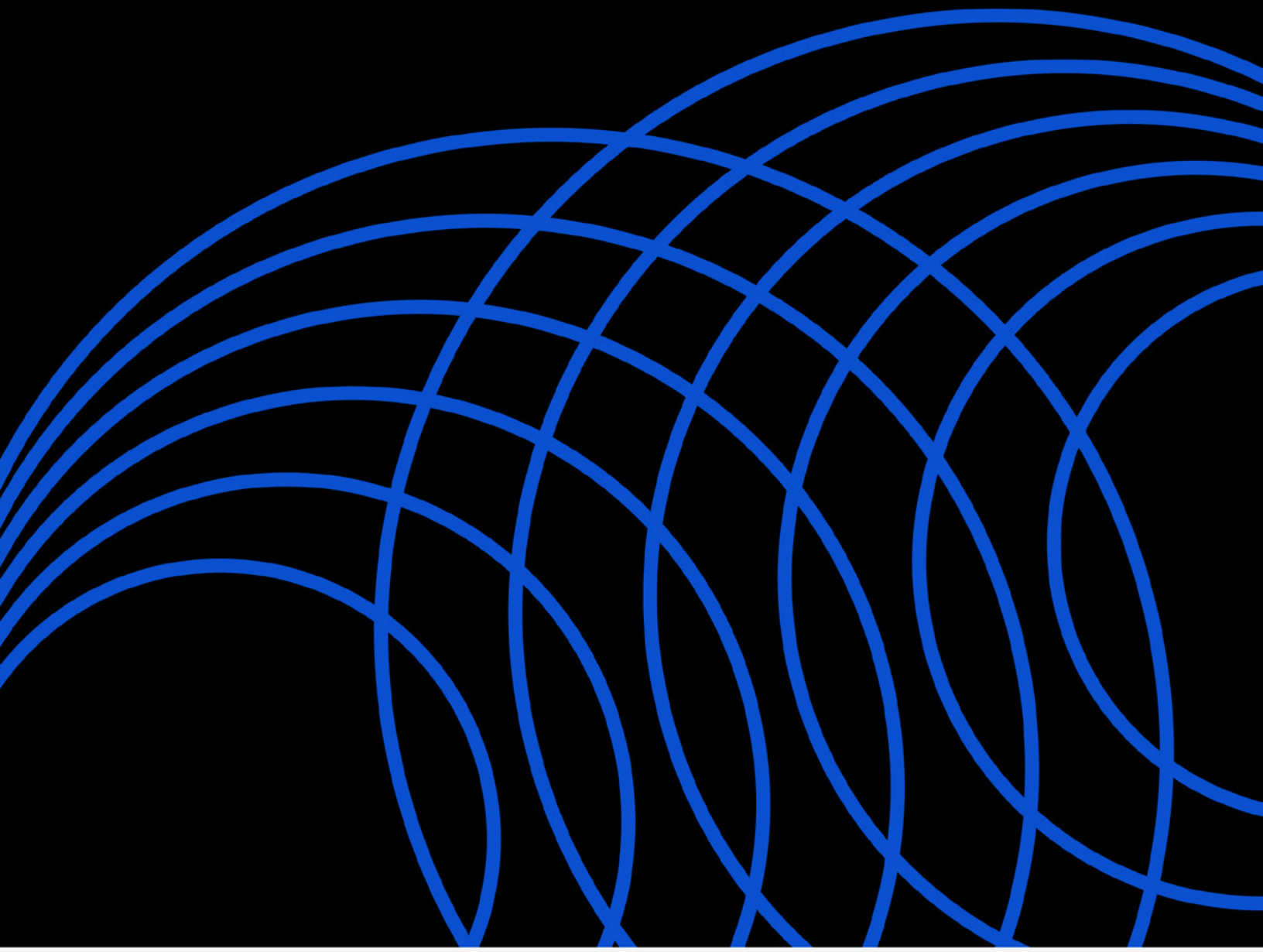
JULY 2024

# ON-CHAIN ECOSYSTEMS

## Evolution of Consumer Applications on Blockchains



COMMISSIONED BY

SOLANA FOUNDATION

SOLANA

THEBLOCK.CO

SPONSORED BY

SOLANA FOUNDATION

The Solana Foundation is a non-profit organization located in Zug, Switzerland dedicated to the decentralization, advancement, and security of the Solana network.

More about Solana Foundation: Website | LinkedIn | Twitter

SOLANA

Solana is a global state machine, and the world's most performant blockchain. It gives developers the confidence to build for the long term by delivering predictable scaling without compromising security or composability. Solana's performance is driven by a single global state, which is capable of processing tens of thousands of smart contracts at once, and by Proof of History, a distributed clock that unlocks low-latency, sub-second finality across the global state. Established in 2018, Solana Labs is a technology company that builds products, tools, and reference implementations to further expand the Solana ecosystem.

More about Solana: Website | LinkedIn | YouTube | Documentation | Twitter | Discord | Github | Telegram | Reddit

RESEARCHED BY

THE BLOCK PRO · RESEARCH

The Block Pro is The Block's premium product portfolio designed to help institutions evaluate opportunities in digital assets. Pro's research, news, and data products are powered by teams of subject matter experts deeply entrenched in the digital asset ecosystem who deliver actionable intelligence so businesses can make informed decisions.

The Block Research produces research content covering the digital assets, fintech, and financial services industries.

CONTACT

Email: research@theblock.co Twitter: @TheBlockPro

# ACKNOWLEDGEMENTS

We would like to thank the Solana Foundation for commissioning this research report. We would also like to thank their teams for providing feedback and input for this report, in particular Austin Federa. We would also like to thank everyone at The Block who assisted with this report - design team: Zoe Ellyse Del Rosario; research team: Marcel Bluhm, George Calle, and Steven Zheng. We are also grateful to those that shared their valuable perspectives through interviews for this report:

- Andreas Nicolos (Access)
- Armani Ferrante (Backpack)
- David Phelps (JokeRace)
- Fitch (Parallel)
- Jesse Pollak (Base)
- Luca Netz (Pudgy Penguins)
- Mert Mumtaz (Helius Labs)

The authors of this report may hold tokens mentioned in this report. Please refer to The Block's financial disclosures page for author token holdings.

AUTHOR

Kevin Peng, PhD
*Research Analyst*
Twitter | LinkedIn

# TABLE OF CONTENTS


2 **SPONSORED BY & RESEARCHED BY**

3 **ACKNOWLEDGEMENTS**

4 **TABLE OF CONTENTS**

5 **OVERVIEW**

6 **PART 1: EMERGENCE OF PRIMITIVE BLOCKCHAIN APPLICATIONS**

9 CDPs and Lending

13 DEXs, Liquidity, and Incentives

15 Extracting the Truth From Metrics

20 **PART 2: DEFI GROWS UP: EMERGING CHALLENGES AND RELATIONSHIP WITH SMART CONTRACT PLATFORMS**

22 Blockchains Drive Application Performance and PMF

29 Dodging Risks and Building Moats in a Decentralized Financial System

36 **PART 3: EMERGENCE OF NEW CONSUMER APPLICATIONS AND THE BATTLE FOR SOCIAL CAPITAL**

38 Limits of Decentralized Ownership

40 Building Loyalty and Social Capital

48 Make Insanely Great Product

58 **PART 4: CONCLUSIONS**






# OVERVIEW

In the past few years, blockchains have undergone a dramatic transformation from their origins as simple ledgers for digital currency transactions to sophisticated platforms supporting a myriad of consumer applications. In particular, the emergence of smart contracts, first introduced on Ethereum in 2015, has catalyzed a broad spectrum of on-chain activities that extend far beyond peer-to-peer transactions. This report delves into the evolution of consumer applications on blockchains, highlighting the critical factors driving their development and adoption.

First, we take a look at the pioneering role of stablecoins in tokenizing financial value on the blockchain, which lay the foundation for some of the earliest on-chain consumer apps to bring novel, tangible utility to crypto users. We explore the ways in which decentralized finance (DeFi) protocols began to tokenize ever-more complex forms of value in a composable manner, enabling an entire sector of decentralized financial services on chain, including lending, borrowing, trading, yield generation, and more. In many respects, DeFi protocols represent some of the first on-chain consumer apps to achieve product-market fit, fundamentally altering the way users interact with blockchains and continuing to serve as a driving force for on-chain activity today.

Over time, the DeFi landscape and its production of newfound revenue opportunities have become increasingly competitive. The industry's relentless pursuit of user liquidity and attention through incremental innovation and token incentives has created an environment that is becoming more adversarial for all participants. DeFi users today often confront unpredictable security risks when interacting with new protocols, while developers are forced to compete for increasingly fragmented, mercenary, and value-extractive capital. This environment, combined with persistent regulatory hostility from government agencies, has steadily reduced the scale of public investment opportunities in favor of private markets in recent years. Meanwhile, consumer loyalty towards protocols has naturally declined as a result of these combined factors as well.

In this report, we explore the unique ways in which DeFi protocols have been able to adapt to these conditions and maintain a competitive advantage. In some cases, protocols that effectively leverage the properties of specific blockchains have enjoyed sustained market dominance, while others have found success by moving between chains at strategic moments. This report also looks forward to the future

of on-chain consumer apps. Emerging trends point towards greater integration with existing Web2 infrastructure, improved user experience, and bespoke approaches to fostering social interactions and user loyalty. As blockchains continue to grow and become more scalable, on-chain consumer apps and the wide range of possibilities they entail are now poised to have a greater influence on the broader crypto experience than ever before.

# PART 1
# EMERGENCE OF PRIMITIVE BLOCKCHAIN APPLICATIONS

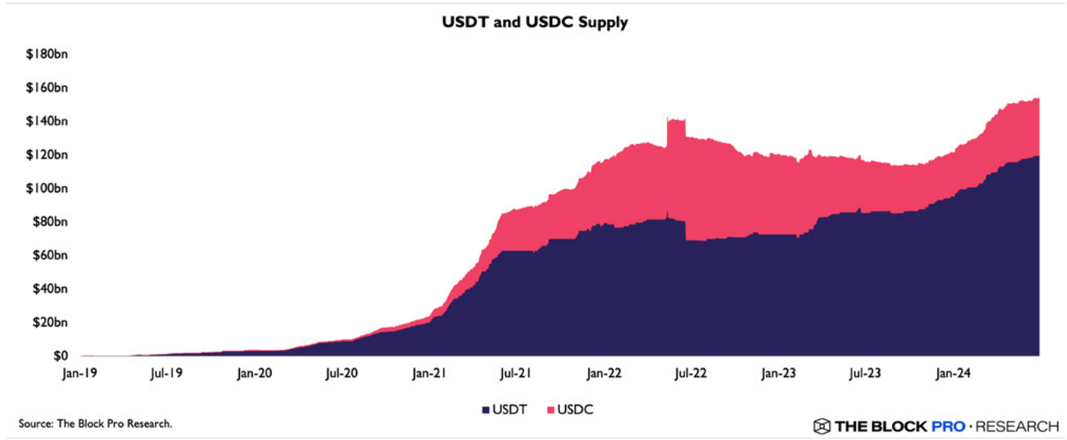




In order to evaluate the current blockchain application or decentralized application (dApp) landscape, it is important to understand why blockchain apps exist at all. To approach this question, let us first consider what gives blockchains utility and value from a user perspective. Fundamentally, blockchains enable the verifiable, peer-to-peer (P2P) transfer of digital assets, with immutable records of every transaction stored on a public ledger. For basic layer 1 (L1) blockchains, such as Bitcoin or Dogecoin, these transactions typically only involve transfers of their respective native tokens (i.e., BTC or DOGE).

By most definitions, these tokens can be reasonably considered money in the modern age (at least on chain); they serve as mediums of exchange, units of account, and stores of value - hence the name "cryptocurrency." However, a significant drawback of transacting in native tokens is that the majority of the world transacts and denominates value in fiat, specifically, the U.S. dollar. Early smart contract platforms like Ethereum were able to address this by unlocking the ability for anyone to deploy their own token at any time while retaining full compatibility with their native execution environments. With this new capability, the stage was set for stablecoins to leave a permanent impact on the way blockchains are used.

By November 2017, Tether USD (USDT), a fiat-backed stablecoin pegged to USD had been deployed by issuer Tether Limited on Ethereum as an ERC20 token, followed shortly after by Circle's deployment of Circle USD (USDC) in August 2018. Both USDT and USDC derive their value from underlying fiat collateral, and



require trust in centralized entities for collateral custody, token issuance, and redemption. These aspects conflict with the decentralized ethos of crypto, but stablecoins have nonetheless grown to become one of the biggest testaments to the value of blockchains. Since the beginning of 2019, the combined supply of USDT and USDC has grown from just ~$323 million to ~$144 billion as of April 2024.

In addition, USDT and USDC are now the 3rd and 6th largest cryptocurrencies in the world by market cap, underscoring the critical role they continue to serve within the broader crypto ecosystem. The enduring relevance of USDT and USDC can largely be attributed to the simple fact that most crypto users prefer to transact and denominate their assets in terms of USD. More importantly, the ubiquity of stablecoins in crypto reveals some key insights about the products that tend to emerge and achieve success within the industry, especially if we entertain the idea that stablecoins are, in a sense, one of the first basic blockchain applications to be developed.

One takeaway is that applications usually arise from underserved user demands; ironically, stablecoins appear to be far more effective at serving the requirements of digital money than other forms of cryptocurrency. Another takeaway is that newer applications can be thought of as progressive expansions of existing technologies. All stablecoins are reliant on the underlying security guarantees of the blockchains upon which they reside and the entities from which they are issued. Yet, with the integration of trusted issuers and blockchain technology, stablecoins have effectively created unprecedented new utility and value for users, enabling the mostly permissionless, fast, and low-cost transfer of digital USD compared to centralized solutions that extract significant fees through middlemen. It is no exaggeration to say that stablecoins have turned out to be one of the main "killer applications" of crypto so far.

If we consider the view that early crypto applications came from an expansion of the fundamental premise of blockchains as digital money platforms, the rapid ascension of decentralized finance (DeFi) to the forefront of crypto app development between 2019-2021 starts to appear almost inevitable in hindsight. After all, money is traditionally used for far more than just simple P2P transfers; it can be lent, borrowed, traded, invested, and much more. In the next section, we will take a look at how a collective movement to recreate - and even improve - the traditional financial system through on-chain apps gave birth to DeFi and some of crypto's most compelling use cases to date.

