



ISSUE BRIEF

DESIGNING DECENTRALIZED FINANCE FOR FINANCIAL INCLUSION

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Cryptocurrency began as a peer-to-peer payments system “without going through a traditional financial institution.”¹ Today, cryptocurrency has evolved into decentralized finance (DeFi) to offer more comprehensive financial tools that further bypass the cumbersome aspects of the existing financial system. There are some, however, who do not recognize the potential for crypto to streamline the financial system, and are calling for a blanket ban². As of September 30, 2021, approximately \$80B of cryptocurrencies are tied to DeFi contracts (a 4x increase from one year ago).³

Proponents of DeFi envision a powerful tool for the unbanked and underbanked, as well as people living in countries with authoritarian regimes, hyperinflation, and weak financial institutions. Communities of color in the United States, for example, could access alternative forms of lending in the face of predatory loans or high fees.⁴ Version 1.0 of DeFi, however, has thus far been primarily aimed at crypto whales, people who already have access to the financial system, and users in markets with robust financial institutions.⁵ This makes sense given the

The GeoEconomics Center works at the nexus of economics, finance, and foreign policy with the goal of helping shape a better global economic future. The Center is organized around three pillars - Future of Capitalism, Future of Money, and the Economic Statecraft Initiative.

- 1 Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System,” Bitcoin, May 24, 2009, <https://bitcoin.org/bitcoin.pdf>.
- 2 Robert Manning, “Bye-bye, bitcoin: It’s time to ban cryptocurrencies,” *Hill*, July 25, 2021, <https://thehill.com/opinion/cybersecurity/564696-bye-bye-bitcoin-time-to-ban-crypto-currencies>
- 3 DeFi Pulse, <https://defipulse.com/>.
- 4 Robert Farrington, “Explaining DeFi And How It Will Revolutionize Financial Services,” *Forbes*, March 23, 2021, <https://www.forbes.com/sites/robertfarrington/2021/03/23/explaining-defi-and-how-it-will-revolutionize-financial-services/?sh=76064ee31d08>.
- 5 Stefan Grasmann, “DeFi — an ecosystem made for “whales”?,” Coinmonks, August 9, 2020, <https://medium.com/coinmonks/defi-an-ecosystem-made-for-whales-93fba38ad>; Seth Goldfarb, “Stop Saying DeFi is About Banking the Unbanked,” ADD. xyz, November 25, 2019, <https://medium.com/addxyz/stop-saying-defi-is-about-banking-the-unbanked-4aa21c6884ed>; Owen Fernau, “DeFi Has a First World Problem: Too Few Developing Nations’ Users,” *Defiant*, March 24, 2021, <https://thedefiant.io/defi-has-a-first-world-problem-too-few-developing-nations-users/>.



The logo for Coinbase Global Inc, the biggest U.S. cryptocurrency exchange, is displayed on the Nasdaq MarketSite jumbotron and others at Times Square in New York, U.S., April 14, 2021. REUTERS/Shannon Stapleton

inherent risks of DeFi and the fact that a liquid financial market requires market makers. But to truly remake the financial system, the next iteration of DeFi must be developed toward an intentional vision for financial inclusion. Financial inclusion means that everyone has the tools to not only meet their daily needs, but to also build wealth for themselves, their families, and their communities. And in turn, greater financial inclusion supports more resilient and robust economies.⁶

An Overview of DeFi

DeFi refers to decentralized applications that provide financial services without relying on a centralized intermediary, such as payments, lending, and insurance. These applications operate on blockchain technology and deliver financial services based on specific rules

and protocols through decentralized networks and digital tokens. DeFi can vary in function but several key archetypes include stablecoins, exchanges, credit, derivatives, insurance, and asset management.⁷

DeFi is best explained by comparing it to what is often referred to as “CeFi,” centralized financial products in crypto. Take Coinbase, a centralized crypto exchange, which offers users the ability to exchange fiat currency and cryptocurrencies. Like any traditional exchange platform, Coinbase holds all user funds to pool together liquidity, utilizes a matchmaking algorithm to connect supply with demand, and manages an order book to internally record and validate every transaction.⁸ Furthermore, Coinbase determines what cryptocurrencies to list. Coinbase features about \$2B

6 Sean Creehan and Paul Tierno, “Mary Daly on Why the Fed Cares about Financial Inclusion,” Federal Reserve Bank of San Francisco, April 15, 2021, <https://www.frbsf.org/banking/asia-program/pacific-exchanges-podcast/mary-daly-why-the-fed-cares-about-financial-inclusion/>.

