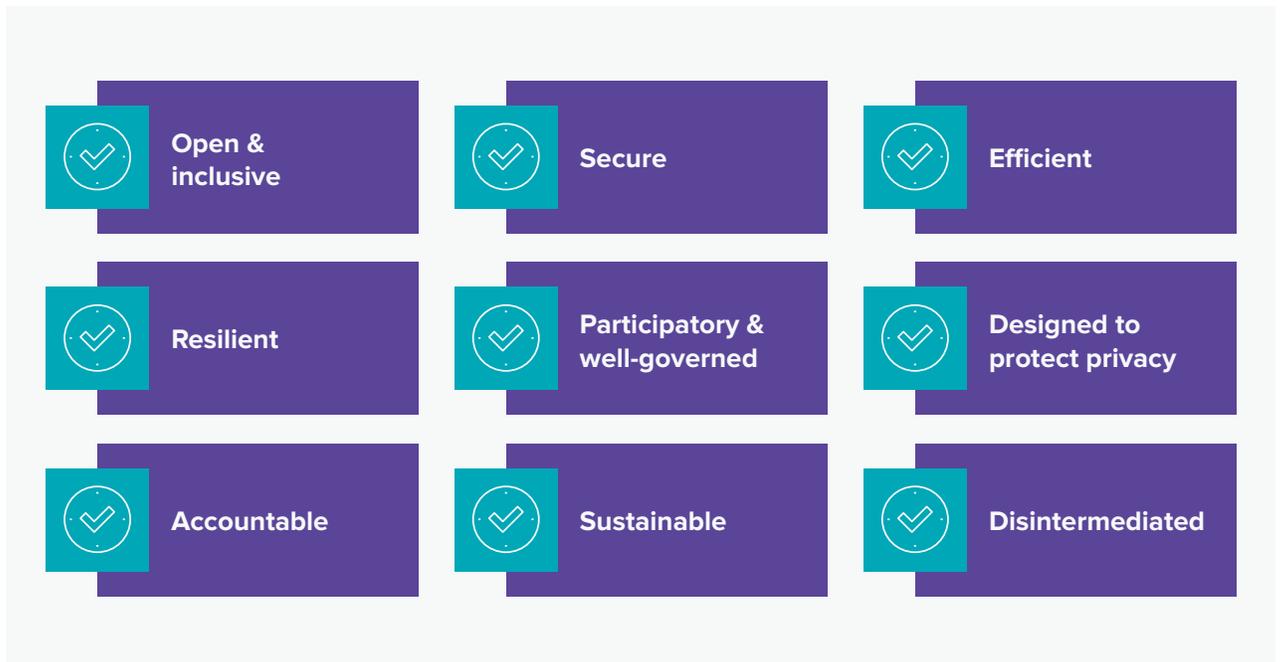|	WAVE 1	WAVE 2	WAVE 3	WAVE 4
3M				
2M				
1M				
0	2011 2012	2013 2014 2015	2016 2017 2018 2019 2020	2021

Charts provided herein are for informational purposes only and should not be relied upon when making any investment decision. Past performance is not indicative of future results.
[1] Developer activity based on crypto stars on Github. [2] Startup activity based on crypto first rounds funding via Pitchbook. [3] Social media activity based on comments on crypto-related subreddits.

Web3 represents a profound shift in the way individuals and communities use technology. Value creation and distribution is being taken away from centralized actors and put into the hands of decentralized groups of people. And there are almost limitless possibilities for the technology to enable new forms of ownership and collaboration.

Realizing the potential of web3 depends on policymakers willing to lay down the policy groundwork to unlock innovation. Thoughtful regulation can establish a framework that enables innovation to benefit society while managing the real risks that might otherwise harm individuals.

Given the rapid growth of web3, now is the time for world leaders to engage. Policymaking around Web 2.0 has been largely reactionary. Leaders have focused on responding to what they don't like about Web 2.0, rather than putting forward an affirmative vision for how to use digital tools. We should not repeat this mistake with web3. Instead, policymakers should ask how we want to use digital tools in open societies, and how we should design and define success for the next generation of the internet.