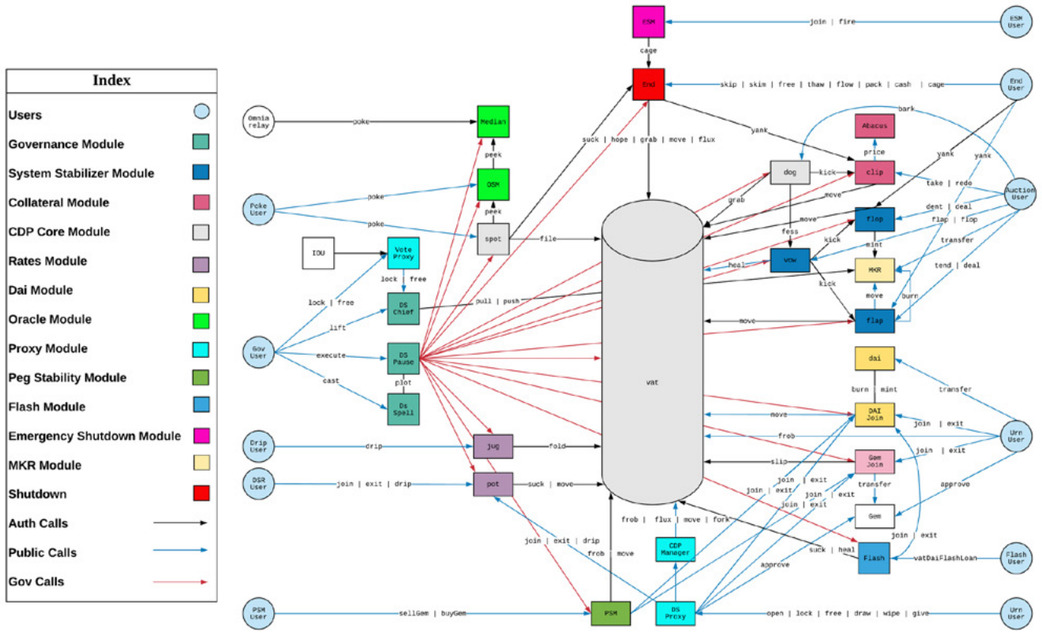
## CDPs AND LENDING

One way to think about fiat-backed stablecoins and their underlying financial infrastructure is to view issuers such as Tether Limited and Circle as acting in a similar capacity to banks. In exchange for cash, these issuers mint USDT or USDC loans at a 0% interest rate, which can then be used to redeem underlying collateral (less any conversion fees). A similar design is employed in the case of so-called "wrapped tokens," such as wrapped BTC (WBTC), which are minted via whitelisted custodians holding native token deposits (e.g., BTC) in order to enable compatibility with specific blockchain standards such as Ethereum's ERC20. Another important facet to note here is how these basic products represent incremental steps in the tokenization of value; stablecoins bring fiat to the blockchain, while wrapped tokens bring crypto to otherwise non-interoperable chains. Throughout this report, we will examine how this trend has continued to accelerate and evolve in recent years.

Focusing back on stablecoins and wrapped tokens, the main issue with these custodial designs from a decentralization perspective is that they rely on user trust in issuers, who maintain full control over deposits without any guardrails enshrined in code. With this in mind, it is perhaps unsurprising that one of the first on-chain applications to leverage smart contracts towards decentralizing finance was MakerDAO, a collateralized debt position (CDP) protocol on Ethereum that allowed users to mint the DAI (originally SAI) stablecoin with ETH collateral.

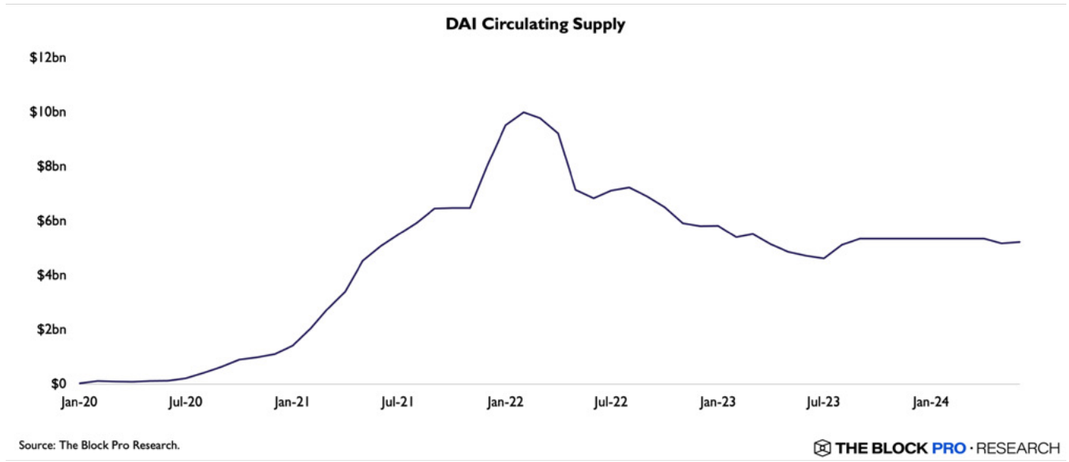
In the MakerDAO system, officially launched in late 2017, each DAI is backed by crypto collateral (ETH, WBTC, USDC, etc.) in excess of the value of debt minted (i.e., ~$1). This design, also referred to as overcollateralization, is a critical part of how CDP protocols are able to maintain the backing of their debt-based products. For example, users who wish to mint $100 worth of DAI must lock at least $150 worth of collateral in a vault, which cannot be withdrawn until the DAI debt is repaid. Overcollateralization enables two key benefits for MakerDAO and other DeFi protocols with a similar design. First, it automates the process of ensuring that every DAI is backed by at least $1 worth of collateral; if the collateralization ratio of collateral to debt ever drops below 150% due to price volatility, MakerDAO's smart contracts will begin the process of liquidating collateral to pay back debt. Second, DAI users gain the ability to access leverage permissionlessly on-chain against their crypto and transact with a stablecoin pegged to USD featuring significantly less exposure to centralized parties, at least in theory.

In reality, the tradeoffs made to enable the benefits of DeFi are often considerably greater and more complex than meets the eye. Interestingly, MakerDAO's complete architecture as it stands today provides an insightful general blueprint for how modern DeFi protocols operate and manage various risk factors.




Source: MakerDAO

For instance, DAI's peg stability is largely maintained by a combination of variable interest rates and auctions, which essentially encourage more minting/borrowing of DAI when demand is high and burning/repayments when demand is low. These factors are dictated by MKR (MakerDAO's governance token) holders, who also set liquidation parameters for various collateral assets according to their individual risk profiles. Maker's overall solvency as a system is further dependent on third-party oracles who are tasked with accurately reporting the market value of both DAI and collateral assets at all times. Simply put, the ability of MakerDAO, and many other major DeFi protocols that we will discuss, to function effectively under duress is still dependent on various human interventions in spite of their automated smart contract components.

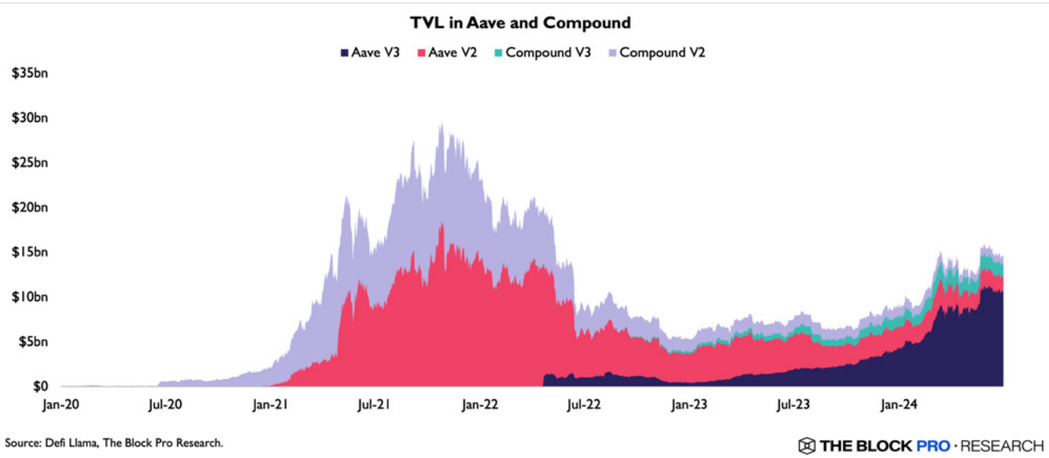



Nevertheless, DAI has grown to become a meaningful part of the broader DeFi ecosystem and remains relevant as a product today. Its supply rose to a peak of ~10.4 billion in early 2022 before settling down to ~5.2 billion as of this writing, and its design has been replicated extensively in various forms across blockchain ecosystems in recent years.

Continuing our discussion on some of the key DeFi primitives that underlie the most popular consumer crypto applications today, let's take a look now at lending protocols, which feature many of the same components as CDPs with additional functionality. Two of the earliest DeFi protocols to come into existence are Compound and Aave, both of which were launched in 2018 with the ability for users to borrow pooled assets in exchange for deposited collateral. Rather than minting new stablecoin supply against their deposits, Compound and Aave users are able to borrow assets from other lenders - including stablecoins - which enables the expression of a range of asset pair-specific long or short market views. Both Compound and Aave feature variable rates on both sides of the market, paying lenders and charging debtors relatively higher interest when borrow utilization of deposits is high, and vice versa Within this design, these early

lending protocols effectively created two new asset classes representing the tokenization of value: yield-bearing collateral tokens and debt-accruing tokens.

By this point, with our discussions limited to only CDPs and lending protocols thus far, one can already begin to see the extent to which early DeFi protocols were engaged in a systematic process of tokenizing value in various parts of the financial system and the new opportunities this unlocked for market participants. With CDPs, crypto holders primarily benefited from permissionless on-chain access to enter leveraged long positions, while with lending protocols, crypto holders gained expanded access to enter both leveraged long and short positions. Moreover, lenders on protocols like Compound and Aave gained the additional option of earning yield on deposits without the requirement of incurring debt to do so. This is another case where the decentralization of a common financial service, through careful app design, can generate novel value for users that was previously far less attainable due to structural capital inefficiencies.




This value proposition is appealing enough that Compound and Aave have consistently remained among the top protocols in DeFi by total value locked (TVL) for the past several years, garnering ~$27 billion at their peak in 2021 and sitting at ~$16 billion as of this writing. Even today, these figures continue to be dwarfed by the amount of capital held in traditional financial institutions, but they remain significant enough that they remain difficult to imagine at first glance. Next, we examine how DeFi evolved from near obscurity in early 2020 to become a crucial aspect of blockchain adoption, positioning itself at the forefront of consumer blockchain applications.

## DEXs, LIQUIDITY, AND INCENTIVES

When it comes to crypto - and financial markets in general - one of the most critical forms of user activity is trading and, by extension, market making. As we have seen, borrowing and lending play a central role in fueling economic growth, distributing risk, and generating liquidity, all of which are in the process of becoming increasingly capital efficient in decentralized financial markets. However, these activities can only be performed effectively when there exists the free flow of capital and assets among market participants through trading.

For the majority of crypto's early history, trading was almost exclusively performed off-chain via centralized exchanges (CEXs) such as Binance and Coinbase, which more closely resemble the brokerage firms that serve equities markets than the decentralized exchanges (DEXs) that have since altered the playing field in recent years. The earliest iterations of on-chain DEXs, such as EtherDelta, also bore considerable similarities to CEXs with the variation of using smart contracts to execute trades between users. EtherDelta's attempt to bring order books on chain was limited by inefficient market pricing, high fees, and perhaps most importantly, the requirement that users relinquish custody of their funds.

The most significant breakthrough for DEXs in terms of both concept and implementation was Uniswap V2, an automated market maker (AMM) protocol launched in May 2020 and inspired by Bancor that allows anyone to add liquidity for any two ERC20 tokens into a pool and make swaps through pools non-custodially. As opposed to traditional order book exchanges, which require bids/asks from traders and market makers to establish prices and liquidity, Uniswap V2 relies exclusively on liquidity pools and the ratio of asset balances in these pools to obtain a  market price. Notably, liquidity positions (LPs) in Uniswap V2 are represented by ERC20 tokens themselves, which allow them to be transferred between users or protocols; in Uniswap V3, which expands optionality for liquidity providers through customizable liquidity ranges and swap fees, LPs are minted as non-fungible tokens (NFTs) to achieve a similar effect. Once again, we can observe how early DeFi primitives accelerated the trend of tokenizing increasingly complex financial value on-chain, with DEXs converting liquidity itself into an easily accessible asset.

By mid-2020, it was becoming increasingly apparent that on-chain liquidity could be a powerful driver of user activity and an indicator of value. In Ethereum's nascent DeFi ecosystem at the time, protocols began to pursue the acquisition of TVL (collateral in CDPs and lending protocols and liquidity in DEXs) with newfound enthusiasm. In this widespread battle for TVL growth now known as DeFi Summer, one particular tool would prove to be incredibly effective at quickly attracting users and capital: incentives. With competition starting to heat up between protocols and feature sets beginning to converge within DeFi subsectors, incentives offered the opportunity to bring new marginal value to liquidity providers looking for the optimal risk-adjusted opportunities among competing protocols.

One of the most well-known and effective incentive programs in DeFi history was launched by Compound in June 2020 and is commonly credited with kicking off a wave of similar programs over subsequent months. Under this program, Compound users were rewarded with COMP governance tokens for both lending and borrowing on the protocol. In some cases, aided by the rising price of COMP at the time, the reward rate on Compound was so high that users could even earn a net profit after factoring in interest rates simply by borrowing assets. This process of depositing capital into protocols to earn incentives became known as yield farming, or liquidity mining, and was so effective that it drove TVL in Compound to surge by ~$1 billion in just two months after its program launch.

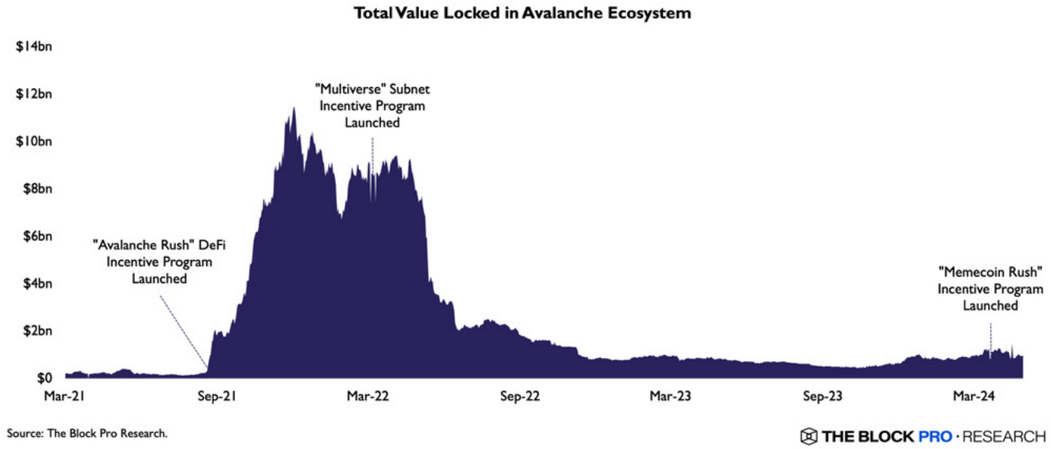
Over the second half of 2020 (and beyond), the DeFi landscape continued to become increasingly optimized for bringing financial services on-chain and enhancing their capital efficiency. Yearn Finance, a yield aggregator / on-chain asset manager, leveraged the composability of DeFi protocols and popularized the concept of "money legos" with its yield-generating vaults, wherein users could, for example, deposit aTokens (collateral lent on Aave) into a pool, which would then be used by the protocol to borrow USDC and deposit it into Compound for additional yield, compounded automatically to reduce gas costs for vault depositors. Another protocol, Synthetix, pioneered the idea of synthetic assets backed by crypto collateral and later expanded into on-chain derivatives with the release of Kwenta and Lyra, which offer perpetual futures and options trading, respectively.