7 Stablecoins are digital assets pegged to stable value assets such as fiat currency or a basket of goods. “DeFi Beyond the Hype: The Emerging World of Decentralized Finance,” Wharton Blockchain and Digital Asset Project, May 2021, <https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf>.

8 Lukas Wiesflecker, “CEX vs. DEX — here are the differences,” Coinmonks, January 9, 2021, <https://medium.com/coinmonks/cex-vs-dex-here-are-the-differences-143fae4c33d4>.



Queen Maxima of the Netherlands looks on during a panel entitled “Moving from Financial Access to Inclusion: Leveraging the Power of Technology” during IMF spring meetings in Washington, U.S., April 20, 2018. REUTERS/Aaron P. Bernstein

to \$3B in daily trading volume and generates profits by charging a transaction fee.⁹

In comparison, the largest decentralized crypto exchange is Uniswap with daily trading volume of about \$1B to \$2B.¹⁰ Uniswap is not owned by a central company or operating on centralized IT infrastructure. Instead, the entire open source application sits on the Ethereum blockchain. Uniswap’s open architecture and decentralized nature give it four key features:

1. Anyone can use it.

2. Users retain custody over their account and assets.
3. Anyone can list a new crypto token.
4. Anyone can copy the Uniswap code to create a new version or port it to another blockchain.

Uniswap’s two key novel features are its liquidity mechanism and method of exchanging digital assets.¹¹ Uniswap’s automated protocol incentivizes everyday users and institutions to become liquidity providers. In exchange, they receive a token that represents the percentage of their respective stakes in the pool.

9 “Uniswap vs. Coinbase and Binance Trade Volume (7DMA), Block, last accessed September 27, 2021, <https://www.theblockcrypto.com/data/decentralized-finance/dex-non-custodial/uniswap-vs-coinbase-and-binance-trade-volume-7dma>; Crypto Ryan, “The Complete Guide to Coinbase Fees (and How to Avoid Them),” *Cryptoryancy*, August 30, 2021, <https://www.cryptoryancy.com/the-complete-guide-to-coinbase-fees-and-how-to-avoid-them/>.

10 “Uniswap vs. Coinbase and Binance Trade Volume (7DMA), Block, last accessed September 27, 2021, <https://www.theblockcrypto.com/data/decentralized-finance/dex-non-custodial/uniswap-vs-coinbase-and-binance-trade-volume-7dma>.

11 Ollie Leech, “What Is Uniswap? A Complete Beginner’s Guide,” *Coindesk*, February 4, 2021, <https://www.coindesk.com/business/2021/02/04/what-is-uniswap-a-complete-beginners-guide/>

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When users tap into this liquidity pool to exchange cryptocurrencies, smart contracts (software code) carry out and document the exchange of tokens.¹² During the entire exchange process, no central party or owner controls the transaction, obtains revenues, or collects data. The Uniswap protocol charges a 0.30 percent transaction fee for facilitating the exchange of tokens. When a liquidity provider removes their stake in the liquidity pool, they receive their original crypto assets along with fees collected by the Uniswap protocol based on the percentage of their stake in the liquidity pool.

Uniswap's decentralized model, however, poses risks. First, the protocol's smart contracts have technical risks. Bugs in the smart contracts or malicious actors taking advantage of vulnerabilities could result in funds being stolen or the inability to access funds. Even if Uniswap's smart contracts are well-designed and audited, broader dangers to the blockchain on which Uniswap operates pose risks to the decentralized exchange. For example, the recent Solana outage meant that its decentralized exchanges were also inaccessible.¹³ Any losses incurred from these technical risks are not protected, unlike transactions on Coinbase. Second, users' only protection of their assets is the passcode for their private wallet. In the scenario that a malicious actor gains access to a person's private wallet, little can stop them from draining all assets held in the wallet. Once this happens, it is difficult to find the culprit and get back stolen assets. In comparison, if money is stolen from a Coinbase wallet, Coinbase as a company is able to provide support and potentially cover the losses. Third, risky tokens may be added to the Uniswap exchange. Unlike Coinbase, which decides what tokens to list, decentralized exchanges' more open infrastructure means risky tokens without strong development teams and protocol fundamentals can be more easily listed. Fourth, liquidity providers face economic risks known as impermanent loss in which

the price of an asset put into a liquidity pool changes.¹⁴ This is best illustrated by the following example:

1. Jane deposits 1 ETH (\$100) and 100 DAI (\$100) for 10 percent of the Uniswap pool (10 ETH and 1,000 DAI).
2. The price of ETH increases to 400 DAI and the pool changes to 5 ETH and 2,000 DAI.
3. If Jane withdraws her stake, she receives 0.5 ETH and 200 DAI for \$400. If she held 1 ETH and 100 DAI she would have made \$500.