We believe that web3 should be built around a clear set of objectives. Specifically, the next generation of the web should be:

Open & inclusive	Secure	Efficient
Resilient	Participatory & well-governed	Designed to protect privacy
Accountable	Sustainable	Disintermediated

We believe that web3 will be the foundation of new financial and digital infrastructure that changes lives for the better. In decentralized systems, value accrues to the platform and its users rather than intermediaries. These systems are much more resilient by virtue of being distributed. Web3 projects are already demonstrating their enormous potential.

	Component	Centralized Solution	Web3 Solution	Examples
Financial Sector	Banking Services	High fee checking accounts, low yield savings accounts. American consumers providing zero-interest loans to highly centralized banking system.	Low fee consumer finance products. High yield automated lending protocols.	eco / Compound / AAVE
	Consumer Lending	Credit bureau oligopoly with opaque credit scoring systems.	Competitive market for on-chain credit scoring based on transparent and auditable data.	truefi
	Payments	Venmo, PayPal layered on top of existing banking relationship with its attendant complexity and fees.	Fast payments for the underbanked and unbanked.	valora / WORLDCOIN
Digital Sector	ISPs	Comcast, AT&T, Verizon. No choice of provider in most markets, slow and expensive. Fights over net neutrality.	Participatory. community supported networks.	helium
	Cloud Computing	AWS, Google Cloud. Centralized and often fragile targets.	High-throughput blockchains that are decentralized and resilient.	SOLANA / alchemy
	Web Infrastructure (e.g., DNS, content delivery)	Cloudflare, Fastly. Can result in arbitrary censorship. Also fragile.	Censorship resistance. Resilience.	handshake / ENS
	Identity & Personal Data	Facebook, Twitter, Google. Business models designed to leverage value of personal data; subject to abuse.	Data and identity portability.	arweave
	Privacy	Ad-supported businesses have a conflict between maintaining income streams and protecting privacy.	Data and identity portability.	Aleo
	Art, Entertainment & Content Creation	High take rates, in which a large percentage of revenue goes to the tech platforms that host content.	Singular digital authenticity with micropayment royalty streams to content creators and artists.	flow / rally

Regardless of the success of any particular project, certain innovations are here to stay. These innovations include digital scarcity, trustless peer-to-peer collaboration and value exchange, cryptographically-secured auditability and provenance, and full-fledged digital economies.

Now is the time for a concerted effort on behalf of societies to lay the groundwork for web3 to thrive within and across national borders. This is a task for political leaders, civil society, and the private sector to tackle together.

To catalyze the conversation, this document enumerates 10 key principles for how open societies should focus their efforts. We are still in the early stages of web3, but the work must begin today.

Nations must have a clear vision for how they will foster decentralized digital infrastructure

Because it has no single point of failure or control, web3 infrastructure promises dramatic improvements over existing slate of fragile, centralized, exclusionary systems.

