DECENTRALIZED FINANCE

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CITE AS: 6 GEO. L. TECH. REV. 373 (2022)

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I. INTRODUCTION

Decentralized Finance (DeFi) is an emerging and evolving area of technology, encompassing a variety of decentralized activities related to finance and financial services.[1] This Technology Explainer provides an overview of DeFi, its underlying technology, a side-by-side comparison between DeFi and traditional finance and banking, and a brief overview of the challenges facing DeFi.

II. WHAT IS DECENTRALIZED FINANCE

The traditional finance system relies on central banking institutions—such as the U.S. Federal Reserve or the European Central bank—to oversee monetary policy using tools like the setting of interest rates and the purchasing of securities. Traditional banking institutions also supervise the borrowing and lending of capital.[2] Consumers and citizens rely on such institutions for

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[1] David Gogel, *DeFi Beyond the Hype*, WHARTON UNIVERSITY OF PENNSYLVANIA 1-2 (May 2021), https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf [https://perma.cc/5XEJ-T8CZ]; CAMPBELL R. HARVEY ET AL., DEFI AND THE FUTURE OF FINANCE 6–7 (Apr. 5, 2021).

[2] HARVEY, *supra* note 1, at 6.

financial trading and for the performance of financial transactions, such as transferring money and exchanging property or equity.[3] DeFi aims to provide an alternative way to perform these financial services using a decentralized infrastructure.[4]

Using a variety of new technologies, discussed further in Section III, *infra*, DeFi allows users or peers to interact directly with others using a common ledger built on distributed ledger technology.[5]

III. TECHNOLOGY UNDERLYING DECENTRALIZED FINANCE

The architecture of DeFi includes many layers: Each layer serves a purpose and relies on the others to create an infrastructure to provide financial services to users.[6] The technology underlying DeFi is integral to its function, but each of these technologies also have various uses outside of DeFi.[7]

DeFi relies on blockchain technologies, which publicly record the digital asset transactions that occur on these networks.[8] The blockchain process starts with a request, which is when one individual requests to send a certain number of digital assets to another individual.[9] Next, the transaction request is sent to a peer-to-peer network, i.e., a distributed ledger network, with a plurality of nodes (e.g., a number of data storage units or computers) connected to the network.[10] The nodes help validate the transaction request using several potential approaches and mechanisms,[11] sometimes referred to

[3] *Id.*
[4] *Id.*; Fabian Schär, *Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets*, 103 FED. RSRV. BANK OF ST. LOUIS REV. 153, 155 (2021), https://files.stlouisfed.org/files/htdocs/publications/review/2021/04/15/decentralized-finance-on-blockchain-and-smart-contract-based-financial-markets.pdf [https://perma.cc/C4LJ-ASG3].
[5] HARVEY, *supra* note 1, at 6.
[6] Schär, *supra* note 4, at 155.
[7] Gogel, *supra* note 1, at 2.
[8] *See, e.g.*, Marco Iansiti and Karim R. Lakhani, *The Truth About Blockchain*, HARV. BUS. REV. (Jan. 2017), https://hbr.org/2017/01/the-truth-about-blockchain [https://perma.cc/GE73-J9QN].
[9] *How does a blockchain work?*, BITPANDA, https://www.bitpanda.com/academy/en/lessons/how-does-a-blockchain-work/ (last visited Jan. 17, 2022) [https://perma.cc/NER6-LGUM].
[10] *Id.*
[11] Numerous potential mechanisms can be used to validate transactions. One potential method is referred to as proof of work, which requires the nodes on the network to use their own computational power to compete against the other nodes on the network to solve a problem, thereby proving their work and validating a transaction. Simon Chandler, *Proof of Stake vs. Proof of Work: Key Differences Between These Methods of Verifying Cryptocurrency Transactions,* INSIDER (Dec. 22, 2021), https://www.businessinsider.com/personal-finance/proof-of-stake-vs-proof-of-work

as cryptocurrency mining, to create the block in which the transaction is stored and viewable to others on the network.[12] Each block is assigned a unique identifying number called a "hash" that refers to the block before it, and that block is then added to the end of the existing blockchain, i.e., the chain of previous blocks that were previously validated.[13] Once added to the blockchain, the transaction is complete and validated, and stored and viewable on the blockchain.[14]

Below are brief descriptions of the technologies that enable DeFi's financial services.