Uniswap is but one example of DeFi. A host of other DeFi applications deliver different financial services.¹⁵ For example, people can borrow and lend crypto through Aave—a powerful tool given the fact that this bypasses financial institutions that have historically been the gatekeepers of credit. Another popular DeFi application is MakerDAO through which people convert their volatile crypto assets to Dai, a stablecoin pegged to the US dollar. Anyone can access DeFi and any developer can build a new or interconnected DeFi application. And all of this technology can be accessed while also giving users the ability to control their data exhaust.¹⁶ The result of this open architecture has been an explosion of new financial tools built on blockchains and an opportunity for a more inclusive ecosystem.

Transforming DeFi to Promote Financial Inclusion

As of 2017, 1.7 billion people do not have access to a bank account and many more are underbanked.¹⁷ Women, communities facing poverty, and young people are disproportionately excluded from the financial system.¹⁸ Much of this, of course, is tied to generations of systemic exclusion, violence, and economic extraction. DeFi could afford access, especially to those who do not have formal identification or who live in places without robust institutions or stable

12 "DeFi Beyond the Hype: The Emerging World of Decentralized Finance."

13 Andrew Hayward, "Solana's Price Crashes 13% as Network Outage Continues," *Decrypt*, September 14, 2021, <https://decrypt.co/80952/solana-price-crashes-13-percent-network-outage-continues>.

14 Eli Tan, "DeFi Lending: 3 Major Risks to Know," *CoinDesk*, July 13, 2021, <https://www.coindesk.com/tech/2021/07/13/defi-lending-3-major-risks-to-know/>.

15 "Top DeFi Tokens by Market Capitalization," CoinMarketCap, <https://coinmarketcap.com/view/defi/>.

16 Marc Hochstein, "DeFi and the 3 Cs," *CoinDesk*, September 12, 2021, <https://www.coindesk.com/markets/2021/09/12/defi-and-the-three-cs/>.

17 World Bank Group, "The Global Findex Database 2017 Chapter 2," https://globalfindex.worldbank.org/sites/globalfindex/files/2018-04/2017%20Findex%20full%20report_0.pdf; Emily Guy Birken, "The Costs Of Being Unbanked Or Underbanked," *Forbes*, July 28, 2020, <https://www.forbes.com/advisor/banking/costs-of-being-unbanked-or-underbanked/>.

18 World Bank Group, "The Global Findex Database 2017 Chapter 2."



Farmers harvest cotton in a field in the province of Al-Sharkia northeast of Cairo, Egypt, September 28, 2021. REUTERS/Mohamed Abd El Ghany

economies. In order to fulfill this vision for economic prosperity and go beyond the overplayed DeFi talking point of “banking the unbanked,” DeFi will need to prioritize four goals: (1) cater to everyday use-cases; (2) offer easy to use products; (3) promote intentional risk-taking; and (4) account for mobile phones and internet accessibility.¹⁹

Cater to everyday use-cases

The crypto economy has undergone tremendous growth surpassing \$2 trillion in market capitalization.²⁰ For it to be meaningful, it will need to connect to the non-crypto world and provide retail solutions. Much of DeFi today looks like the same old market making and speculative finance, but decentralized, with technical jargon such as “yield farming,” “liquidity protocols,” and “governance tokens.” By “democratizing” finance,

DeFi has moved from the financial institutions of the world to crypto enthusiasts and crypto whales.

The work of these DeFi protocols and crypto specialists, however, cannot be dismissed. Without the liquidity offered by the current iteration of DeFi, new retail use cases would be impossible. But today’s crop of DeFi protocols assume that users are interested in remaining within the crypto economy and fail to provide the critical retail financial tools offered by traditional banks. The result is limited grassroots activity.²¹ Not enough DeFi products as of yet help the corner shop owner in Buenos Aires get a small business loan or the small-scale farmer in Kenya get insurance to protect their harvest—much of this has been early-stage pilots.²² Moving forward, DeFi needs to be deliberate in three things to claim a better and more inclusive financial system.