Distributed Networks are More Resilient

Unique Point of Failure   No Unique Point of Failure ⟶ More Secure
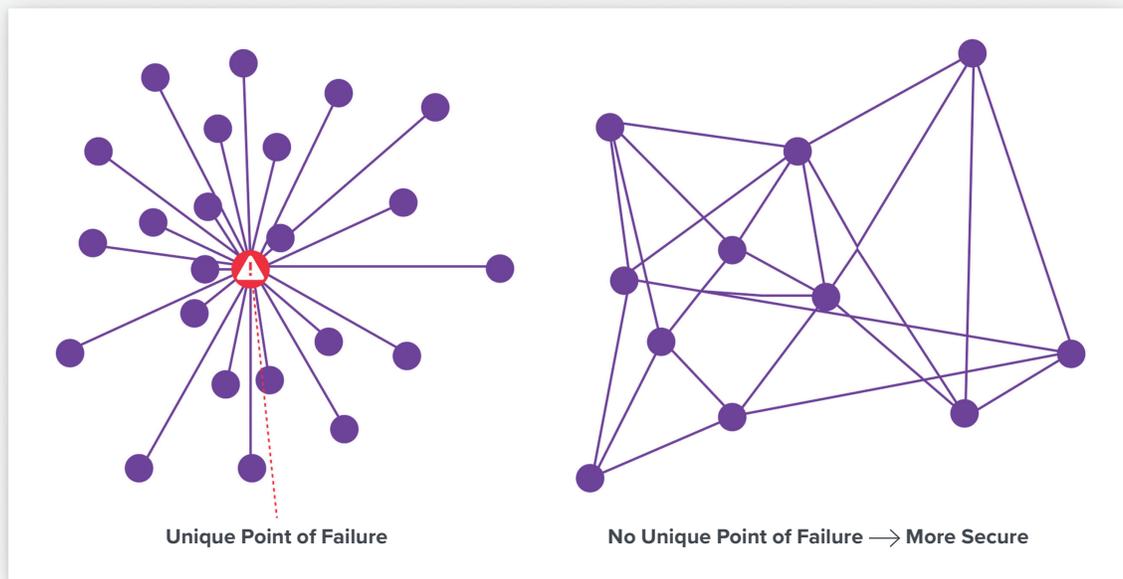
Source: Voshmir (2019)

National technology strategies should embrace the benefits of decentralized systems for functions critical to society, such as identity, property rights and titling, securing financial systems while enhancing financial inclusion, and cybersecurity. Individual data sovereignty and privacy should be a cornerstone of this new infrastructure. From a design perspective, this will have the added benefit of enhancing compliance with existing laws: the auditability of web3, combined with privacy solutions such as zero-knowledge proofs, promises to dramatically reduce compliance costs across the economy.

Embrace multi-stakeholder governance and regulation

The public sector, private sector, and civil society each has unique contributions to make in terms of expertise and perspectives when it comes to the future of web3. Leaders should therefore explore regulatory frameworks overseen by multi-stakeholder organizations. One prominent example of such an organization is the Brazilian Internet Steering Committee, a government agency founded in 1995 managed by representatives from each sector that has successfully regulated innovation and access to internet services in Brazil for nearly three decades.

Create targeted, risk-calibrated oversight regimes for different web3 activities

Web3 encompasses a huge array of human behavior. Art creation and curation. Video games and collecting. Data archiving and preservation. Publication. Borrowing and lending. Remittances. The easiest way to lose out on all of this potential is to treat web3 as if it were a monolith. Treating all digital assets in the same way is analogous to having a single legal regime to cover stocks, real estate, cars, art, watches, and trading cards.

One area where it is particularly important to make careful distinctions is between protocols and applications. TCP/IP, HTTP, SMTP, and TLS/SSL are all protocols with which we interact on a daily basis—the building blocks of the internet and basic applications such as email and file transfers. The technical standards for these protocols were developed by a smattering of government agencies, nonprofit organizations, private sector entities, and academic institutions. Importantly, no one controls these protocols. Nonprofit organizations such as the Internet Engineering Task Force, composed of volunteers, may set particular standards, but the protocols themselves are open and jointly developed. Similarly, ethereum has adopted an open model for web3, with nonprofit organizations funding development of related technologies as part of a much larger ecosystem.

Applications vs. Protocols

Web3   **Traditional Web**

Web3	Traditional Web
Layer 3 — Client and User Interface	**Application Layer** — Ecommerce, Social Network, Search/Advertising, Video Streaming, ... ← **Applications**
Layer 2 — Smart Contracts	
Layer 1.5 — Compute	**Protocol Layer** — HTTP ← **Application Layer Protocol**; TCP ← **Transport Layer Protocol**; IP ← **Internet Layer Protocol**
Layer 1 — Consensus	
Layer 0 — Hardware and Networking	

Much of web3 consists of open protocols, including protocols for storage, computation, lending, and value exchange. Like the internet protocols developed over the past six decades, web3 protocols have flourished due to the robust communities supporting their development. This development is open, distributed, and transparent, so these protocols are resistant to arbitrary or malicious changes and neutral with respect to the applications that use them. Regulatory oversight should capitalize on these benefits.