A. Brief Description of the Technology

Distributed Ledger Technology. Distributed ledger technology (DLT) consists of a ledger or collection of accounts that utilize a number of nodes or data storage units to create a decentralized infrastructure.[15] Each node or data storage unit has a specific ledger stored within it.[16] Each node is connected to other nodes on a shared network, and each of these nodes communicates with the other nodes to update the ledger when an alteration is made to the ledger.[17] Unlike a centralized form of finance, the data on the ledger is not located on a single cloud, data storage unit, or computer.[18] Rather, the ledger is distributed and shared between numerous nodes or data storage units.[19] The distributed ledger may be public—i.e., the network may be publicly accessible, allowing anyone to access the network, view data stored on the network, or become a node on the network—or private—i.e., permission may be required for a user

[https://perma.cc/ES6A-GZ74]. Proof of stake is another potential method where cryptocurrency holders on a network vote to approve legitimate transactions and are awarded with cryptocurrency for approving legitimate transactions. *Id.*

[12] *How does a blockchain work?*, *supra* note 9.

[13] *Id.*

[14] *Id.*

[15] Drew Diedrich, *Distributed Ledger Technology*, 4 GEO. L. TECH. REV. 673, 675 (2020) (citing REED SMITH LLP, BLOCKCHAIN: DISTRIBUTED LEDGER TECHNOLOGY AND DESIGNING THE FUTURE 3 (3d Ed. 2019); Sys. Innovation, *Token Economics Distributed Ledgers*, YOUTUBE (Apr. 3, 2018), https://www.youtube.com/watch?v=2eyXeINe8IU [https://perma.cc/5Y5TD6NL]).

[16] Diedrich, *supra* note 15, at 675.

[17] *Id.* (citing Jordan Heal, *How Network Nodes Are Used in Cryptocurrency,* COIN RIVET (Mar. 2, 2019), https://coinrivet.com/guides/what-iscryptocurrency/how-network-nodes-are-used-in-cryptocurrency/ [https://perma.cc/E23PSJV4]; Forex Academy, *How Is Distributed Ledger Technology Different From Blockchain?*, YOUTUBE (Oct. 18, 2019), https://www.youtube.com/watch?v=xFVjQv3cuYw&t=61s [https://perma.cc/85PM-BRW7]).

[18] *See* Diedrich, *supra* note 15, at 674.

[19] *Id.*

to access the network, which may be desired for DLTs storing sensitive information.[20] An illustrative representation of a distributed ledger is shown in Figure 1 below.

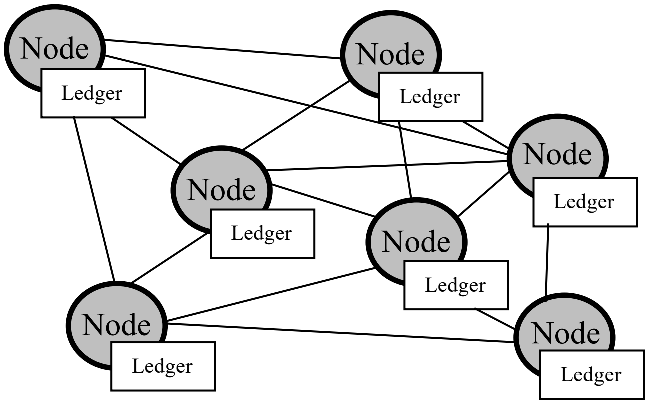

Fig. 1: Illustration of a distributed ledger with numerous nodes and ledgers.

Blockchains. A blockchain is built using distributed ledger technology.[21] Each blockchain uses distributed ledger technology, but not all distributed ledger technology is a blockchain.[22] Blockchains provide a digital database that stores information, such as records of financial transactions in the case of DeFi, that can be simultaneously used and shared by a decentralized network.[23] Blockchains, therefore, serve as ledgers that are distributed and decentralized, and act to settle and store transactions occurring on a DeFi ecosystem.[24] Numerous blockchain networks exist, but the most well-known is the Bitcoin blockchain, which contains all transactions involving Bitcoin digital assets.