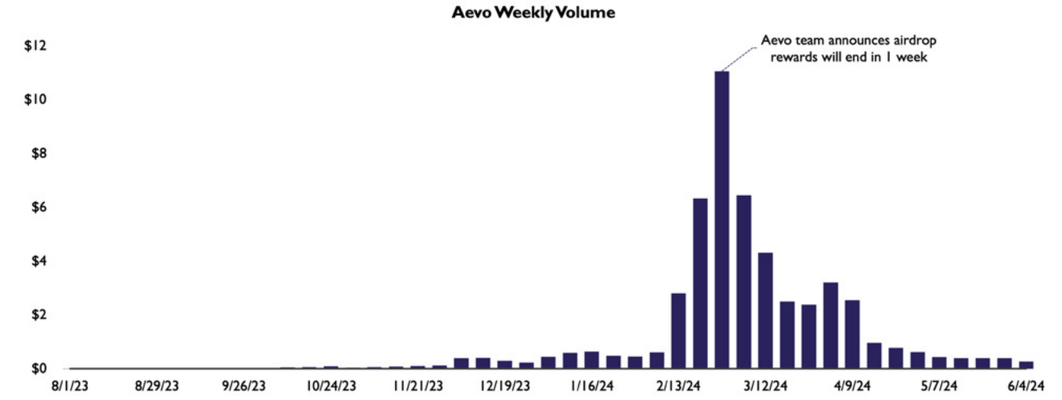
## EXTRACTING THE TRUTH FROM METRICS

In 2024, crypto users have access to a staggering array of on-chain financial tools powered by DeFi, highlighting the degree to which apps built atop blockchains can create novel value for end users beyond what is available in more established industries like finance and tech. On-chain games, NFT lending markets, delta-neutral stablecoins; these are just a few examples of the ever-more sophisticated apps being developed today. However, as the dApp landscape evolves to become more complex and competitive, it is also becoming more difficult to effectively evaluate the relative value of specific dApps or blockchain ecosystems. In a world where it has become commonplace to fork protocols and distribute token incentives, singular metrics like TVL become more susceptible to short-term, mercenary capital, and less reflective of organic user activity.




In recent years, incentives have become marketing tools to bootstrap network effects not only for dApps, but entire blockchain ecosystems as well. One notable example is the "Avalanche Rush" incentive program for DeFi apps launched by the Avalanche Foundation in August 2021, which helped push TVL in the Avalanche ecosystem up to ~$11.5 billion over the course of ~3 months. The success of this program drove multiple L1 foundations to launch similar programs of their own, but a closer look at the results of subsequent programs deployed by the Avalanche Foundation reveals diminishing returns over time, suggesting that incentives alone are not sufficient to promote long-term growth and adoption.

Incentives can result in short-term impacts on trading volume as well, which is generally a more reliable measure of DEX usage compared to liquidity alone. As with TVL, it is important to consider DEX volumes over time, including the schedule of token emissions and other incentives, when evaluating protocol adoption. Even when incentives are merely implicit, such as when teams encourage users to earn "points" for potential future airdrops, they can yield major changes to user behavior in the short term. One recent example of this dynamic is Aevo, a decentralized derivatives exchange that rewarded users with allocations of the AEVO token airdrop in March relative to their trading volume.



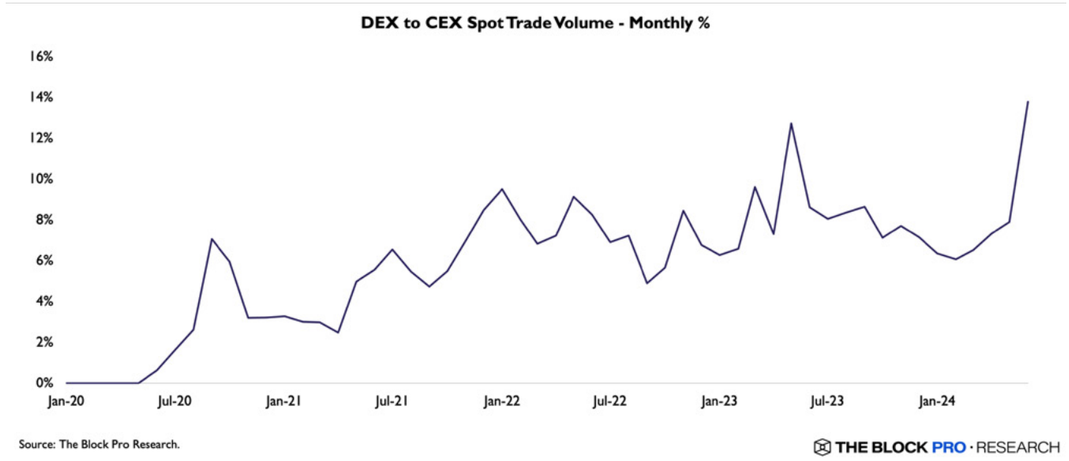

In the leadup to Aevo's token launch, weekly trading volumes surged as users began to use the platform heavily in order to earn future AEVO tokens, peaking at ~$11 billion in the last week of February. That same week, the Aevo team announced that AEVO airdrop incentives for trading would be ending the following week, which led to weekly volumes declining considerably and continuing to remain far below their peak over the ensuing months.

Consistent growth across multiple metrics like TVL, volume, users, etc., after incentives have been eliminated - or reduced to sustainable levels - is a far more reliable indicator of crypto app adoption than any of these individual metrics in isolation or without context. When the nuances of data interpretation are



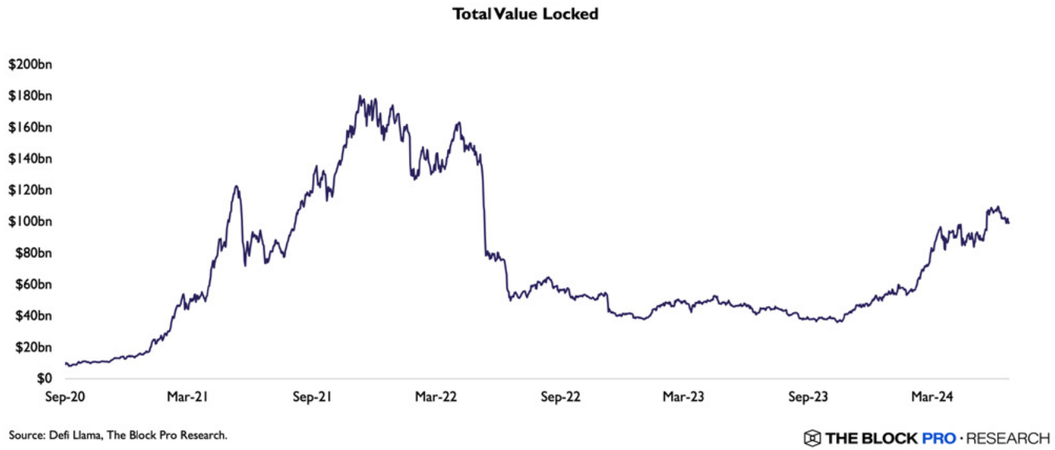


taken into account, DeFi metrics can provide deep insights into the state of the crypto industry overall. This is especially true for aggregated data across longer timeframes, which dampen the impact of short term, individual events and reveal broader trends.




In the chart above, we see that the monthly ratio of DEX to CEX volumes grew steadily between 2020 and 2024, averaging ~9.8% over the past year as of this writing. In other words, DeFi protocols have already had a palpable effect on the way crypto users trade assets, carving out a significant portion of total volumes in just four years. Furthermore, DeFi has contributed to a shift in the way that people interact with blockchains, expanding beyond simple P2P transfers to a whole host of financial activities. This shift is best illustrated by TVL in DeFi, which rose dramatically to a peak of ~$180 billion in 2021 before settling down to ~$107 billion as of mid-2024.

These numbers describe not only the amount of user capital today that is comfortable with storing wealth on the blockchain but also in DeFi smart contracts. Clearly, DeFi has established itself as one of the most compelling use cases for blockchains in recent years through an iterative process of creating novel value for consumers. DeFi protocols are effectively some of the earliest consumer applications in crypto and remain among the most widely used to this day.




Throughout its rapid ascension over the years, DeFi has pushed the boundaries of what is possible in on-chain financial applications, driving changes in user behavior and innovations in core blockchain technologies. From the TVL chart above, it is apparent that DeFi is no longer confined to a single smart contract platform as it was in the early days; it has spread across a wide variety of chains that have grown and matured alongside it. In the following section, we will take a closer look at the symbiotic relationship between DeFi and core blockchain development and how this interplay has laid the groundwork for some of the newest consumer apps on the blockchain that are beginning to emerge today.

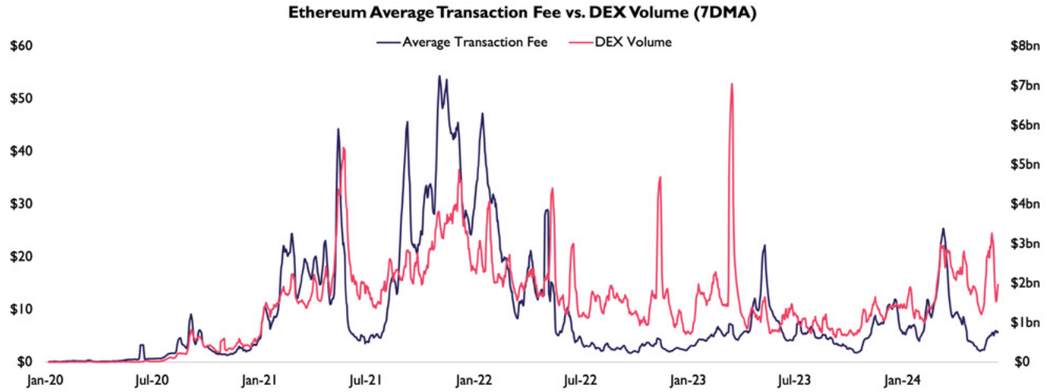
# PART 2
# DEFI GROWS UP: LEVERAGING THE STRENGTHS OF SMART CONTRACT PLATFORMS





In the previous section, we discussed how DeFi emerged as the most dominant form of on-chain consumer applications in crypto in recent years, primarily through the framework of progressively tokenizing more value and expanding the range of available financial services on-chain. Over time, DeFi has continued to mature and provide new tools for consumers, but many protocols have struggled to maintain long-term value due to a range of factors that include unstable demand, unsustainable incentive structures, ineffective governance models, security risks, and more. In this section, we'll discuss how the leading DeFi protocols today have become increasingly catered to the particular strengths of their underlying blockchains and infrastructure and how blockchains themselves play a key role in dictating product success and consumer behavior.

From a holistic perspective, it is hard to overstate the impact that DeFi's emergence has had on the broader crypto industry's development in recent years. By enabling significantly greater financial optionality on chain, DeFi protocols also created an environment conducive to generating new revenue opportunities, fundamentally altering the way in which blockchains are used in the process. One of the most prominent examples of this paradigm shift was the surge in demand for Ethereum block space as DEXs gained popularity and began to facilitate significant on-chain trading activity in 2021.



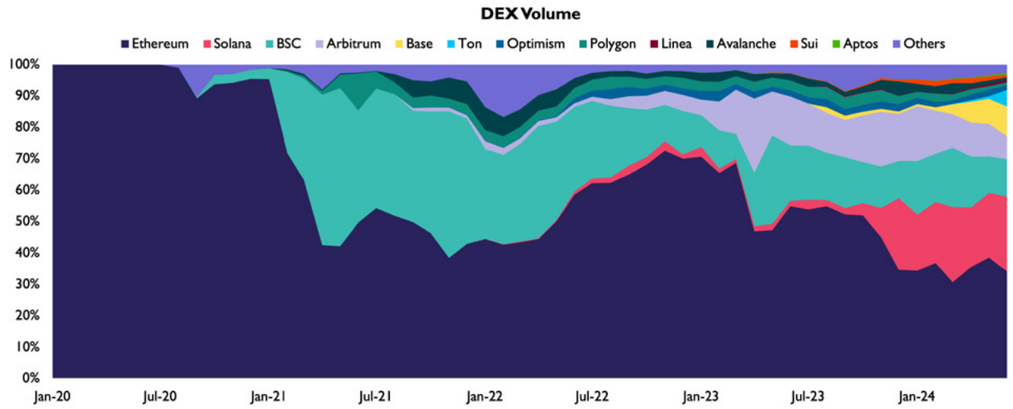

Source: Etherscan, Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

As DEX volumes increased to new heights throughout 2021, so too did average transaction fees on Ethereum. At one point, the average cost of making a transaction on Ethereum rose to over $50 in late 2021, underscoring the extent to which the growth in DeFi activity pushed the network beyond its natural scaling limits. This revelation ultimately accelerated the adoption of various scaling approaches, first with the emergence of EVM-based L1s such as BNB Chain and Avalanche, followed by high-throughput L1s like Solana and rollups like Arbitrum and Base.

## BLOCKCHAINS DRIVE APPLICATION PERFORMANCE AND PMF

Ethereum's DEX volume dominance first began to erode with the growth of BNB Chain in 2021-2022, which demonstrated the idea that core DeFi applications could be re-created or forked onto new chains with relative ease. This raised the possibility of formerly Ethereum-centric DeFi protocols engaging new target markets on other chains and potentially even gaining a competitive advantage by doing so. In the past two years, the most notable growth in DEX market share has come primarily from networks with opposing approaches to scaling: Solana, with its integrated systems design, and Arbitrum and Base, with their modular rollup designs. We discussed the various pros and cons of these approaches in our previous report on blockchain architecture here.




Source: Artemis, Defi Llama, The Block Pro Research.

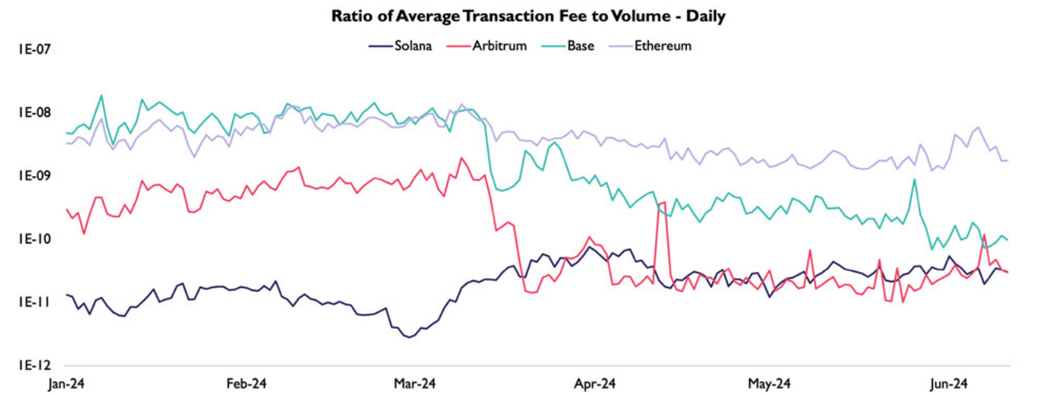
THE BLOCK PRO · RESEARCH





In 2024, Solana has led the way in challenging Ethereum for the top spot in the DEX market, garnering ~20.8% of total DEX volumes in the first 6 months of the year, up from ~5.6% in 2023 and just ~0.9% in 2022. Optimistic rollups Arbitrum and Base have made some headway as well, combining for ~16.3% of total DEX volumes in the first half of 2024 compared to ~14.5% in 2023 and ~2.3% in 2022. These trends point to an important aspect of the competitive landscape for consumer crypto apps: the underlying blockchains that host apps play a major role in determining product performance and ultimately, product-market fit (PMF).