Composability and community will drive innovation

Composability is a basic feature of web3. In the same way a set of legos can be assembled into many different configurations, anyone can use the basic building blocks of smart contracts and put them together in new and different ways. If someone has already solved a problem once with a smart contract, you can modularly integrate that solution into your project, rather than starting from scratch.

In web3, composability is amplified by the power of open communities of users and developers in which anyone can participate and contribute. This leads to further virtuous cycles where the contributors to successful projects reap the benefits of increasing network value. It can unlock whole new models of funding for public goods. Policymakers should work to accelerate these innovation flywheels—for instance, by lowering barriers to entry and promoting data portability.

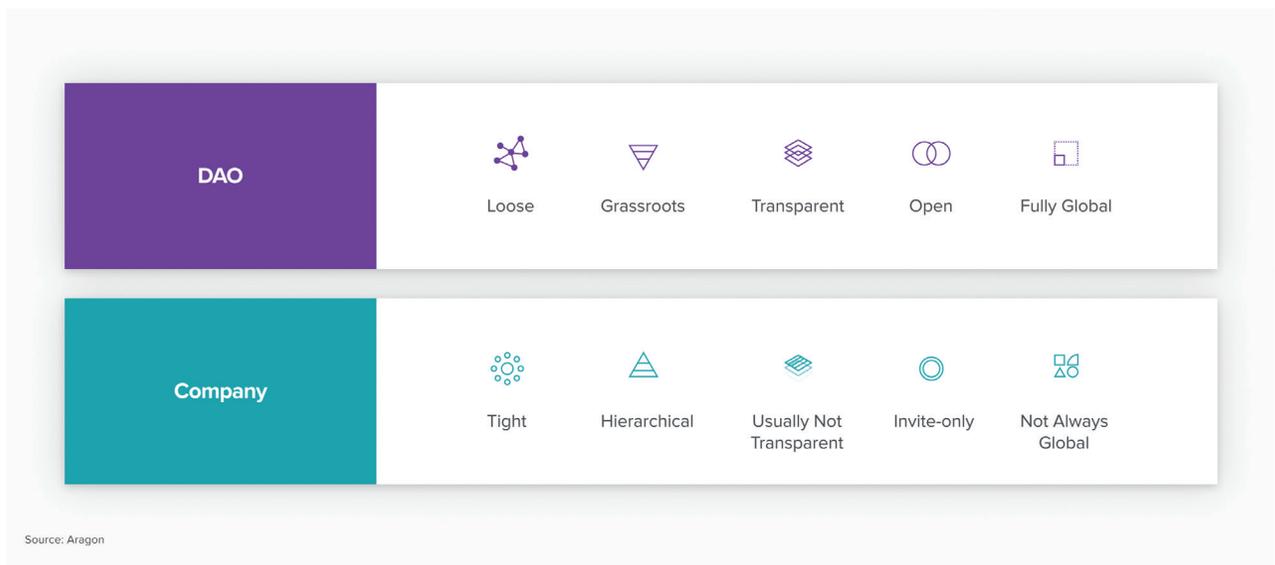## Value Creation and Capture on a Decentralized Network
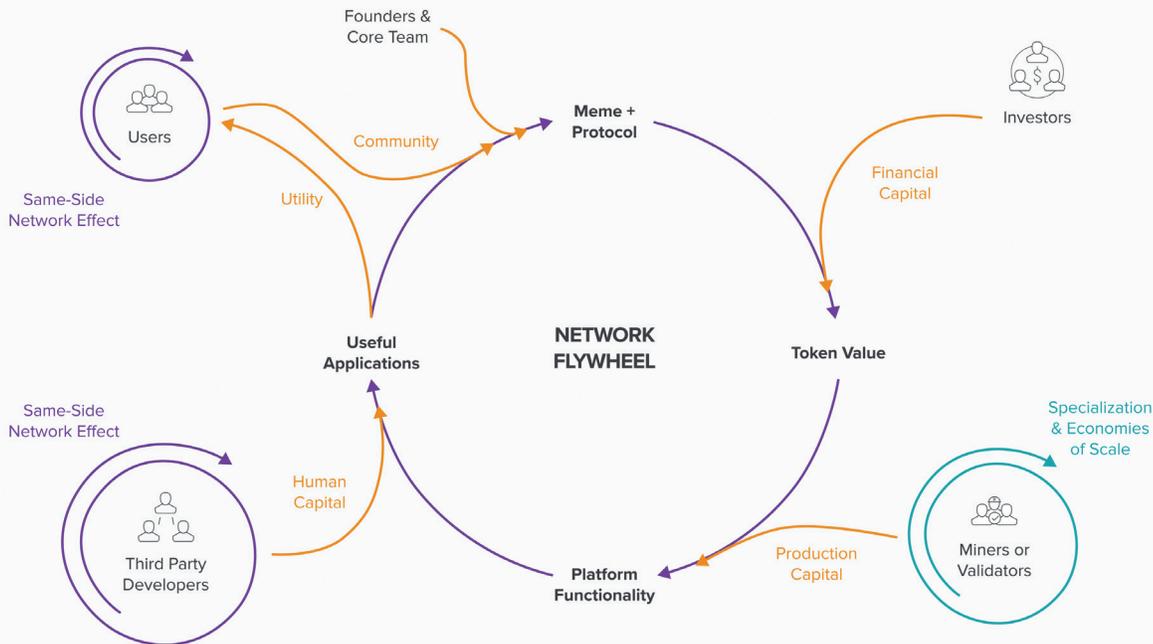
Broaden access to the economic benefits of the innovation economy