19 Yaya Fanusie, “Stop Saying You Want To Bank The Unbanked,” *Forbes*, January 1, 2021, <https://www.forbes.com/sites/yayafanusie/2021/01/01/stop-saying-you-want-to-bank-the-unbanked/?sh=3eb0f7bf456a>.

20 Joanna Ossinger, “Crypto Market Retakes \$2 Trillion Market Cap Amid Bitcoin Gains,” *Bloomberg*, August 15, 2021, <https://www.bloomberg.com/news/articles/2021-08-15/crypto-market-retakes-2-trillion-market-cap-amid-bitcoin-gains>.

21 Muyao Shen, “DeFi Adoption Is Still Far From Mainstream: Chainalysis,” *CoinDesk*, August 24, 2021, <https://www.coindesk.com/business/2021/08/24/defi-adoption-is-still-far-from-mainstream-chainalysis/>.

22 James Downer, “Field Notes: Undercollateralized DeFi Pilot in Colombia,” *Celo*, August 3, 2021, <https://medium.com/celoorg/field-notes-undercollateralized-defi-pilot-in-colombia-db22f991f96a>.

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First, the average person needs more retail financial solutions, like those by Centrifuge and DuniaPay.²³ These can include microfinance, small business loans, savings accounts, fixed income interest rates, and community investment funds. Accessibility and participation cannot hinge upon having large amounts of capital. Additionally, most DeFi protocols require overcollateralization, which undermines the purpose of borrowing and lending in the first place.²⁴ Second, DeFi projects and foundations promoting blockchains (e.g., Ethereum Foundation and Tezos Foundation) will need to engage with payment providers, merchants, and exchanges to enable seamless and efficient on- and off-ramps between blockchains, fiat currencies, and cryptocurrencies. For example, DeFi products can partner with payment platforms like PayU and Visa so that users can make real-world purchases using their crypto assets. Third, blockchain developers should promote interoperability between blockchains.²⁵ This is especially important for users who are making small transactions and need applications with low transaction fees (gas prices). At the moment, high gas prices on Ethereum keep DeFi from being feasible for smaller transactions.²⁶ In an interoperable and multichain world, users can more easily move across blockchains to access applications with low gas fees.

Offer easy-to-use products

Ethereum co-founder Vitalik Buterin recommends that people stay out of DeFi unless they truly understand the applications.²⁷ The notorious complexity is due

to two characteristics.²⁸ First, DeFi's decentralized nature requires users to interface with a multitude of applications and cryptocurrencies, each of which offer different financial tools, services, and yield rates (that fluctuate). Second, applications are generally designed for crypto natives who have the ability to take risks and the capacity to invest their time. The result is complex user interfaces with many moving parts and no clear documentation.²⁹ The lack of intermediaries and government support in DeFi leaves users to fend for themselves.³⁰ In traditional finance, intermediaries (e.g., asset managers and banks) help navigate the complexity and charge a fee for their services. Government agencies from the federal level, such as the FDIC, to the local level, such as the San Francisco Office of Financial Empowerment, also provide financial guidance.³¹ In addition, creative banking solutions such as Community Development Financial Institutions (CDFI), credit unions, community-based commercial banks, and nonprofits address banking deserts across the United States.³²

Looking forward, DeFi developers should take on a more inclusive design approach.³³ This includes designing integrated dashboards that make it easy for users to compare financial options across applications and blockchains. DeFi builders can also better assist users of their products by providing resource hubs and peer-to-peer customer support. Education resources, both centralized and decentralized, will be critical to helping the average person understand the digital transformation offered by cryptocurrency and take