From a consumer perspective, the benefits of newer, low-cost networks are readily apparent, especially for activities such as trading tokens on-chain. In the chart below, we can see that average transaction fees are orders of magnitude cheaper on Solana compared to Ethereum, even when normalized by volume. To provide some frame of reference, transaction fees averaged ~$3.55 per transaction on Ethereum in May 2024, with ~$66 billion in total DEX volume for the month; on Solana, fees averaged just ~$0.03 per transaction with ~$35 billion in DEX volume over the same period.



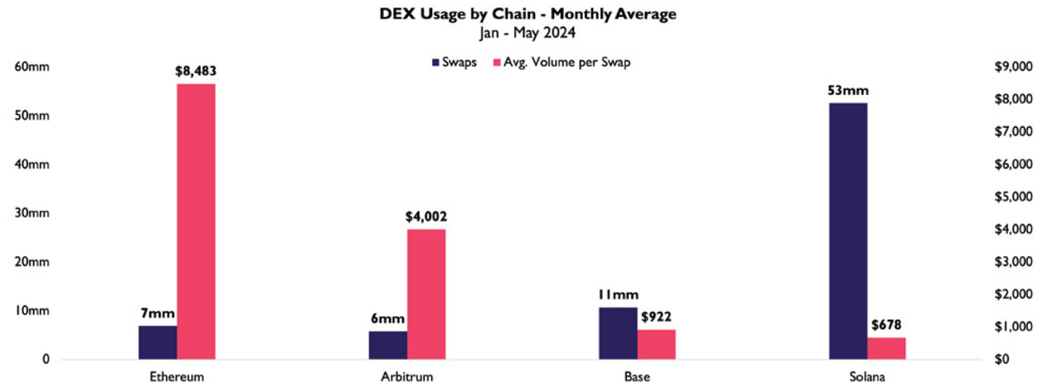

Source: Dune, Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

Recently, rollups have also begun to close the gap with Solana in terms of transaction fees following the Ethereum Dencun upgrade in March 2024, which reduced the overall cost of data storage for rollups. As

a result, DEXs built on rollups have been able to remain competitive on fees, allowing rollups to continue growing their share of on-chain trading volume.

Due to their influence on economic costs, blockchains can also have a significant effect on user behavior in apps. To get a better sense of this impact, let's take a look at the chart below, which compares 1) average number of swaps and 2) average volume per swap on a monthly basis across Ethereum, Arbitrum, Base, and Solana for the first five months of 2024.




Source: Dune, Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

In order to thoroughly isolate the differences in user behavior, we used the leading DEX by volume on each chain: Uniswap for Ethereum, Arbitrum, and Base, and Jupiter for Solana. Note that Jupiter is technically a DEX aggregator that routes most of its volume through Raydium and Orca, but its combined volume and unrivaled popularity among Solana users make it the most apt choice for this comparison. Given these parameters, one trend that is immediately apparent is that Solana users make significantly more swaps than users of other chains - about 7.5X more than Ethereum users on average. One likely explanation for this pattern is that the Solana network has far higher throughput than its competitors due to its parallel transaction processing, which enables a higher swap count from a technical standpoint. See our previous report on blockchain architecture for a deeper discussion of the various design choices represented here.

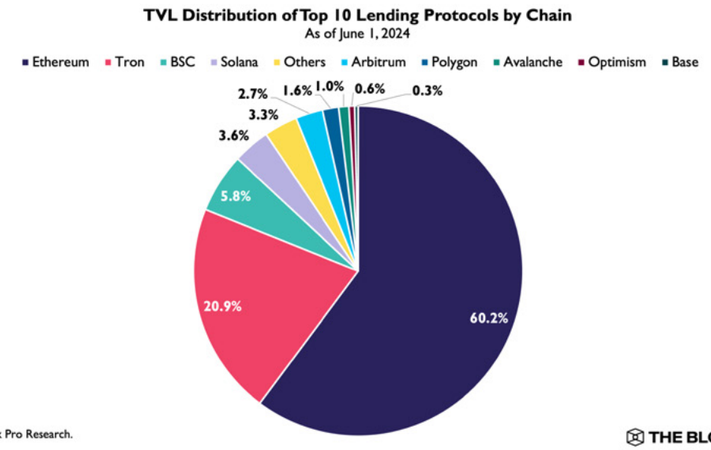
At the same time, Solana's lower transaction fees make it far more economically feasible for users to conduct multiple swaps, especially compared to a low-throughout, high-fee network such as Ethereum. By the same logic, low fees also make low-value swaps viable, which likely explains the average swap size for Solana DEX users - $678 compared to $8,483 on Ethereum. We see these general patterns exhibited for the other chains in our comparison as well. Base users made the second-most swaps on average, with 11 million swaps per month, along with second-lowest average swap size at $922 per swap. Meanwhile, Arbitrum users made a similar number of monthly swaps as Ethereum users, with ~2.1X less volume per swap. This trend is partially a reflection of Arbitrum's current positioning in the broader DeFi landscape; as of this writing, Arbitrum has ~1.8X the TVL of Base, which permits larger swaps, while it remains constrained by the throughput limitations of the EVM's single-threaded execution. Overall, the difference in swap quantity and value among DEX users on different chains points to the clear influence of network-specific features like transaction throughput and fees. Another angle of the divergence between Ethereum and Solana in terms of swaps vs average volume per swap is that Ethereum may be primarily used for high value transactions due to a (perceived) higher economic security. On the other hand, smaller (retail-driven) transactions, such as for memecoins, which gained significant attention in 2024, make most economic sense on Solana (or Base).




Source: Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

The chart above highlights a key relationship underlying DEX metrics: higher TVL - and thus deeper ecosystem liquidity - enables higher volume. It is no coincidence that the chains with the most DEX volume are also those with the most TVL. Often, this relationship becomes self-reinforcing; high DEX volumes generate higher yield for liquidity providers (LPs), which attract more liquidity, enabling even higher volume, and so forth.




Source: Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

This concept extends into other sectors of DeFi as well. Consider the case of lending protocols, which primarily generate revenue from borrowers via interest payments on loans and liquidation fees on loan defaults. As lenders deposit more assets, the amount of capital available for borrowers increases, which lowers borrow interest rates and encourages more borrowing. As borrowers start to use up more of the available liquidity, lender yield increases, which incentivizes additional deposits and perpetuates the cycle further. Now, taking a look at the distribution of lending protocol TVL in the chart below, we see a familiar trend.

For simplicity, we compared the top 10 largest lending protocols by TVL as of June 1st, 2024, which alone make up ~86% of lending TVL, highlighting the high concentration of liquidity in just a few protocols. Within the top 10, the majority of TVL exists on Ethereum, followed by Tron, BNB Chain, Solana, and others. This ordering, and share of lending protocol TVL, closely tracks each chain's share of DeFi TVL overall. In fact, most of the largest ecosystems are primarily dominated by lending protocols or DEXs when it comes

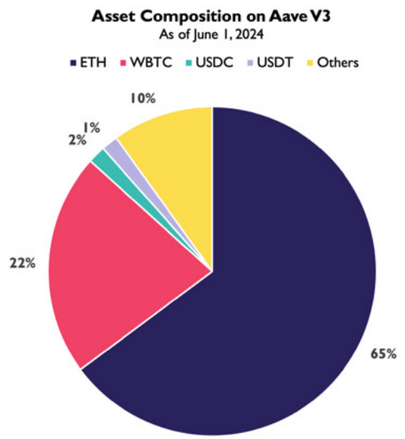




to TVL. The question is, why has most of the liquidity in the lending market gravitated to these particular chains?

To answer this, let us consider the factors that are most important to lending protocols and their users, all of which ultimately revolve around containing risk relative to reward. The first factor is liquidity; more liquidity in a lending protocol equates to more leverage and more stable interest rates available to borrowers. At the same time, stable collateral utilization rates mean that lenders face a lower likelihood of being unable to withdraw funds due to collateral being fully lent out to borrowers. The second, more important factor is solvency risk, which is a direct function of the quality of assets used as collateral in a lending system.

One of the biggest risks for lenders and lending protocols is the possibility of collateral assets losing value rapidly or collapsing entirely. In extreme cases, protocols face the risk of incurring bad debt and becoming undercollateralized if the value of liquidated assets during a major drawdown is not enough to cover liabilities, ultimately resulting in losses for lenders. Protocols can mitigate these risks by taking precautions like limiting borrowing capacity and tightening liquidation triggers for riskier assets, but ultimately, the most effective way to ensure solvency is to prioritize the use of stable, highly liquid assets. Today, this is reflected clearly in the composition of assets among the top lending protocols and sheds light on the distribution of lending protocols across chains as well.




Source: Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

On Aave, the largest lending protocol in DeFi by TVL, ~87% of assets consist of ETH, liquid-staked ETH, or wrapped BTC. Another 3% consists of USDC and USDT, which underscores the overall stability of most assets on Aave, given that BTC and ETH are the two largest and most liquid cryptocurrencies in the world. On Tron's leading lending protocol, JustLend, BTCT (Poloniex-wrapped BTC) accounts for ~95% of TVL. Similarly, Venus on BNB Chain consists primarily of BTCB (Binance-pegged BTC), BNB, and ETH, which account for ~48%, ~28%, and ~12% of TVL, respectively, for a total of ~88% overall. The key takeaway here is that a significant majority of user capital deposited in lending protocols today consists of the largest, most liquid crypto assets. As such, the blockchains that hold the largest supply of these assets, whether native (ETH, BNB, SOL) or wrapped (WBTC, BTCT, BTCB, etc.), naturally become the main platform for lending protocols and their users.

It is also worth noting that most of the TVL in the largest lending protocols exist on L1 chains, which may be another indication of users viewing security as a top priority. Rollups typically rely on assets bridged from underlying L1s for the bulk of their liquidity, including those that already rely on 3rd-party backing (e.g., WBTC), which introduces another potential source of risk to lenders. At the same time, usage patterns for lending protocols are markedly different from DEXs, wherein they typically do not require high transaction volumes on low time frames. As such, the benefits of features like fast confirmation times or low fees are not as dramatic as they are on DEXs, which might further explain why chains like Solana, Arbitrum, and Base have not gained as much traction in lending compared to their growing foothold in the DEX market. Overall, the success of lending protocols appears to be driven by two key factors, which are i) network effect (liquidity, track record/first mover advantage) and ii) chain architecture (convenience, performance).

Throughout the on-chain app landscape, we see ample evidence of this close relationship between blockchains and the apps upon which they confer their unique architectural advantages (and disadvantages). In the following section, we look at some of the key challenges faced by protocols in the fast-paced, competitive world of DeFi, how this environment has helped crystallize the bond between blockchains and apps, and what this means for the many consumer apps vying for mainstream adoption today.

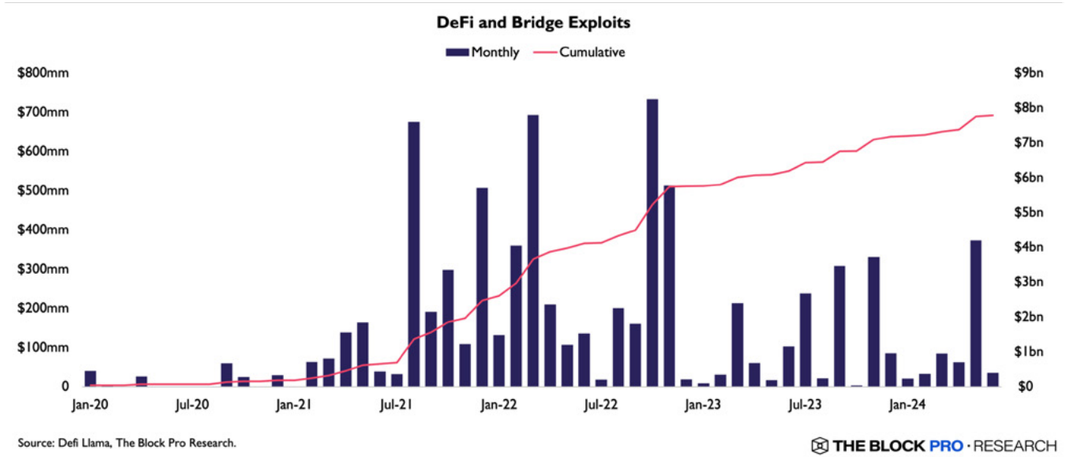




## DODGING RISKS AND BUILDING MOATS IN A DECENTRALIZED FINANCIAL SYSTEM

It is often said that with great power comes great responsibility, and this could not be more true for crypto and DeFi as a whole. At a basic level, crypto offers the opportunity for anyone with an internet connection to participate in an alternate financial system on the blockchain. However, this opportunity also comes with the grave burden of diligently protecting self-custodied funds, given the reality that there is often little to no legal recourse for lost or stolen crypto. This situation applies to the realm of DeFi as well, where users are regularly confronted with new and unpredictable risks in order to participate.

One of the most compelling arguments for DeFi in its early days was that the immutability and transparency of smart contracts would enable unparalleled security guarantees for users and accountability for project founders. To a certain extent, this remains true today, provided careful smart contract design and thorough auditing prior to implementation. A good example of this is the Uniswap V2 contracts, which have been forked hundreds of times by various protocols and have over $3 billion in TVL beyond the original contracts to this day. The resiliency of immutable, highly audited contracts like Uniswap's has become one of the cornerstones of DeFi, serving as the foundation for ever-expanding composability and capital efficiency in modern protocols.



Nonetheless, in practice, DeFi protocols and their users have fallen victim to billions of dollars of cumulative exploits over the years through both immutable and upgradable smart contracts alike. As protocols have attracted increasingly large amounts of capital in recent years, they have also become more enticing targets for hackers over time.

In some cases, the same functions that provide powerful and novel utility to DeFi protocols have also become tools for malicious actors to steal funds in stunningly efficient ways. A prime example of this is the Euler Finance exploit that occurred in March 2023, wherein the hacker used flash loans to exploit a flaw in Euler's smart contract logic, ultimately stealing ~$197 million from one of the largest and fastest-growing lending protocols at the time. From an objective standpoint, flash loans are a highly functional tool that can enable significant gas savings for both protocols and users. Flash loans essentially allow anyone to borrow an unlimited amount of funds from lending protocols without collateral as long as the funds are returned within the same block. This enables users to perform actions such as swapping assets, paying off debts, and removing collateral in a single transaction. However, flash loans have also been used to attack DeFi protocols throughout the years, often with devastating effects.