In Web 2.0, the financial benefits of networks flowed overwhelmingly to large corporations that ran the networks. In web3, network value accrues to the users, communities, and developers actually creating the value, rather than to managerial middlemen. It is crucial that individuals, especially those currently on the margins of the innovation economy, have the opportunity to create value on digital networks and realize the upside from their efforts.

For instance, decentralized telecom networks such as Helium share economic benefits with individuals and communities that host network infrastructure. Play-to-earn games, such as Axie Infinity, enable gamers to earn rewards and money from the games they play, and is quickly emerging as a promising new area of economic activity worldwide. Likewise, the web3 creator economy is enabling artists, musicians, and others to finally realize most of the revenues from their work, rather than having revenue skimmed off by platforms and middlemen.

Unlock the potential of DAOs

The corporation was the default mode of organizing human activity in the private sector in the 20th century. DAOs may become the default mechanism for facilitating collaboration in the 21st century. DAOs enable individuals to collaborate, manage projects, own assets, invest, and operate like a traditional organization, but they can provide far greater levels of transparency, efficiency, and accountability than traditional corporate models. It is important to create space for this new cooperation mechanism to flourish—ensuring that DAOs have the same basic legal protections and privileges as traditional corporate structures.

DAO	Loose	Grassroots	Transparent	Open	Fully Global
Company	Tight	Hierarchical	Usually Not Transparent	Invite-only	Not Always Global

Source: Aragon

Deploy web3 to further sustainability goals

Web3 platforms have potential to drive incredible value in supporting sustainability objectives, such as by enhancing the liquidity, integrity, and utility of carbon markets.

The payments blockchain Celo processes 7M transactions per ton of CO_2, and has become ~8x carbon negative through offsets. By way of comparison, one estimate cites that the Visa network—which does not plan to achieve net zero until 2040—is 70% less efficient. Other web3 projects, such as MakerDAO with their "clean money" proposal, hope to innovate at the cutting edge of clean energy financing. Web3 can and should be used in novel ways to support net zero targets globally.

Despite headlines, the leading web3 projects need not—and, in most cases, do not—consume vast amounts of energy. Ethereum, the most commonly used protocol for web3 applications, will soon use an energy-efficient proof-of-stake (PoS) consensus mechanism, reducing energy consumption by a factor of 1,000.