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- 23 Dan Edelstein, "Centrifuge And Real World Assets Are Changing The DeFi Game By Onboarding Four More Asset Pools onto MakerDAO," ACCESSWIRE, August 5, 2021, <https://www.accesswire.com/658540/Centrifuge-And-Real-World-Assets-Are-Changing-The-DeFi-Game-By-Onboarding-Four-More-Asset-Pools-onto-MakerDAO>; Celo Foundation, "Celo and DuniaPay: The Next Chapter of Banking in West Africa," August 5, 2021, <https://medium.com/celoorg/celo-and-duniapay-the-next-chapter-of-banking-in-west-africa-9825ef6ecf16>.
- 24 Ryan Sean Adams, "DeFi lending doesn't exist (yet)," Bankless, September 3, 2020, <https://newsletter.banklesshq.com/p/defi-lending-doesnt-exist-yet>.
- 25 Dmitriy Berenzon, "Blockchain Bridges: Building Networks of Cryptonetworks," 1kx, September 8, 2021, <https://medium.com/1kxnetwork/blockchain-bridges-5db6afac44f8>.
- 26 Michael Garbade, "High Gas Fees Prevent Ethereum From Being Ethereum," *CoinDesk*, October 14, 2020, <https://www.coindesk.com/tech/2020/10/14/high-gas-fees-prevent-ethereum-from-being-ethereum/>.
- 27 Connor Blenkinsop, "Can this dApp finally make DeFi simple for all to understand?," *Cointelegraph*, November 5, 2020, <https://cointelegraph.com/news/can-this-dapp-finally-make-defi-simple-for-all-to-understand>.
- 28 James Murphy, "The Biggest Problems Challenging DeFi, and How To Solve Them," *Entrepreneur*, April 27, 2021, <https://www.entrepreneur.com/article/368299>.
- 29 Hasan Furkan Gök, "The Lowly Fixed Income Interest Rate is the Magical Motor DeFi Needs," *Defiant*, August 23, 2021, <https://thedefiant.io/the-lowly-fixed-income-interest-rate-is-the-magical-motor-defi-needs/>.
- 30 "Decentralized Finance: (DeFi) Policy-Maker Toolkit," World Economic Forum, June 8, 2021, <https://www.weforum.org/whitepapers/decentralized-finance-defi-policy-maker-toolkit>.
- 31 "Economic Inclusion," FDIC, <https://www.fdic.gov/consumers/community/inclusion.html>; "Meet a Financial Coach," Office of Financial Empowerment, <https://sfgov.org/ofe/meet-financial-coach>.
- 32 Boston Ujima Project, <https://www.ujimaboston.com/>.
- 33 Felix Chang, "To Build More-Inclusive Technology, Change Your Design Process," *Harvard Business Review*, October 19, 2020, <https://hbr.org/2020/10/to-build-more-inclusive-technology-change-your-design-process>.



Representations of cryptocurrencies Bitcoin, Ethereum and Dogecoin are placed on PC motherboard in this illustration taken, June 29, 2021. REUTERS/Dado Ruvic/Illustration

advantage of new solutions. Additionally, developers will need to be proximate to the people who most need DeFi.³⁴ This begins with extensive user research (going beyond crypto natives) and honest partnership with community organizations and communities to design easy-to-understand solutions (and translations to other languages). Furthermore, developers will also need to establish and normalize diversity, equity, and inclusion commitments in the workplace across levels while also promoting belonging in which end users and team members are accepted and valued for their differences.³⁵ DeFi developers are in the best position to put in place the conditions for financial inclusion. An inclusive design-centric approach is a good first

step to helping more people navigate the complexity of DeFi.

Risk-taking with intent

DeFi is a risky business as evidenced by its high yields.³⁶ The rise of DeFi was driven by “crypto degens,” or self-described degenerate gamblers.³⁷ Crypto degens are willing to put in large amounts of capital, take on high risk, and face substantial losses. Their strategy pushes the frontiers of DeFi and tests the limit of use cases. But in a world of “meme coins” (coins based on jokes or memes rather than a product), fear of missing out, Twitter, Reddit, and generations of structural inequality, the crypto degen mentality can encourage others with less capital and experience to take on unnecessary

34 Leandra Fernandez, “Empathy and Social Justice: The Power of Proximity in Improvement Science,” Carnegie Foundation for the Advancement of Teaching, Carnegie Foundation, April 21, 2016, <https://www.carnegiefoundation.org/blog/empathy-and-social-justice-the-power-of-proximity-in-improvement-science/>.

35 “The Importance of Belonging at Work,” *DiversityInc*, May 6, 2020, <https://www.diversityinc.com/the-importance-of-belonging-at-work-by-stephanie-creary/>.

36 Leeor Shimron, “DeFi Yield Farmers And Crypto Investors Are Raking In 100%+ Annualized Yields,” *Forbes*, June 22, 2020, <https://www.forbes.com/sites/leeorshimron/2020/06/22/defi-yield-farmers-and-crypto-investors-are-raking-in-100-annualized-yields/?sh=7462a7f45eb5>.