Digital Assets. Digital assets are assets on a particular blockchain, which unlike tangible assets (such as cash or gold), are intangible.[25] Further, digital assets, as their name implies, are digital in nature: created and stored on a digital platform (i.e., a blockchain), where they can also be exchanged

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[20] Diedrich, *supra* note 1515, at 675; Dirk A. Zetzche et al., *Decentralized Finance*, 6 J. OF FIN. REGUL. 172, 180 (Sep. 30, 2020), https://academic.oup.com/jfr/article/6/2/172/5913239 [https://perma.cc/43JL-RAH4].
[21] Gogel, *supra* note 1, at 2.
[22] *What is the Difference Between DLT and Blockchain*, BBVA (Apr. 26, 2018), https://www.bbva.com/en/difference-dlt-blockchain/ [https://perma.cc/73DY-KUVN].
[23] *Merriam-Webster*, "blockchain"; *see also* Zetzche, *supra* note 20, at 179–81.
[24] Gogel, *supra* note 1, at 2.
[25] *Digital Assets: Cryptocurrencies vs. Tokens*, CRYPTOPEDIA (May 17, 2021), https://www.gemini.com/cryptopedia/cryptocurrencies-vs-tokens-difference#section-what-is-a-digital-asset [https://perma.cc/67KM-XQC6].

digitally.[26] Cryptocurrencies, which are the most commonly known digital assets, are the native digital asset of a blockchain network.[27] They are a medium of exchange and a store value on a particular blockchain network.[28] Another type of digital asset is tokens or crypto tokens, which are digital assets built or developed on a particular blockchain network.[29] Tokens, similar to cryptocurrencies, can be traded and can hold value, but tokens can also represent physical assets, a utility (such as data space), a service, or intangible assets.[30] Assets can be added to the blockchain by a process called tokenization.[31]

Stablecoins. Stablecoins are a class of cryptocurrencies or digital assets linked to a reserve asset or fiat currency.[32] Therefore, unlike many cryptocurrencies, stablecoins are much less volatile.[33]

Wallets. Wallets are software interfaces that users can interact with and use to manage and exchange their digital assets or stablecoins on a particular blockchain.[34] There are two types of wallets: custodial wallets and non-custodial wallets.[35] Custodial wallets are typically wallets offered by a company—e.g., Coinbase, Robinhood, and Binance—and these companies offer custodial wallets to hold, transfer, and sell digital assets, such as cryptocurrencies.[36] Non-custodial wallets, on the other hand, do not rely on a company or business; rather, the individual alone holds the private key to their wallet.[37]

Smart Contracts. Smart contracts, based on blockchain networks, carry out and control events using software code.[38] Put differently, smart contracts are

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[26] *Digital Assets: Cryptocurrencies vs. Tokens*, *supra* note 25; Gogel, *supra* note 1, at 2.
[27] *Digital Assets: Cryptocurrencies vs. Tokens*, *supra* note 25.
[28] *Id.*
[29] *Id.*
[30] *Id.*
[31] Schär, *supra* note 4, at 157.
[32] Gogel, *supra* note 1, at 3, 8–9.
[33] *Id.* at 9.
[34] *Id.* at 2.
[35] *Id.*; Jackson Wood, *Custodial Wallets vs. Non-Custodial Crypto Wallets*, COINDESK (Mar. 9, 2022, 10:50 AM), https://www.coindesk.com/learn/custodial-wallets-vs-non-custodial-crypto-wallets/ [https://perma.cc/RT2E-7YPD].
[36] Gabriel Rodriguez, *5 Best Crypto Exchanges of April 2022*, MONEY (Apr. 1, 2022), https://money.com/best-crypto-exchanges/ [https://perma.cc/6TTY-S4WD].
[37] Wood, *supra* note 35.
[38] Gogel, *supra* note 1, at 3.

computer protocols that self-execute the terms of a contract using code.[39] Nick Szabo is considered to be the originator of smart contracts and offered an example of a car lien that used a smart contract.[40] In this example, the car would include hardware and software that allows operation with cryptographic keys, which provide the lender a back door that enables the lender to disable the car if the owner fails to make payments; however, this back door would be permanently switched off when the final payment for the car is received by the lender.[41] Disabling the car, and permanently switching off the back door providing this capability, may be automatic and self-executed through the use of the smart contract's program code and receipt of the agreed-upon electronic payments between the parties of the agreement.[42]