Following Its Transition to PoS in the Coming Months, the Ethereum Blockchain Will Consume 99.95% Less Energy

Estimated Power Consumption

Estimated Power Consumption

Giga Watts

Giga Watts

16
14
12
10
8
6
4
2
0

0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000

MAY 2017 · DEC. 2017 · JUN. 2018 · JAN. 2019 · JUL. 2019 · FEB. 2020 · SEP. 2020 · MAR. 2021

2,000X

2020-12 · 2021-01 · 2021-03 · 2021-04

Bitcoin and Ethereum PoW data taken from Digiconomist

— Bitcoin   — Ethereum PoW   — Ethereum PoS   — Bitcoin   — Ethereum PoW   — Ethereum PoS

Source: Ethereum Foundation

Meanwhile, policymakers should continue working with the bitcoin community to bring greater levels of sustainability and renewable power use to the bitcoin blockchain. Efforts are already underway: the Cambridge Center for Alternative Finance found that 76% of bitcoin miners use renewables as part of their energy mix, and 39% of bitcoin mining's total power consumption comes from renewables—twice as much as the U.S. grid.

Embrace the role of well-regulated stablecoins in financial inclusion and innovation

Financial technology has been incredibly successful over the past decade at improving the experience of consumer finance for much of the world's middle class. However, little has been done to upgrade and improve core financial infrastructure, particularly when it comes to international payments, clearing, and settlement. This means billions of people worldwide are left out of the existing system due to the prohibitively high costs.

Decentralized financial technologies already handle hundreds of billions in transaction volume every day and provide compelling evidence that there is a pathway for instantaneous, global, 24/7 financial rails. Stablecoins are a basic building block on which this financial innovation is occurring. They provide a key prerequisite for unlocking financial innovation: a stable, programmable, digitally native representation of value.

In order to avoid falling far behind international competitors and to provide greater opportunities for financial inclusion, open societies should embrace well-regulated stablecoins by providing projects with clear, reasonable regulatory frameworks. Fostering development of the stablecoin ecosystem will involve creating multiple regulatory approaches optimized for different types of stablecoins, such as those collateralized by digital assets and algorithmic stablecoins, each of which has a different risk/opportunity framework from stablecoins backed by traditional fiat assets.

Policymakers should also seriously consider the compliance benefits of stablecoins. For instance, stablecoins can make possible auditing and disclosure far beyond anything available to consumers and regulators today. When coupled with appropriate privacy-first architecture, they can also provide national security and law enforcement agencies novel ways to detect illicit activity and enforce sanctions.

Multilateral applied use cases can address major global challenges

Multilateral collaboration on regulatory frameworks is strictly necessary for web3 to realize its promise. Policymakers should likewise look to the ways in which web3 can be an enabling technology for multilateral use cases to address global challenges that have proven intractable to date.

To take one example: countries should work together to help usher in a new era of cross-border payments. Cross-border banking transaction chains today can involve five or more intermediary banks and take days to complete due to incompatible regulatory requirements. This means the average cost of sending a $200 remittance is ~7% using traditional infrastructure. Meanwhile, cross-border payments using decentralized technology can be instantaneous with trivial fees.

Of course, international collaboration is crucial to short-circuit bad actors from exploiting these new rails. The international law enforcement community is well aware of these risks, and has leveraged the technology to its advantage. Web3 infrastructure—such as permanent distributed data storage—can further support efforts to improve security by undermining the efforts of ransomware attackers and other bad actors.

Provide clear, fair tax rules for the reporting of digital assets, and leverage technical solutions for tax compliance

It is in the mutual interest of both governments and the web3 community to facilitate tax compliance across the ecosystem. Revenue collection agencies need to be smart about leveraging the benefits of web3 technology. To the extent that reporting obligations are in need of expansion to capture web3 activity, these obligations should generally rest with actors that collect relevant information not available to the agencies themselves. For public blockchains, no actor in the system possesses greater information than a revenue collection agency could with proper blockchain analytics. Meanwhile, recognizing that it makes little sense for a person's every transaction to be publicly viewable by anyone, revenue collection agencies should consider the ways in which privacy can in fact lead to greater compliance—for instance, by producing robust audit trails using zero-knowledge proofs.

Disclosures

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