37 Jeff Benson, “Decrypt’s People of the Year: the DeFi Degens,” *Decrypt*, December 31, 2020, <https://decrypt.co/52739/decrypts-people-of-the-year-the-defi-degens>.

risks. Already, crypto-hacks have inflicted serious harm on people who simply cannot afford these types of dangers.³⁸ Consumers face a precarious world of loss in token values, market manipulation, and fraud.³⁹ To mitigate these dangers, users need to examine DeFi protocol whitepapers, research the developers, determine if the protocol has been audited, assess the level of decentralization, and keep a lookout for other red flags (e.g., unsustainable marketing). Much of this, however, is an art rather than science, and still puts people with limited financial experience—or a safety net—at risk.

Risk-taking must be done with intention. Given the lack of regulatory clarity, it is DeFi developers' responsibility to help users manage their risks while policymakers catch up.⁴⁰ The World Economic Forum's most recent DeFi Policy Maker's Toolkit outlines five areas of risks—market risk, counterparty risk, liquidity risk, transaction risk, smart contract risk—for policymakers to consider that are also relevant for DeFi developers.⁴¹ For example, developers can begin working with user experience (UX) designers to flag the financial risks in easy to understand terms and add warning signs prior to any transaction. In addition, developers should ensure their code is sound through third-party auditors and clearly communicate how decentralized the protocol actually is.

Most importantly, developers in the crypto industry should be realistic in their rhetoric. Pushing forward narratives of outsized returns without pointing out the underlying risks will damage long-term growth of the crypto economy and only add to regulators' concerns.⁴² At best this rhetoric can be misleading and at worst predatory, especially as more people without

prior crypto experience enter the market. The risks posed by DeFi can be particularly dangerous when considering market and liquidity risk. People can face substantial losses in a downturn or an illiquid market if they put their savings into cryptocurrency during a financial bubble. Financial institutions are required by law to manage risks, but the everyday purchaser of crypto assets may not be as sophisticated in their risk management. Certain coins also hold outsized influence over the overall crypto ecosystem. Tether (USDT), for example, underpins many cryptocurrency purchases and a loss of trust in USDT would pose a "severe liquidity shock to the broader cryptocurrency market."⁴³

Sustainable long-term growth should be valued over quick returns if DeFi is to promote an inclusive system. Looking back at the traditional finance industry, a major barrier to banking solutions offered by financial institutions is a lack of trust—particularly among low-income communities and communities of color.⁴⁴ This is unsurprising given the financial industry's history of predatory and misleading practices.⁴⁵ DeFi could offer a fresh start. Developers can put their best foot forward by helping people use the financial tools that serve their respective needs and risk profile.

Account for mobile phone usage and internet accessibility

People do not all access the Internet in the same way—devices, costs, and bandwidth vary. If DeFi is to expand access to a broader base of users that include those who have been financially excluded, developers will need to account for these differences. Approximately 60 percent of the world has access to the Internet as of January 2021.⁴⁶ Of this group, over

38 Joe Tidy, "The real victims of mass crypto-hacks that keep happening," BBC, August 26, 2021, <https://www.bbc.com/news/technology-58331959>.

39 Eli Tan, "DeFi Lending: 3 Major Risks to Know," *CoinDesk*, July 13, 2021, <https://www.coindesk.com/tech/2021/07/13/defi-lending-3-major-risks-to-know/>.

40 Matthew Goodman and Nikhil Raghuvra, "The case for a financial digital asset framework for cryptocurrencies," Atlantic Council, August 24, 2021, <https://www.atlanticcouncil.org/blogs/geotech-cues/the-case-for-a-financial-digital-asset-framework-for-cryptocurrencies/>; "Decentralized Finance: (DeFi) Policy-Maker Toolkit," World Economic Forum.

41 "Decentralized Finance: (DeFi) Policy-Maker Toolkit," World Economic Forum.