Decentralized Applications (Dapps). Decentralized applications are software applications that combine blockchain and traditional web technology.[43] Dapps are user-interfacing, are built on a particular blockchain, and utilize smart contracts to function.[44] In short, Dapps are applications that a user may directly interact with on a particular DeFi network.[45] For example, Dapps may be created on the Ethereum blockchain, which provides data storage for the Dapps, and may use smart contracts to function and provide logic for the Dapps operation.[46] To provide a more specific example, Ethlance is a job market platform on the Ethereum blockchain, which connects freelancers with potential employers.[47]

Decentralized Autonomous Organizations (DAOs). Decentralized Autonomous Organizations are entities or organizations consisting of individuals that use smart contracts to have a defined structure and operation.[48] DAOs can perform a variety of functions, have treasuries of digital assets, and

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[39] Jenny Cieplak & Simon Leefatt, *"Smart Contracts": A Smart Way to Automate Performance*, 1 GEO. L. TECH. REV. 414, 418 (2020).
[40] *Id.* (citing Nick Szabo, *The Idea of Smart Contracts*, NICK SZABO'S ESSAYS, PAPERS, & CONCISE TUTORIALS (1997), https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/idea.html [https://perma.cc/2YFJ-4K39]).
[41] Cieplak et al., *supra* note 3940, at 418 (citing Szabo, *supra* note 40).
[42] Szabo, *supra* note 40.
[43] Gogel, *supra* note 1, at 3.
[44] *Id.*
[45] *Id.*
[46] *Decentralized Applications (Dapps)*, ETHEREUM, https://ethereum.org/en/dapps/#what-are-dapps (last visited Jan. 18, 2022) [https://perma.cc/236X-TDJS].
[47] *See generally Ethlance*, https://ethlance.com/#/ (last visited Jan. 18, 2022) [https://perma.cc/22H5-DX9K].
[48] Gogel, *supra* note 1, at 3.

are managed by the individual members themselves.[49] For example, MakerDAO is a decentralized autonomous organization governed by the individual holders of its token, who work together to manage a system that allows users to create currency.[50] Unlike a traditional organization, DAOs typically have a flat and fully democratized structure, and all activity is transparent and fully public.[51]

B. The Layers of DeFi

As briefly mentioned above, the architecture of DeFi includes many layers, each layer having a purpose and each layer being built on the others to create an infrastructure that provides an open forum for providing financial services to users.[52] This layered approach to understanding the infrastructure of DeFi is depicted by Fabian Schär using a figure—i.e., Figure 2 below—which displays a settlement layer, an asset layer, a protocol layer, an application layer, and an aggregation layer.[53]

[49] *See generally Decentralized Autonomous Organizations (DAOs)*, ETHEREUM, https://ethereum.org/en/dao/ (last visited Jan. 18, 2022) [https://perma.cc/H3TD-HHZW].
[50] *The Maker Protocol: MakerDAO's Multi-Collateral Dai (MCD) System*, MAKERDAO, https://makerdao.com/whitepaper/White%20Paper%20-The%20Maker%20Protocol_%20MakerDAO%E2%80%99s%20Multi-Collateral%20Dai%20(MCD)%20System-FINAL-%20021720.pdf (last visited Apr. 28, 2022) [https://perma.cc/W3QQ-RRRB].
[51] *See generally Decentralized Autonomous Organizations (DAOs)*, *supra* note 51.
[52] Schär, *supra* note 4, at 155.
[53] *Id*. at 156.