Lending protocols have been especially vulnerable to on-chain exploits, whether through flash loans or otherwise, due to their reliance on price oracles that must function properly at all times to ensure sufficient collateralization. For instance, the Cream Finance lending protocol was exploited for ~$130 million in October 2021 by using flash loans to manipulate the price of Yearn's yUSD vault token, and the Mango Markets lending protocol / perpetuals exchange was exploited for ~$116 million through manual price oracle manipulation for the MNGO token. In our discussions above, we touched upon the fact that TVL in lending protocols has trended towards a concentrated handful of the largest protocols with stable collateral over time, likely in part due to user fears over the safety of their funds. Given the rich history of lending protocols being exploited, it is not difficult to see why this has become the case, and once again highlights the role of blockchains and their specific security assumptions in influencing user behavior.

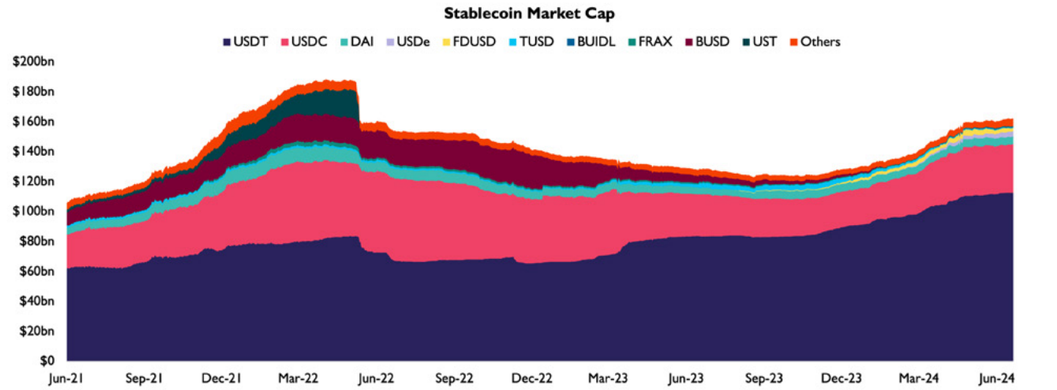
Throughout the course of DeFi's history as crypto's main form of consumer app, major events, including exploits, have shaped changes in user behavior that have led to the current landscape of leading apps. Clearly, security considerations are one of the driving forces for both user and developer decisions, but other factors are important to both of these groups as well. In recent years, continued innovation in the industry has allowed observers and participants to gain a better understanding of the value of different layers in the blockchain application stack. New blockchain infrastructures, asset standards, protocol mechanisms, and





UX designs have continually been battle-tested in the open market, and their subsequent successes (or failures) have all helped to inform perceptions and decision-making for users and developers today.

One useful case study is the dramatic rise and fall of Terra's UST, an algorithmic stablecoin with a fatally flawed design from inception that nonetheless managed to grow to a market cap of ~$18.8 billion before its spectacular collapse in May 2022.




Source: Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH

At its peak, UST represented over 10% of the global stablecoin supply, seemingly validating the market demand for decentralized stablecoins and high stablecoin yields. At the time, the two largest fiat-backed stablecoins in the world, USDT and USDC, combined for a total of ~80% of the overall stablecoin market and appeared to be losing ground to alternatives with more attractive yields. Today, roughly two years after UST's demise, the market has swung heavily back in favor of fiat-backed stablecoins, with USDT and USDC accounting for ~89% of the total stablecoin supply in a clear sign of user demand for security as a top priority.

Interestingly, USDC's share of the market has also fallen over the past two years, from ~29% in June 2022 to ~20% as of this writing in June 2024. This is likely in response to an incident in March 2023 wherein Circle revealed its $3.3 billion exposure to assets held in Silicon Valley Bank during its collapse, which led USDC to temporarily de-peg before eventually recovering several days later. As a result, USDT is now the

most dominant stablecoin in the market with ~69% market share, once again highlighting the sensitivity of users to potential safety risks. In the past year, the stablecoin market has also witnessed the rapid rise of Ethena's USDe, a yield-bearing stablecoin backed by delta-neutral ETH and BTC positions, as well as the growth of Blackrock's BUIDL tokenized USD fund backed by Treasury bills, pointing to continued demand for access to sustainable stablecoin yield and novel forms of tokenized value on the blockchain. It is worth noting that Ethereum and Tron now account for over 85% of the world's stablecoin supply, in line with the market's preference for stablecoins minted natively by issuers Circle and Tether.

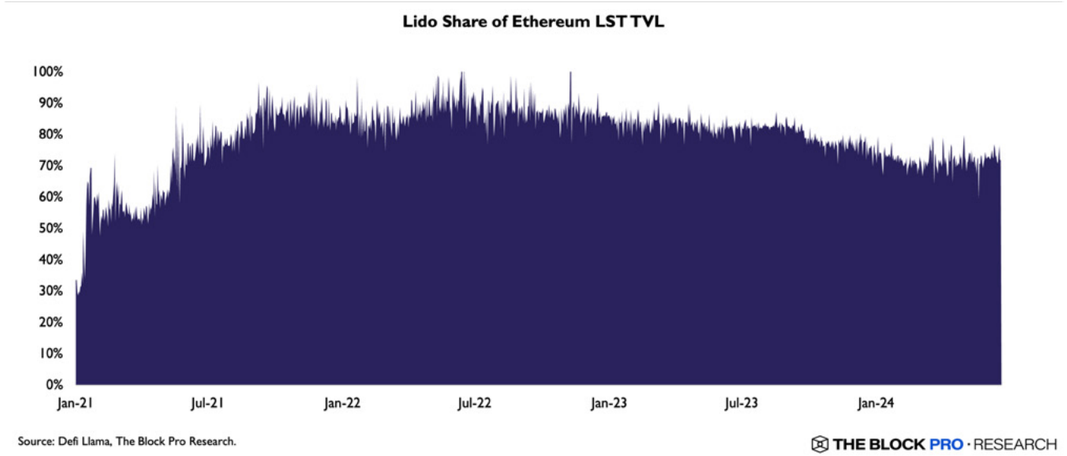
Most of the DeFi landscape today has not become established as a direct product of disastrous events as in the case of the stablecoin sector, but it is apparent when analyzing the distribution of capital and user activity that crypto markets have been relatively efficient at coalescing around market leaders when they are able to tap into user needs and provide distinct advantages over their competitors. A clear example of this phenomenon is the steady rise of liquid-staking token (LST) protocols in recent years. LST protocols essentially tokenize natively staked assets such as ETH or SOL so that they can be transferred, traded, or otherwise utilized in various on-chain apps. This allows users to retain access to native staking yields without being bound by network unstaking parameters while also gaining the ability to access additional yield and leverage through DeFi.

The adoption of liquid-staking has been so dramatic that LSTs now represent the largest category of DeFi protocols by a long shot, boasting over $53 billion in TVL as of this writing, which is ~55% larger than lending protocol TVL overall. One of the most notable aspects of this growth is the fact that Ethereum accounts for ~87% of LST TVL, followed by Solana with ~6% of TVL. To a large extent, this dominance by Ethereum, and to a lesser extent, by Solana, is a reflection of strong user demand for access to the native staking yields of the two L1 networks. It is also partly a reflection of the overall vibrancy of each network's respective DeFi app ecosystems, which impart additional utility for LSTs and create an opportunity cost for vanilla, non-liquid staking.

Perhaps the most interesting aspect of the LST market from an application perspective is the fact that Lido holds an overwhelming lead over its competitors on Ethereum, with ~73% of the TVL among Ethereum LST protocols. In fact, Lido has been the dominant LST protocol for over 3 years, maintaining its firm grip on the market in spite of the emergence of new challengers over time.

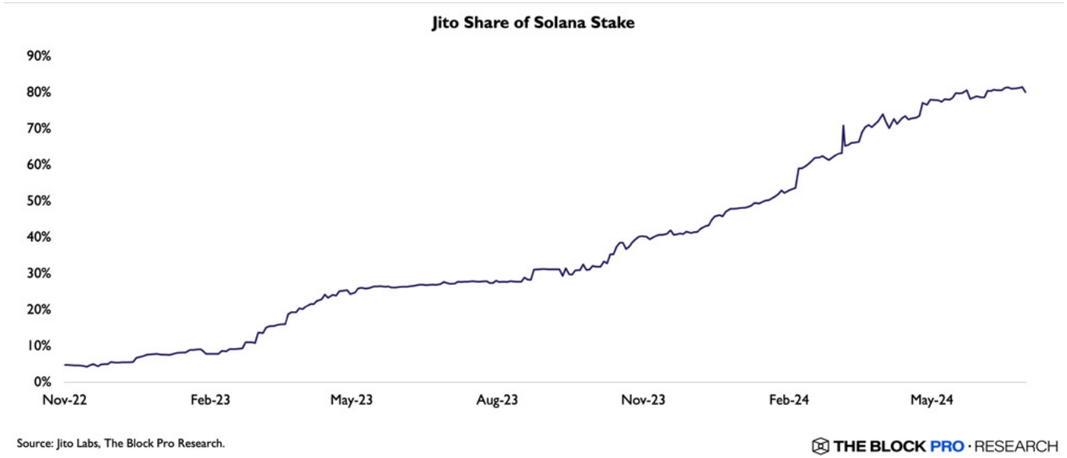







On some level, Lido's success over the years is a product of its first-mover advantage as one of the earliest LST protocols on the market, which allowed it to accumulate a significant amount of TVL before competitors had a chance to establish a foothold. Earlier, we discussed how liquidity in DEXs and lending protocols can become self-reinforcing, offering users increasingly greater value as they scale. This is especially true for LST protocols, wherein the LSTs (e.g., stETH) can only truly be considered liquid to the extent that they can be redeemed quickly and at low cost. Lido's long-running dominance has, therefore, allowed it to establish significant liquidity for its products across a wide variety of DeFi markets, both on Ethereum and on other chains.

Of course, being first to market and growing liquidity are not the only reasons for Lido's continued dominance. The protocol has also been quick to adapt to the changing environment of Ethereum's on-chain activity over time, opting early on to integrate the MEV-boost relay software, developed by maximal extractable value (MEV) research organization Flashbots, for all of its validators. As MEV activity grew rapidly alongside on-chain activity in recent years, Lido validators running MEV-boost were able to offer higher relative yields for stETH users compared to competitors. On Solana, the leading LST protocol today, Jito, was able to employ a similar strategy in its rise to dominance despite early leads from first-movers Marinade and Lido.




Jito's most important product to date has been the Jito client, developed as an alternative to the default client released by Solana Labs. With the Jito client, validators were able to capture a portion of MEV activity on Solana in the form of validator tips from MEV searchers, part of which were then passed on to jitoSOL holders. Today, the Jito client is by far the most widely used Solana client, commanding over 80% of the network's total stake. For both Lido and Jito, a key part of their success within their respective ecosystems has clearly been their ability to leverage deep technical knowledge of their underlying blockchains, including the shifting trends in on-chain user activity over time.

In this report thus far, we have taken a deep dive into the rise of DeFi in crypto, breaking down some of the key factors - such as the progressive tokenization of value on chain - that allowed early apps to meet and even create new user demand. DeFi protocols were among the first and certainly most prominent consumer apps in crypto to achieve PMF, and have continued to refine this process over time. We have also seen how the overall DeFi landscape has become increasingly dominated by the leading protocols in each category, which have been able to leverage the state of their underlying blockchains to achieve competitive advantages and better address user needs for their specific products.

However, longevity remains one of the most stubborn challenges for crypto projects today. Those that manage to avoid security failures face endless competition for users, attention, and capital. Even projects





that are able to establish a competitive moat against all odds, can still become vulnerable to newer tech and faster competition in a surprisingly short amount of time. And despite remarkable success stories within the crypto industry, no apps have been able to achieve mainstream adoption thus far. In Part 3 of this report, we will discuss the ways in which emerging consumer apps can learn from the problems of the past, and thus adapt to overcome the biggest problems with DeFi protocols today as they attempt to break through to larger audiences than ever before.

# PART 3
# EMERGENCE OF NEW CONSUMER APPLICATIONS AND THE BATTLE FOR SOCIAL CAPITAL





One of the key themes underlying much of the discussion in this report is that the world of on-chain app development is intensely competitive. In the early days of DeFi, when there were very few apps to begin with, each new app with novel features could reasonably unlock enough marginal value for users to attract attention, liquidity, and even outside investments. Over time, aided by easy access to open-source code, developers have become increasingly efficient at forking projects and adding incremental improvements, splintering attention and capital in the process. In some ways, this has been beneficial to end consumers, who have been able to enjoy the benefits of continually optimized financial tech, but the marginal utility of each successive Uniswap fork begins to decrease rather quickly.

Users who actively seek the marginal benefits of apps that aim to maximize on-chain yields or capital efficiency also take on increasing risks for doing so. A recent example of this is the March 2024 exploit of Prisma Finance, a decentralized stablecoin protocol backed by LSTs and liquid-restaking tokens (LRTs) that sought to provide users with additional leverage on top of assets already locked in 1-2 layers of 3rd party smart contracts, ultimately failing to prevent a $12 million loss due to its own flawed smart contract logic. In many cases, users eventually become overwhelmed by the sheer number of possible apps to choose from or distrustful of on-chain apps overall. This dynamic poses a serious problem for app developers, who ultimately rely on sustained attention, user loyalty, and liquidity to continue providing value through their protocols (e.g., better rates for lenders/borrowers and traders, higher yield for LPs). Even more problematic is the fact that reduced attention and user activity generally have a negative impact on protocol token prices, which reduces protocol revenue and lowers the probability of further development.

As some of the first consumer-friendly apps to leverage smart contract platforms in order to create new value, DeFi protocols have helped shift the way that crypto users think about and interact with blockchains today. However, as DeFi has grown increasingly efficient and competitive over time, it has also become harder for existing users - much less everyday people - to find significant, sustainable value when interacting with DeFi apps. As we start to think about ways in which crypto apps, including DeFi, can shift to develop more mass appealing, it is important to reconsider some of the default assumptions of DeFi that may have limited its spread to wider audiences thus far. First, let's take a look at the functional but imperfect token mechanics common to most DeFi protocols, which ultimately represent one of the biggest barriers to broader on-chain consumer app adoption today.

## LIMITS OF DECENTRALIZED OWNERSHIP

One of the most exciting parts of the original DeFi vision was the idea that users could essentially become shared owners of decentralized, revenue-generating businesses on chain. To some extent, this vision has been realized, as DeFi users now have the ability to earn fees directly from other users via lending or LPing. However, protocol token holders to this day typically receive no direct benefit in the form of protocol-generated revenue.