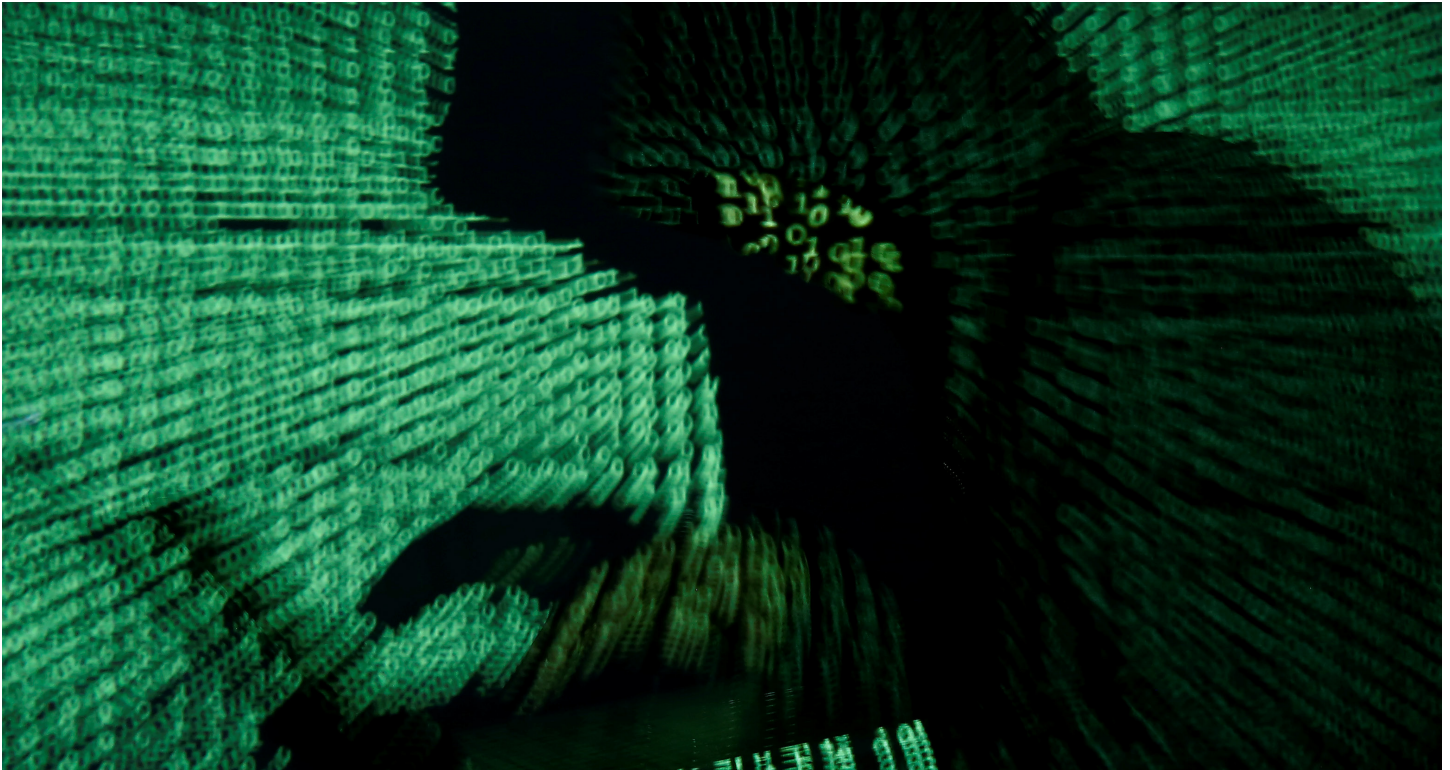
42 Gary Gensler, "Remarks Before the Aspen Security Forum," U.S. Securities and Exchange Commission, August 3, 2021, <https://www.sec.gov/news/public-statement/gensler-aspen-security-forum-2021-08-03>.

43 Omkar Godbole, "A Sudden Loss of Faith in Tether Would Pose Risk to Bitcoin, JPMorgan Says," *CoinDesk*, February 19, 2021, <https://www.coindesk.com/markets/2021/02/19/a-sudden-loss-of-faith-in-tether-would-pose-risk-to-bitcoin-jpmorgan-says/>.

44 "Systemic Barriers to Banking and Unbanked," San Francisco Office of Financial Empowerment, https://sfgov.org/ofe/sites/default/files/2020-12/TTX%20Barriers%20to%20Banking%20Report_v4.pdf.

45 Steve Denning, "Lest We Forget: Why We Had a Financial Crisis," *Forbes*, November 22, 2011, <https://www.forbes.com/sites/stevedenning/2011/11/22/5086/?sh=42fff32f92f1>.