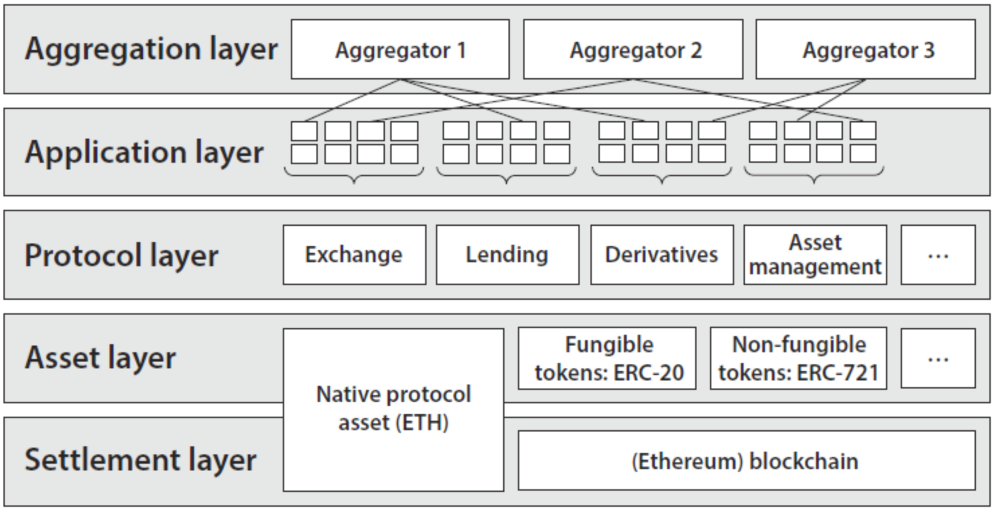

Fig. 2: Illustration of the DeFi Stack.[54]

The settlement layer is the base layer of DeFi and consists of the blockchain on which the DeFi ecosystem is built and the native asset used on the ecosystem.[55] For example, Bitcoin has its own blockchain, and its native asset is Bitcoin.[56] Other examples abound: Ethereum is a blockchain and ether is its native asset, and Solana is a blockchain with its native asset Solana.[57] This layer of the financial ecosystem includes distributed ledger technology, and as such, this layer allows the DeFi network to store ownership information.[58]

The second layer is the asset layer.[59] This layer of a DeFi network consists of all of the digital assets that are issued or tokenized on the settlement layer and relies on a particular blockchain to function.[60] This layer, like the settlement layer, includes the underlying native asset of the ecosystem (e.g., Bitcoin, ether, Solana, etc.,) and other digital assets that are issued on the blockchain ecosystem, such as fungible and non-fungible tokens, that may be transferred and collected on the blockchain.[61]

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[54] *Id.*
[55] *Id.* at 155–56.
[56] *Id.* at 155.
[57] *Id.*; *see also* Luke Conway, *What Is Solana (SOL)? Learn About Ethereum's Growing Rival*, BLOCKWORKS (Feb. 7, 2022), https://blockworks.co/what-is-solana-everything-you-need-to-know-about-the-ethereum-rival/ [https://perma.cc/RG3H-SF9Q].
[58] Schär, *supra* note 4, at 156.
[59] *Id.*
[60] *Id.*
[61] *Id.*

The protocol layer sits on top of the settlement and the asset layers, which it relies on to function.[62] This layer sets the standards for uses on the DeFi network.[63] Further, the DeFi networks can be used as exchange platforms, lending platforms, and asset management platforms.[64] The protocol layer also includes the smart contracts that lay out the protocols, standards, or rules for each platform.[65] For example, a DeFi network might enable peer-to-peer lending executed by a smart contract agreed upon by the parties, and the borrowing party may use some of their digital assets as collateral for the loan. In this example, the peer-to-peer lending is enabled by smart contracts—the digital assets from the asset layer—and the exchange of these assets using a blockchain from the settlement layer. Users These smart contracts can be accessed by the users or the DeFi applications on the DeFi network.[66]

The application layer is the fourth layer and includes the Dapps created for each DeFi network.[67] Housing the Dapps, this layer includes the applications which a user may directly interact with on a particular DeFi network, each of which may utilize the protocols on the protocol layer to function.[68] Building on our peer-to-peer lending example, a user may interact with a Dapp on a computer that allows the user to engage in peer-to-peer lending. Further, the Dapp may utilize established smart contracts, a native asset (e.g., ether) to execute the peer-to-peer lending, and a particular blockchain to execute the peer-to-peer lending, thereby relying on the protocol layer, the asset layer, and the settlement layer, respectively.