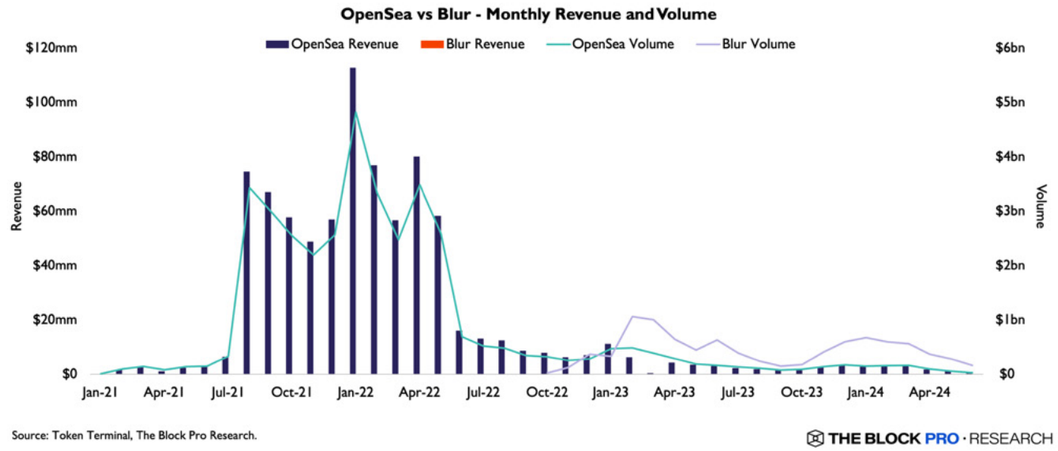
The reason for this failure to deliver largely comes down to stringent U.S. regulations and the SEC's broad interpretation with respect to securities. Fee-sharing tokens would likely be considered to be unregistered securities in the eyes of the SEC, and thus, DeFi tokens have historically been designed simply as "governance tokens" that give holders a vote in directing protocol treasuries and future roadmaps. This, of course, severely limits the fundamental value of DeFi tokens in general and eliminates a critical reason for users to buy or hold them, leading to poor asset performance over time.

Some protocols have made efforts to work around this limitation by enacting mechanisms where protocol fees are used to buy governance tokens off the market and distribute them to stakers (e.g., Sushiswap), but this ultimately siphons revenue from either the protocol treasury, LPs, or both. The reality of this regulation-induced situation is that protocol fees across the industry have naturally trended towards zero in an effort to remain competitive, with teams generating funding only by selling governance tokens on the open market or to private investors. There are some exceptions to this zero-revenue design, such as the Aave lending protocol, whose dominance in the market has allowed it to continue charging small fees for loan originations and flash loans, but the overall market environment remains effectively capped by this competitive stalemate nonetheless. In other words, most teams building on-chain apps are essentially forced to keep protocol fees low or at zero to remain competitive while also being incentivized to inflate their token prices despite a lack of value accrual.

As one can imagine, these are not exactly the best ingredients for building and growing on-chain consumer apps ready for mass adoption. Such a task is usually dependent on growing revenue as a function of increasing user activity rather than focusing solely on enticing new token buyers or attracting activity through unsustainable incentives. Nevertheless, on-chain consumer app developers will need to contend with the realities of competition in crypto today, even if regulations were to change overnight.








Source: Token Terminal, The Block Pro Research.

THE BLOCK PRO · RESEARCH

For one, it is not automatically guaranteed that all protocols will turn on revenue-sharing for stakeholders (a.k.a. fee switch) in the event of favorable regulatory rulings. Tokens have become a popular way to speculate on the future success of both apps and blockchains throughout the years, whether they include built-in utility that extends beyond governance or not. In the current environment, tokens are also often used extensively as incentives, which remain powerful drivers of user behavior, even if their effects only endure over a short period of time. As such, hypothetically, teams that choose to increase protocol fees relative to their competitors would likely face a legitimate risk of losing market share for the sake of increasing their revenue. In fact, we have seen a similar situation play out in the recent past with the NFT marketplaces OpenSea and Blur.

Since its launch in October 2022, Blur has maintained a 0% fee for NFT trades on its platform, compared to OpenSea's 2.5% fee. At the same time, Blur has continued to offer token incentives for bids on NFTs and a fully optional royalty fee on sales while releasing new features like NFT lending. The impact of this strategy on the NFT market - and OpenSea's market share - has been profound. Despite OpenSea's attempts to remain competitive by eliminating royalty fees (while still maintaining its platform fee) in August 2023, Blur has effectively taken over NFT trading volume on Ethereum, outpacing OpenSea every month since the beginning of 2023. This has resulted in significant declines in OpenSea's monthly revenues while Blur continues to maintain no revenue aside from its own token emissions. Clearly, the negative impacts of

weak fee positioning can be dramatic, potentially leading to long-term uncertainty even after a course correction down the line.

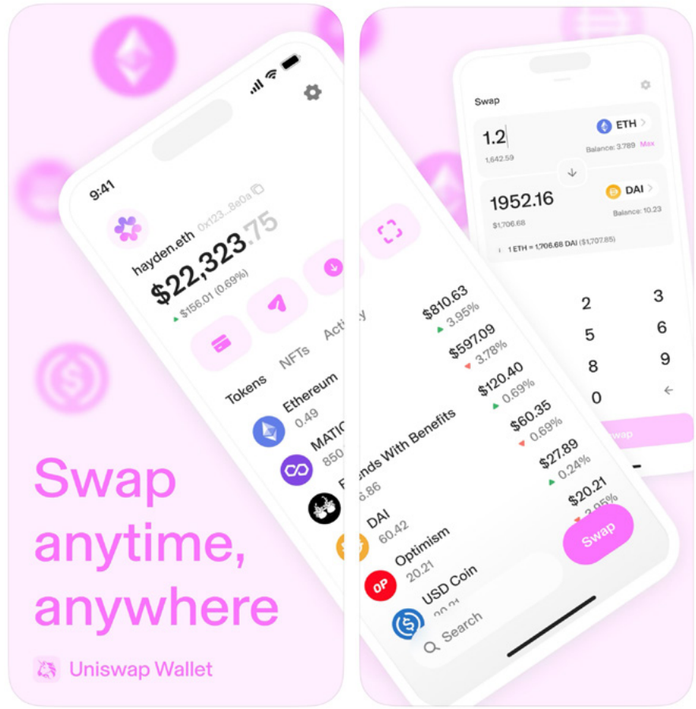
In light of this example of a successfully executed market takeover, it is worth reconsidering the notion that revenue-sharing is always a positive factor in terms of developing and growing on-chain consumer apps. An alternative interpretation is that protocol fee-shares are essentially a form of financial incentive for stakeholders at the potential cost of actual users. One of the tangible results of Blur's battle with OpenSea was that NFT traders quickly adopted Blur as their preferred platform, even if only due to the lower fees and incentives. Based on the volume comparison chart above, these traders likely maintained this thinking over the course of months or even years, during which they were continuously exposed to Blur's unique UX, feature updates, marketing promos, and more. Though it may still be too early to tell, it is not unreasonable to think that many former OpenSea users who spent an extended period of time using Blur initially for rewards may have eventually grown familiar with or even loyal to the new platform offering an alternative to OpenSea's former monopoly. Loyalty, it turns out, might just be one of the key pieces to unlocking the next generation of on-chain consumer apps.

## BUILDING LOYALTY AND SOCIAL CAPITAL

Traditionally, DeFi protocols have focused on acquiring users primarily through the lens of direct financial incentives, with the idea being that users would eventually grow accustomed and loyal to a particular platform over time. This has turned out to be untrue for the most part, as DeFi users have largely become synonymous with "mercenary capital," moving from protocol to protocol in the pursuit of airdrops and other incentives. One of the underlying narratives in the battle between Blur and OpenSea was the idea that users were collectively taking back ownership of their right to trade NFTs freely, which had been stifled by OpenSea's high fees and tight grip on the market. OpenSea, with its traditional, token-less corporate structure and unrelenting stance on its platform fee, thus began to appear as a villain compared to the fee-less, token-giving Blur.

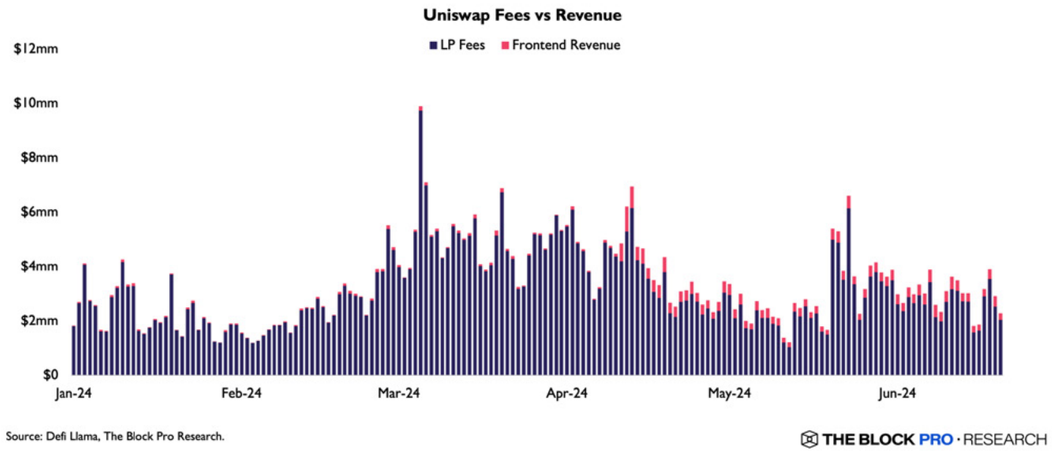
This dynamic is one of the key takeaways from the Blur vs. Opensea saga, as it represents a rare case where crypto users largely found common ground against a shared adversary - on top of clear financial incentives of course. Recently, it appears that even large DeFi incumbents are becoming privy to the value of cultivating loyalty and community. Over the past year and a half, the Uniswap Labs team has made a number of strategic moves that point to an overarching goal of reaching new users outside of DeFi.

For instance, Uniswap Labs announced the launch of its own NFT marketplace in November 2022 after it acquired the Genie NFT aggregator several months prior. In December 2022, the team introduced the ability for users to purchase crypto on Uniswap directly with a credit card or bank account. In April 2023, the team took another major step into existing Web2 channels with the launch of its mobile wallet on iOS, followed by support for Android in November 2023. All of these decisions represent a deliberate effort to simplify the onboarding experience for new crypto users, and to establish trust and familiarity with Uniswap products.



In 2024, the Uniswap Labs team has been even more aggressive with its push into consumer crypto, launching Uniswap branded (uni.eth) ENS subdomains for wallet users, early access to a new Uniswap browser extension, and integrations with both Robinhood and Coinbase in its mobile app. One of the most interesting moves by Uniswap Labs came in June with the acquisition of Crypto: The Game, a team-based, on-chain survival game that further underscores the team's desire to draw new participants into DeFi without necessarily realizing the leap they've made. It also hints at a new strategy of introducing a social component to the Uniswap experience, complementing its introduction of Web3 usernames in the Uniswap wallet.

As a whole, Uniswap Labs' emerging strategy in terms of consumer crypto provides a glimpse into what existing DeFi protocols might look like in a world with a far larger user base. This means less of a focus on financial incentives and fee generation and more of a focus on social networks. David Phelps, co-founder of the on-chain contest platform JokeRace, recently explained, "One of the great lessons of Web2 was that the most important frontend driver is user networks. You go to a site because other users are there to find—and to find you. Just as financial liquidity matters for bootstrapping a protocol, user liquidity matters for bootstrapping a frontend." Indeed, one of the ways that Uniswap Labs has begun to generate revenue, even without protocol fees, is through fees charged on swaps through its frontend, which were first introduced in October 2023 at a rate of 0.15% per swap and recently hiked to 0.25% per swap in May.



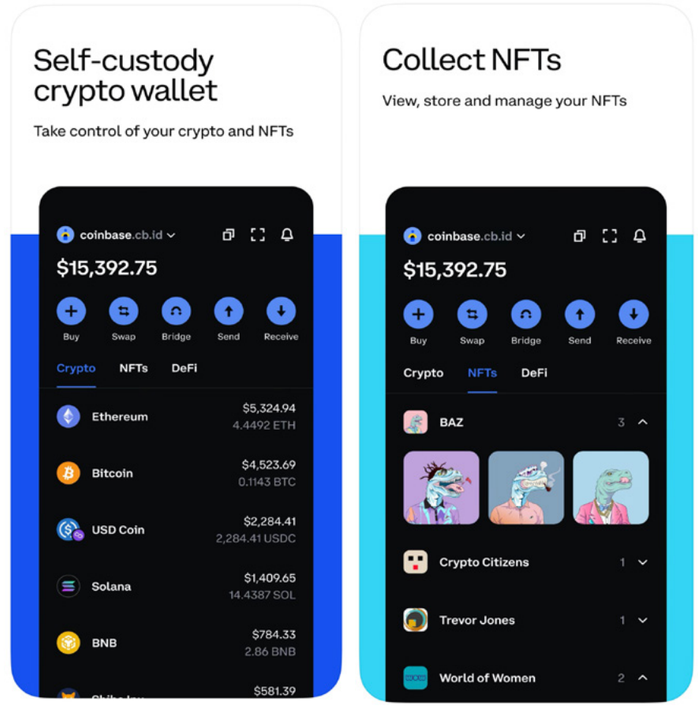

Source: Defi Llama, The Block Pro Research.

THE BLOCK PRO · RESEARCH





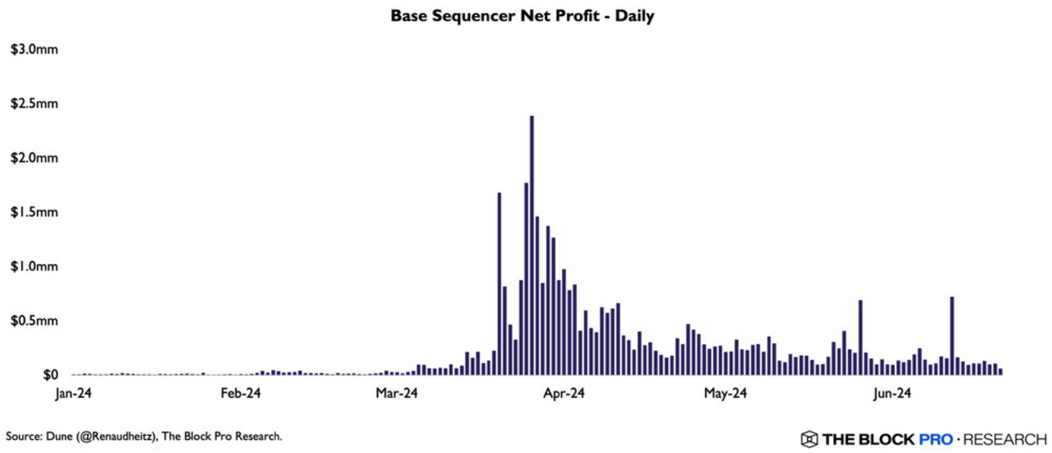
Uniswap Labs' revenues have jumped considerably since introducing their rate hike in April, from a total of ~$5.4 million in Q1 to ~$26.5 million in Q2 thus far. For such recent changes, these metrics are especially impressive when considering that Uniswap LPs have made a total of ~$245.4 million in Q2 thus far, which means that the frontend alone is now generating ~10.8% of fees generated by LPs. This income is even more astonishing given that users could carry out the same swap via another frontend (for example via a DEX aggregator such as 1inch), that uses the same Uniswap smart contracts under the hood. This percentage is on the low end of possible fees that could be implemented with a protocol fee switch, according to a surprise proposal introduced by the Uniswap Foundation in February. Still, it represents a significant source of revenue for a seemingly minor adjustment and highlights the potential for a radically different revenue model compared to years past, especially with continued user and loyalty growth.