46 Statista, "Global digital population as of January 2021," <https://www.statista.com/statistics/617136/digital-population-worldwide/>.



A man holds a laptop computer as cyber code is projected on him in this illustration picture taken on May 13, 2017. Capitalizing on spying tools believed to have been developed by the U.S. National Security Agency, hackers staged a cyber assault with a self-spreading malware that has infected tens of thousands of computers in nearly 100 countries. REUTERS/Kacper Pempel/Illustration

90 percent of people also access the Internet through their smartphone, especially those who are financially excluded.⁴⁷ The costs for access to the Internet still varies greatly between emerging and established markets.⁴⁸ Despite this, the largest blockchain for DeFi, Ethereum, primarily focuses on computer users.⁴⁹ Developers must focus more on mobile. Specifically, financial inclusion will hinge upon application development for cheaper smartphones rather than only the latest iPhone or Samsung Galaxy. Additionally, DeFi applications need to be designed to operate in low-bandwidth areas and allow for some level of offline functionality. Otherwise, DeFi developers risk further

entrenching a digital divide by adding onto existing forms of inequality and failing to reach those who need DeFi the most.⁵⁰

While the crypto world has naturally been skeptical of governments when it comes to financial innovation, it should not happen at the cost of ignoring key public sector sponsored changes that would expand access to DeFi. Lost within the recent debate between policymakers and the crypto industry over the crypto tax provision in the US infrastructure bill, which showed a seriously limited understanding of crypto, was how the infrastructure bill set aside \$65 billion to expand

47 Statista, "Global digital population as of January 2021."

48 "Measuring digital development ICT price trends," ITU Publications, 2020, https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2020/ITU_ICTPriceTrends_2020.pdf.

49 Kosala Hemachandra, "Why Ethereum Should Go Mobile," *Cointelegraph*, March 29, 2020 <https://cointelegraph.com/news/why-ethereum-should-go-mobile>.

50 "Driving Actions to Eliminate the Digital Divide," STEM Ecosystems, May 15, 2020, <https://www.youtube.com/watch?v=wcLM81IHGc>.

internet access.⁵¹ Internet infrastructure is perhaps one of the most critical building blocks to expanding the reach of DeFi to financially excluded people. The DeFi industry, however, has been largely silent when it comes to advocating for policies that address structural access such as internet infrastructure. Instead, the newfound lobbying power of the greater crypto industry has focused on protecting existing users and developers.⁵² The DeFi industry and developers must engage with governments (both in the United States and abroad) to address policies that would improve access to the Internet, especially for historically marginalized communities. By doing this, DeFi can help create a novel financial system that is truly decentralized and more inclusive for all people.

The Private and Public Sectors are Responsible for DeFi's Future

DeFi protocols offer an alternative for people to access financial tools. While development has thus far focused on crypto native users, its future can push the frontiers of financial inclusion. For this, responsible development falls upon private organizations and developers as well as public sector entities.

Private sector serves as the frontline to the evolution of DeFi. Developers must be intentional in their work to address everyday use cases, create user-friendly applications, communicate risks, and navigate the different ways people access internet technology. This requires an honest and accountable approach to innovation as well as educating the public to make sense of this new form of digital innovation. Blockchain technology serves novel use cases and simply cobbling together schemes to make quick returns does more harm than good in the long term.

Public sector regulators and central banks establish the guardrails to protect users. These organizations can frame DeFi as a competitive alternative to traditional

finance and test its integration with central bank digital currencies through various policy tools.⁵³ The public sector must look at cryptocurrency and DeFi beyond the lens of speculation and illicit finance because there are in fact many more possible use cases. This requires taking time to holistically understand the technology. The current payments system, designed precisely within the regulatory frameworks set by the public sector, has failed immeasurably. Of particular note, two major problems in the United States include a last-mile problem and a payments ecosystem that is incapable of quickly getting COVID stimulus to people.⁵⁴

DeFi in its decentralization, however, holds us all accountable. We cannot look to intermediaries to solve the most pressing financial problems. Instead, it falls upon each of us, public and private sectors, to design the frameworks and applications that ensure DeFi prioritizes expanding everyday use cases, offering user-friendly products, promoting intentional risk taking, and accounting for internet access. DeFi has so far been directed toward crypto enthusiasts. Next, more intentional design and execution is needed to reach all people.

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