The final layer is the aggregation layer, which as the name implies, aggregates applications on the application layer to complete more complex tasks.[69] For example, the aggregation layer may comprise a program that connects Dapps from two different blockchains, thereby enabling a borrower from one ecosystem to interact with a lender on a different ecosystem.[70]

IV. DECENTRALIZED FINANCE VERSUS TRADITIONAL BANKING

As discussed previously, traditional finance depends on intermediaries to provide financial services.[71] DeFi, on the other hand, is a decentralized

[62] *Id.*
[63] *Id.*
[64] *Id.*
[65] *Id.*
[66] *Id.*
[67] *Id.*
[68] *See id.*
[69] *Id.*
[70] *Id.*
[71] *See* Gogel, *supra* note 1, at 4.

environment that does not rely on intermediaries.[72] Rather, the structure of DeFi is public, permissionless, and has open-source software protocols.[73] A comparison between DeFi and traditional banking can help provide a valuable side-by-side comparison that exhibits the profound capabilities of DeFi.

In traditional finance and banking, assets are held and lent by an institution that acts as a custodian.[74] For example, an individual may open a basic checking account at a bank and deposit funds into the account, which is held by the bank or used to issue loans to other entities. To obtain a loan in the traditional finance ecosystem, an individual interacts with a bank that sets the loan terms, including the interest rate, collateral, and pay-back period. By contrast, DeFi infrastructure allows assets to be held directly by individuals in wallets, which do not require a custodian or intermediary.[75] The data which records ownership of the digital assets is stored using decentralized ledger technology, which contrasts with traditional banking, where centralized data storage by an institution is the norm.[76]

This decentralized infrastructure may provide several advantages. First, it may enable greater accessibility to the financial system, especially for those that face discrimination in the traditional banking system.[77] Additionally, as this decentralized infrastructure eliminates intermediaries, it has the potential to be more efficient than the traditional banking system.[78] Further, without intermediaries, DeFi could eliminate the fees associated with traditional banking.[79] For example, suppose an individual wishes to purchase bread from their local bakery. Under the traditional banking infrastructure, a user may use a debit or credit card issued by a banking institution and card network to make this purchase.[80] However, this transaction will typically include a credit card processing fee charged to the business (in our example, the local bakery) of 1.5% to 3.5% of the transaction's total, a portion of which goes to the bank that issued the card (e.g., Bank of America, Chase, and Citi), a portion of which goes to the card network that enables the card (e.g., Visa, Mastercard, and Discover), and a portion of which goes to the payment

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[72] *Id*.
[73] *Id*. at 3.
[74] Chris McCann, *DeFi infrastructure 101—Overview & Market Landscape*, MEDIUM (June 15, 2021), https://medium.com/racecapital/defi-infrastructure-101-overview-market-landscape-78e096a85834 [https://perma.cc/5NCT-LR2B]; HARVEY, *supra* note 1, at 6.
[75] Gogel, *supra* note 1, at 4.
[76] McCann, *supra* note 74.
[77] Schär, *supra* note 4, at 169.
[78] *Id*.
[79] *Id*.
[80] *See generally* Billie Anne Grigg & Whitney Vandiver, *How Much Are Credit Card Processing Fees?*, NERDWALLET (Oct. 27, 2021), https://www.nerdwallet.com/article/small-business/credit-card-processing-fees [https://perma.cc/C68V-WFKH].

processor used by the local bakery (e.g., Square, Stax, and Helcim).[81] Use of DeFi could eliminate these intermediaries (and, by extension, much of the payment fees) by enabling true peer-to-peer payments.[82] In the bakery example, the individual would simply transfer digital assets from their wallet to the wallet of the local bakery.[83] With that said, blockchain networks do have fees of their own, which are charged for the processing of the transaction over the blockchain.[84]

Other potential advantages are numerous. Because DeFi does not rely on intermediaries to execute services, the settlement time for DeFi networks can be quicker than traditional banking: Whereas traditional banking may take multiple days to finalize a pending transaction, DeFi's use of blockchain technology, as well as its ability to constantly operate as opposed to only during business hours, enables DeFi network systems to settle transactions within seconds to minutes.[85] Further, due to its decentralized structure, data and transactions can be observed by the public, which allows for a level of transparency not offered by traditional financial systems.[86] In contrast, data and transactions under the traditional banking infrastructure are scattered and proprietary, only accessible to the banking intermediaries, for example.[87]