In many ways, Uniswap's approach to transitioning into an on-chain consumer app is comparable to that of another industry incumbent: Coinbase. Despite operating a centralized exchange (CEX) in a more traditional structure compared to Uniswap's DEX, it would appear that the two entities have a shared interest in onboarding significantly more users into crypto through on-chain consumer apps. In early June, Coinbase introduced its updated self-custodial Coinbase Wallet with "smart wallet" features.

With a similar look and feel to the Uniswap wallet - as well as other Web2 finance apps - it is clear that Coinbase is hoping to make the process of onboarding new users into Web3 more seamless and less confusing than with older standalone wallets like Metamask. One of its unique features is its built-in support for a wide variety of blockchains, with emphasized support for Coinbase's own Base chain. The addition of features like gas-less transactions on Base and NFT marketplace support is effectively a way to abstract away many of the typical complexities of transacting on-chain for new users.

Both Uniswap and Coinbase have strong reasons for bringing more users on-chain; Uniswap earns revenue from swap fees on its DEX, and Coinbase earns revenue from fees generated by the rollup sequencer it operates for Base.




In Q2 thus far, Coinbase's sequencer has generated a net profit of ~$22.9 million, which is relatively similar to Uniswap's frontend revenue over the same period. It is interesting to note that Uniswap and Coinbase's respective visions for on-chain consumer apps are so similar, given their different backgrounds from an organizational standpoint. However, this confluence provides evidence that both teams have identified common pain points for end users that may unlock far more on-chain participants if solved effectively. In a recent discussion with The Block Pro Research, Jesse Pollak, the creator of Base, explained:

> *"The thing that I'm really excited about and think we need to solve is building better wallet experiences that just work for everyday people. You don't have to sit down your friend who you onboard to crypto and give them the talk: 'Don't mess it up. If you mess it up, you're going to lose everything.' That's just not a sustainable way to onboard people to crypto. We need it to be as easy as setting up your Facebook account or as trustworthy as your bank account."*

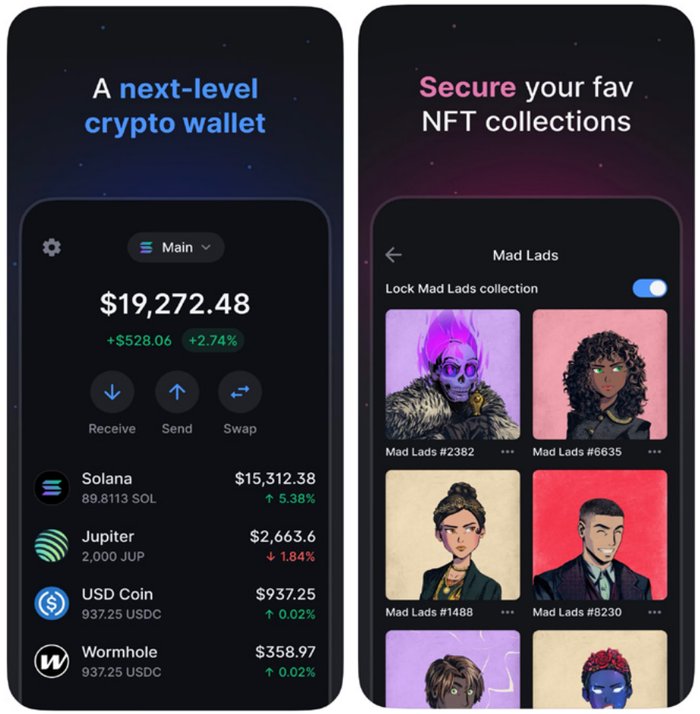
One of the themes that is becoming apparent in our discussion on on-chain consumer apps is the fact that infrastructure tools such as wallets will also play a big role in the future of user-blockchain interactions. In fact, from just the examples we've seen so far, it is possible that on-chain transactions will be nearly indistinguishable from typical Web2 actions in-app, especially given that many standard DeFi actions such as swapping and lending can already be performed in the wallets mentioned above. The Solana Saga phones, developed by Solana Labs, take these concepts of seamless integration with Web2 a level deeper, essentially offering a Web3-native mobile device with a familiar software UX.

Aside from the ability to provide UX improvements in Web3 interactions, crypto wallets can also serve as a powerful tool for protecting users from some of the security risks in DeFi discussed earlier in this report. While wallets are not yet at the point of conducting full smart contract audits, some tools like the Rabby wallet already offer helpful features like automatic transaction simulations to warn users of potentially malicious interactions on-chain. Built-in secure enclaves like the "seed vault" in Solana Saga phones also offer another layer of security for users whose devices themselves have been compromised.

From a high level, the product suites emerging from Uniswap and Coinbase today can be roughly described as all-in-one experiences, with the intent of unifying multiple crypto sectors into a single interface. Armani Ferrante, founder of the Backpack exchange and wallet, recently described his vision for enabling consumer crypto:

> *"Backpack is your financial super app for crypto. Anything you want to do in crypto can be done inside of Backpack. It's designed to be the easiest way to buy crypto, use any blockchain, and utilize any financial instruments in this new frontier. Having both the exchange and the wallet lets us create seamless experiences. For example, users can trade on the exchange, then use the Backpack wallet to explore on-chain products like NFTs and decentralized applications."*

Today, this idea of a "super app" appears to be one of the most likely paths for the future of the space. Ferrante's Backpack products mirror Coinbase's current offerings in the sense that they allow users to move from fiat, to crypto on a CEX, to on-chain, through a single unified brand.




The Backpack team's vision of fully unifying crypto's multi-faceted experiences is best exemplified by their support for executable NFTs (xNFTs), a new asset standard they pioneered themselves. On top of serving as standard, tradable NFTs, xNFTs are also able to execute code, which allows applications and experiences to be run directly within an NFT, effectively blurring the boundary between assets and applications to an extent that is rarely seen elsewhere in crypto today. This integration of xNFTs and the communities behind them is also a sign of Backpack's emphasis on social experiences and loyalty as well, taking a step further beyond the Web3 IDs featured in both the Uniswap and Coinbase wallets. Recently, Ferrante commented on the key role that Mad Lads, the first xNFT collection, have played in Backpack's development:

> *"The Mad Lads mint experience was unique. We built games into the wallet that users had to play to earn a whitelist spot for minting the NFT. It wasn't just about hype; it was about creating something engaging and different. Mad Lads has grown into its own community, which is invaluable for us. They actively try our products, give feedback, and help spread the word. This community aspect has been crucial to our success."*

In recent years, it has become clear that many of the developers striving to actualize the next generation of on-chain consumer apps are placing significant weight on the value of social communities over more traditional DeFi approaches that center around financial incentivization. NFT projects and their communities are at the forefront of this new way of thinking, with more and more crypto protocols starting to realize the value that these tightly-knit, vocal communities can provide in terms of evangelizing new technologies or applications.

Notably, the Nim network airdrop in March specifically targeted holders of the Pudgy Penguins NFT collection as an acknowledgement of the community's active participation in Web3 social circles. In June, the LayerZero team cited similar reasons for allocating tokens to the Pudgy community, emphasizing their key role in growing the brand. In recent conversations with The Block Pro Research, Pudgy Penguins CEO Luca Netz described the future of consumer apps that brands like Pudgy are helping bring to fruition:

> *"Consumer crypto is changing the game by making blockchain the backbone of our interactions. Instead of just being about fees and revenue, projects are moving to blockchain because of what it can actually do. It's driving market participation by connecting different ecosystems through blockchain. This shift will decentralize organizations, capturing the attention and engagement of users in a way we've never seen before."*

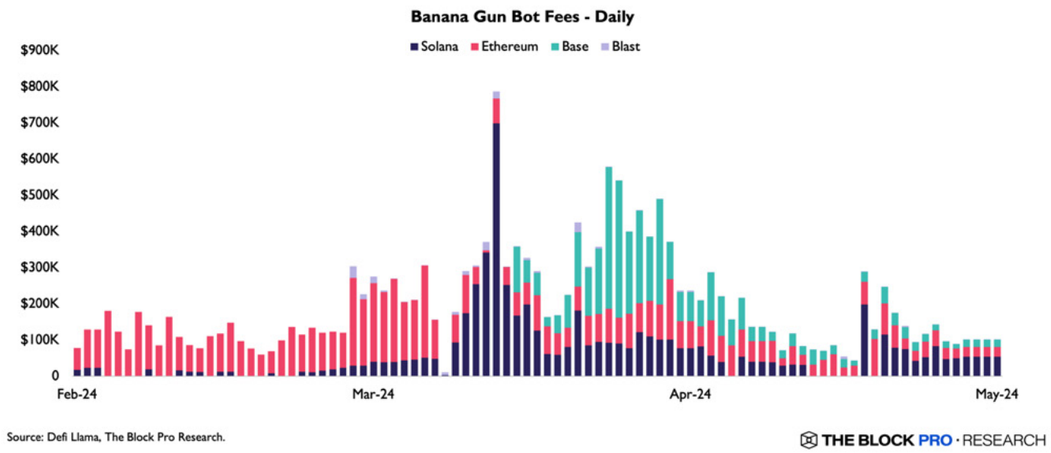
If there is one thing that appears to unite many of the teams and communities pushing for consumer apps today, it is that user interactions and engagement patterns on the blockchain are bound to change in a fundamental way. In the following sub-section, we take a closer look at the different ways that on-chain consumer apps are aiming to redefine user experiences and the way that blockchains are used.

## MAKE INSANELY GREAT PRODUCTS

Throughout the history of crypto, one of the key driving forces of innovation and user participation has been the belief that blockchain technology can create new value beyond what is available in existing industries, whether it be finance, the internet / Web2, or even art. In this report, we saw how the sudden rise of DeFi protocols ushered in a wave of new financial tools that were often more efficient and accessible than their traditional counterparts. In recent years, NFTs also leveraged the newly crafted tools made available through DeFi to redefine concepts of digital value, ownership, and identity. Today, as DeFi protocols and NFT communities are starting to come to terms with the limitations of some of their original ideas, more and more app developers are starting to consider the ways that blockchains can harness existing Web2 technologies to once again bring new forms of value on-chain.

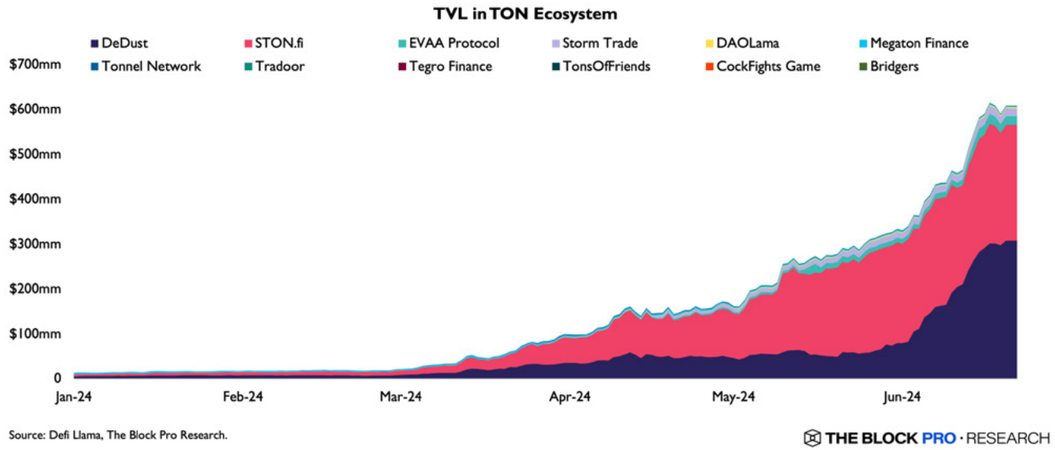
In some cases, Web2 organizations are coming to meet Web3 halfway in recognition of the latent potential between the two technology sectors. One of the most noteworthy areas of growth this year has been the TON ecosystem, developed by the company behind the popular Telegram messaging app. Telegram has long been one of the most widely used tools in the crypto community, and the integration of the underlying technologies has manifested itself in novel ways over the past year. In particular, we have seen the rise of Telegram-based trading tools such as Unibot, Maestro, and Banana Gun, which have enabled users to transact on the blockchain via smart contracts in a far more seamless manner than ever before.

This relatively major shift in user behavior has not been entirely without adversity. For instance, in October 2023, Unibot was exploited for a sum of ~$580K, with many new crypto users unaware of the risks of having their private keys managed by a 3rd party system like Unibot. Even still, the introduction of trading bots on Telegram has introduced a fresh dynamic in on-chain markets, giving users access to tools like private RPCs, token snipers, wallet trackers, and more that were previously only available to a handful of technically savvy market participants. Maestro and Banana Gun have continued to see steady usage throughout the year following the decline of Unibot, demonstrating the potential for a new class of on-chain consumer apps capable of generating consistent revenue.




These apps once again provide confirmation that a focus on delivering simple, easy-to-use UX can make a major difference in consumer adoption, even without the use of direct financial incentives. Another interesting aspect of Banana Gun's continued relevance is the fact that it has not remained bound to any particular blockchain, in part because the value it offers to users does not increase by isolating itself in one ecosystem. Rather, the team has been quick to gauge the demands of their users, following them to new chains wherever volume and capital flow. This strategy is a major part of the reason it has been able to maintain consistent revenue over time, serving users on Solana, Ethereum, and Base without hesitation. For other on-chain consumer apps in development, this outcome is an important reminder that understanding user demands and behavior is paramount in determining what blockchains to build on.

Apart from these bots that do not actually utilize the TON blockchain, the TON ecosystem itself has seen significant gains in TVL in 2024, from only ~$13.8 million at the start of the year to ~$608 million as of this writing. As is the case in most new ecosystems, the large majority of TVL is concentrated between two DEXs, but this will likely shift as new developers enter and the ecosystem starts to mature.




It is important to note that these TVL metrics do not fully account for the range of TON-native apps that may already be providing a service to users without acquiring TVL in the traditional DeFi sense. Compared to most blockchain app ecosystems today, one of the most unique aspects about TON is the fact that it stands to benefit from its existing user base of ~900 million users who have likely already developed some level of loyalty and trust in the Telegram brand.