V. CHALLENGES FACING DEFI

Despite the exciting promises of DeFi, issues and challenges remain for this type of technology. First, while smart contracts have the potential to revolutionize the execution transactions and services on DeFi networks, they also have risks and drawbacks.[88] For one, smart contracts utilize code, and although code may provide benefits (such as efficiency, transparency, and objectivity), it may be difficult for an average user to read and understand that code.[89] Additionally, the underlying code of a smart contract may include errors, opening the smart contract up to vulnerabilities.[90]

[81] *Id.*
[82] *Id.*
[83] *See* Schär, *supra* note 4, at 169.
[84] *What is the blockchain fee?*, WIREX, https://wirexapp.com/help/article/what-is-the-blockchain-fee-0078 (last visited Apr. 28, 2022) [https://perma.cc/9Q5E-KC56].
[85] McCann, *supra* note 74.
[86] Schär, *supra* note 4, at 169.
[87] *Id.*
[88] *Id.* at 170.
[89] *Id.*
[90] *Id.*

Second, though transactions on a blockchain are public, the identity of the individuals behind the transactions are not, providing pseudonymity.[91] This pseudonymity provides privacy, but it also may offer cover for individuals engaging in illicit activity and hoping to avoid such records.[92] Despite pseudonymity being a founding principal of essentially all blockchain networks, some argue that forgoing it, at least in some capacity, might make the networks more trusted, less susceptible to market manipulation, and more likely to comply with regulations and legal obligations.[93]

DeFi networks and blockchain have also been criticized for the energy usage required to operate them.[94] The energy concerns of DeFi and the energy required to execute the functions on DeFi networks may limit the scalability of DeFi.[95] Additionally, the number of transactions being processed on existing blockchain networks is significantly less than those being processed by traditional financial systems, such as credit card companies.[96] Therefore, other potential issues beyond energy usage may occur as the number of transactions continues to increase.

Potential solutions exist, however, to this scalability problem. One possible solution that has gained traction is called "sharding."[97] Sharding, in short, consists of partitioning a network's transactions into a number of subsets, i.e., shards.[98] In sharding, each node is responsible only for processing the transactions within its subset.[99] As a result, each node on a blockchain is no longer responsible for each transaction on the blockchain, thereby distributing the computational and storage workload of a blockchain network and increasing the efficiency of the blockchain network.[100] However, although each node only processes a subset of the transactional load within its subset,

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91 Commissioner Caroline A. Crenshaw, *Statement on DeFi Risks, Regulations, and Opportunities*, U.S. SEC. AND EXCH. COMM'N (Nov. 9, 2021), https://www.sec.gov/news/statement/crenshaw-defi-20211109 [https://perma.cc/6SQT-UF2R].
92 *Id.*; Schär, *supra* note 4, at 155.
93 Crenshaw, *supra* note 91.
94 *E.g.*, Peter Hoskins, *Tesla Will No Longer Accept Bitcoin Over Climate Concerns, Says Musk*, BBC NEWS (May 13, 2021), https://www.bbc.com/news/business-57096305 [https://perma.cc/924T-9SJY].
95 Gogel, *supra* note 1, at 7.
96 Daniel O'Keeffe, *Understanding Cryptocurrency Transaction Speeds*, COINMONKS (June 5, 2018), https://medium.com/coinmonks/understanding-cryptocurrency-transactionspeeds-f9731fd93cb3 [https://perma.cc/U8ZX-2PAF].
97 Lucas Mearian, *Sharding: What it is and why many blockchain protocols rely on it*, COMPUTERWORLD (Jan. 28, 2019), https://www.computerworld.com/article/3336187/sharding-what-it-is-and-why-so-many-blockchain-protocols-rely-on-it.html [https://perma.cc/E9XQ-9XLX].
98 *Id.*
99 *Id.*
100 *Id.*

the entirety of the ledger is still shared with each node, maintaining the security of the blockchain.[101] Another potential solution is the proof of stake approach to verifying transactions, rather than the proof of work approach utilized by many cryptocurrencies.[102]

VI. CONCLUSION

Decentralized Finance offers a new financial infrastructure that has the promise of transparency, accessibility, efficiency, and security, all executed in a non-discriminatory manner. DeFi has the potential to replace many traditional institutions and provide finance and payment systems to users without the reliance on traditional banking institutions. However, DeFi does not come without its challenges and concerns, which still need to be overcome to prove its functionality and availability for widescale use in society.

[101] *Id*.
[102] Chandler, *supra* note 11.