Increasingly, developers and investors are seeking to harness the benefits of this type of funnel, as it can be a powerful tool for reaching a significantly larger user base. For example, two of the most popular on-chain social media apps in the past year, Farcaster and Friendtech, were built exclusively on Base in order to capitalize on Coinbase's existing customers. Base's Jesse Pollak explains:

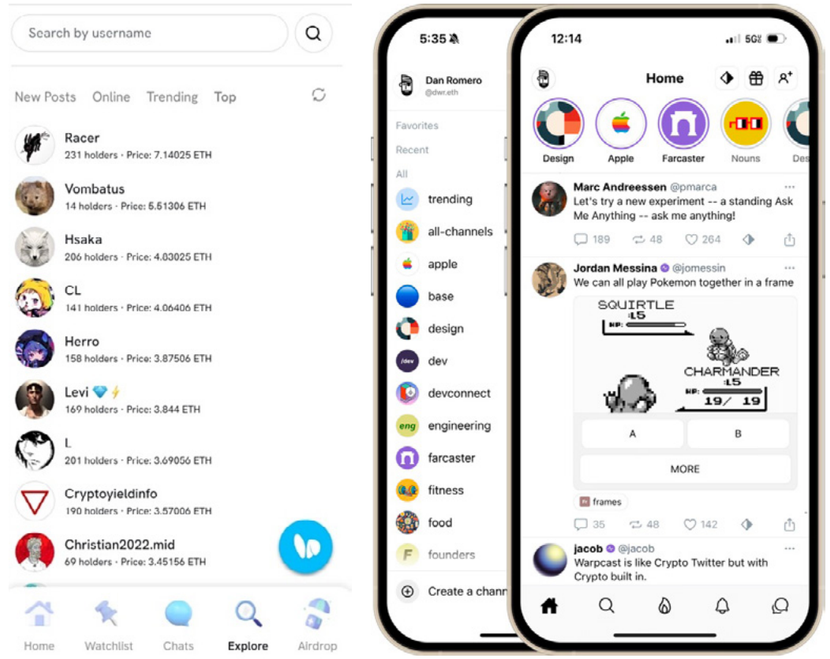
> *"The things that we hear pretty consistently from developers are like: if I build on this platform, how is it going to help me reach more users? I think Base has really shined there. People are building on Base; they're reaching more users than anyone, both through Coinbase products and through the scale of the Base ecosystem."*

These factors are compelling for aspiring on-chain social media apps looking to bootstrap network effects, especially considering Coinbase's apparent interest in getting users on chain, and increasing social interactions as we discussed above. The two teams have taken markedly different approaches to app

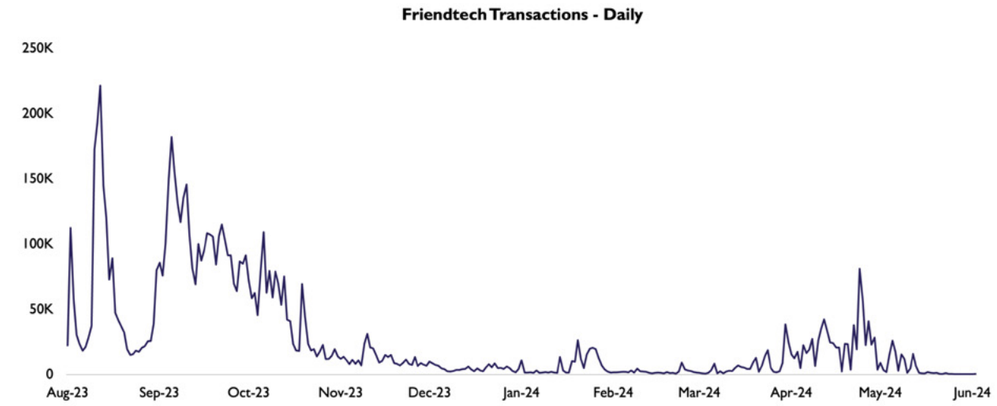




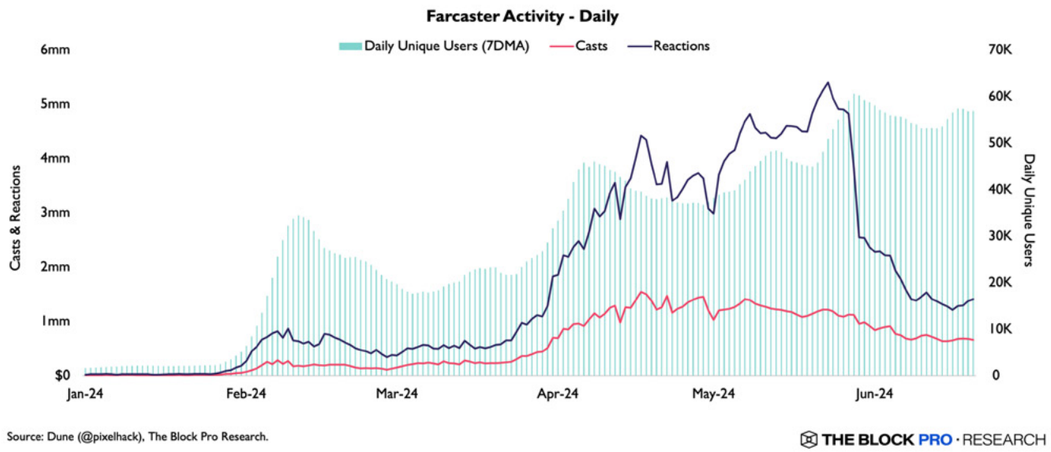
design, both in terms of UX and in-app economics, which have had a dramatic impact in terms of their usage patterns over time.




Friendtech (left) designed its app with a focus on the buying and selling of "keys," which users could use to access chat rooms for various social media personalities. Popular users were featured prominently on a leaderboard with the price of their keys in order to project market value, with the app enforcing a 20% spread between buys and sells, and fees split between the app and creators. The app also clearly featured an upcoming airdrop with weekly points updates, and utilized color schemes and branding similar to OnlyFans. Meanwhile, Farcaster (right) took heavy inspiration from X (formerly Twitter) for its overall design, mostly prioritizing organic user interactions without a clear economic component, as well as the usage of interactive mini applications called "frames," designed by the team.




Friendtech initially saw a surge in daily transactions following its launch in the summer of 2023, trading activity began to decline sharply into the end of the year. With limited ability to interact with other users on the platform without purchasing keys, daily activity remained muted until Friendtech's airdrop launch in early May, which induced a sharp spike and subsequent drop in daily transactions. On the other hand, Farcaster has seen steady growth in daily active users in 2024, rising steadily alongside user-triggered casts and reactions on the app.








Thus far, Farcaster has not seen a sharp decline in its number of daily users, which highlights the differences in behavioral outcomes between Farcaster's non-incentivized, interaction-centric approach and Friendtech's speculation-centric approach. Friendtech's strategy of driving app usage with the promise of a potential airdrop was ineffective for most of the year, and led to an even stronger dropoff in activity following its token launch. It is worth noting that at least some activity on Farcaster still appears to have been speculative, as the app saw a sharp decline in casts and reactions immediately following the announcement of a $150 million fundraising round in May, which presumably convinced users that an airdrop was less likely to occur in the future. Still, Farcaster has been able to maintain a steady number of active users since the announcement, which is a testament to the quality of user experience it has been able to create.

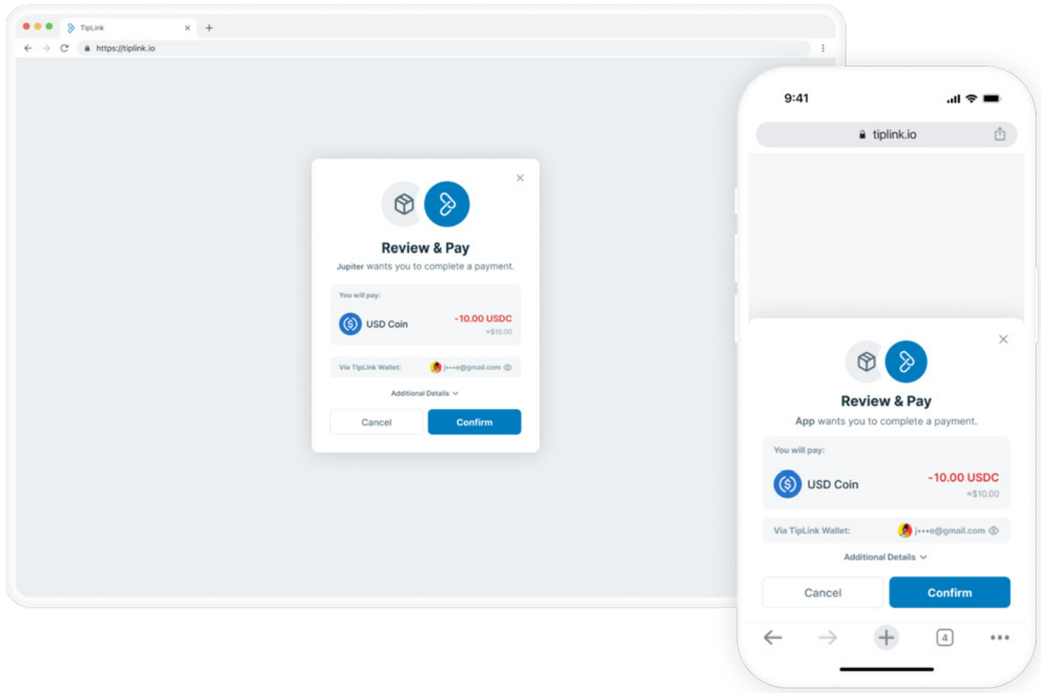
Another key takeaway from Farcaster's traction this year is the benefit of recreating a familiar Web2 interface in terms of educating users on the unique features of Web3 and thus building brand loyalty. This tactic is similar to the ones employed in products by other consumer-focused teams mentioned today, such as Uniswap, Coinbase, and Backpack's UX-friendly wallets. Andreas Nicolos, the CEO of content monetization platform Access Protocol, shares a similar perspective, commenting recently:

> *"The value prop of Web3 is just way better... It's more that the user experience is drastically worse versus Web2, and that's where I think most people and companies are lagging, ourselves included. Web2 obviously nailed the initial consumer interaction experience, but where they massively fail and where crypto over-delivers is the post-sale consumer experience."*

One of the ways that Access Protocol aims to attract a wider audience compared to typical DeFi apps is by abstracting away as many of the crypto interactions as possible within its app. To do this, it plans to integrate the TipLink wallet adapter for Solana apps, which essentially eliminates the need for new crypto users to download a wallet and follow the typical onboarding process.

> *"The ideal flow on these larger sites is login via TipLink on Gmail, one click to create your account, no having to download an application and interact with it there, and then just on-ramp via credit card and automatically swap your fiat into what is a staked access subscription."*

The core idea behind this decision - and one of the main benefits of TipLink's middleware - is that new users are able to completely bypass many parts of the onboarding process that might create confusion or




fear. As a result, the key value proposition afforded by blockchain technology within a consumer app can shine much more clearly.

One of the most ambitious projects in Web3 today that abides by this approach is Parallel, a digital trading card game that utilizes fungible tokens for in-game rewards and non-fungible tokens to enable user ownership of in-game assets. The Parallel team has made the deliberate choice to make crypto usage completely optional within the free-to-play game, only introducing it once new players have been familiarized with the basic gameplay aspects. The core belief behind this decision is that Parallel must compete with the true incumbents of the gaming industry, rather than other projects in crypto. Fitch, the Head of Partnerships at Parallel, recently explained to The Block Pro Research:





> *"Our competition is not Web3 TCGs. Our real competition is Hearthstone, Magic Arena, or Marvel Snap. By creating a game that has a completely non-blockchain oriented playing path, we aim to attract regular TCG players and use blockchain to enhance their experience."*

Similar to what other consumer app builders like Andreas have echoed, Fitch believes that the best way to inform users about the benefits of blockchains is to first build a great product that can stand even without crypto. Then, the subsequent introduction of on-chain technology and its benefits become much more compelling. In his words:

> *"It's about creating a UX that's easy for people to get in and play without blockchain, and then showing them the benefits of blockchain integration. The core idea of what web3 gaming does for gamers is a good idea. It's about making games value-neutral or value-positive, rather than extractive."*

One of the more unique aspects of Parallel's blockchain integration is the fact that it has decided to deploy assets and build across multiple chains. Fitch explains:

> *"We started on Ethereum because, at the time, it was the place to start, and we remain the number one traded gaming product on OpenSea for our main collection. However, the economic realities of being on Ethereum Mainnet became more apparent, leading us to expand to Base, which is an obvious strategic choice as an extension of Ethereum. We've also considered putting higher volume stuff and successive releases on Base, and it's plausible that we might move all of it to Base at some point. For the volume and type of transactions in Colony, it makes sense to put Colony on Solana. The choice of blockchain depends on the specific needs of the product, and we are committed to placing our products on the chains best suited for them."*

Parallel's main trading card game currently operates off-chain for its gameplay, and only utilizes the blockchain for interactions with in-game assets, but its upcoming Colony game that features autonomous AI avatars is expected to require a much higher volume of blockchain transactions. According to the Colony whitepaper, AI avatars in Colony will be continually performing various in-game actions throughout the day, and all of these transactions will be recorded onto Solana. Throughout our discussion of various teams building on-chain consumer apps in this report, it has been clear that the future of app development is trending toward a reality where users will not have to know on what blockchain they are transacting. This is expected to provide clear benefits for users, who will not need as much technical knowledge of

blockchains to enjoy their advantages as they do today. Developers would also benefit as they would be able to focus more on creating meaningful experiences and cultivating social capital.

At the same time, we are starting to see how different blockchain ecosystems can provide different types of value for builders, depending on their specific product or growth needs. Blockchains that come with the benefit of existing user communities like TON or Base may be attractive to developers looking to quickly establish user networks or to target specific product users, while blockchains that offer high performance and low fees may be attractive to developers building products that rely on high volume or real-time feedback.

In recent years, Solana has become a leading platform for decentralized physical infrastructurenetwork (dePIN) projects to build on, unlocking novel use cases like Hivemapper's decentralized mapping network or Helium's decentralized mobile network, but the biggest challenge for apps may be to create novel experiences that are fun and easy to participate in. As apps and UX become more relevant and blockchains - along with their supporting infrastructure - continue to improve, app developers thus face a difficult task. They will need to continue leveraging the properties of specific blockchains to remain competitive on performance and cost for their product-specific needs, while at the same time, they will also need to abstract away these technical integrations to the point where users can enjoy their apps and build loyal relationships. One thing is clear - the world of on-chain consumer app development today is becoming more complex and competitive than ever before, but the rewards for success will be immense.

# CONCLUSION



The evolution of on-chain consumer apps into their current state has been rapid and dramatic. In the beginning, these apps were based solely on the idea of tokenizing financial value on the blockchain, giving rise to the stablecoins that continue to serve a critical role in crypto today. Over time, DeFi emerged as the natural extension of this basic concept of tokenizing value, bringing newfound utility to users and the blockchains upon which protocols are built. In the process, DeFi protocols became some of the first on-chain consumer apps to achieve PMF, altering consumer behaviors and creating unprecedented levels of app-driven demand in the crypto industry.

As the DeFi sector has matured and grown increasingly competitive in recent years, some of the inherent risks and limitations of DeFi protocols as consumer apps have become apparent as well. Protocols today continue to be challenged by issues including security vulnerabilities borne out of design complexity, declining effectiveness of incentive schemes, fragmented liquidity, and limited user loyalty and adoption. In this report, we unpacked the various strategies that teams behind new and existing on-chain consumer apps are pursuing to address these challenges. One common thread is that improving UX is a core focus in many consumer apps today. By simplifying and abstracting away many of the complexities typical in crypto interactions, consumer apps stand a much better chance of educating and retaining new users, while also reducing the potential for risky user errors.

Looking to the future, the trajectory of on-chain consumer app development today suggests that the race to achieve mass adoption of crypto will only accelerate and become more competitive. App developers will likely continue to benefit from performance and UX enhancements attained by leveraging core blockchain technologies, and it will be important to strategically choose the blockchains that are most appropriate for specific products as well. For most teams, the ultimate goal will be to build lasting social capital and user loyalty. These tasks are complicated and certainly not easy to accomplish, but the most successful on-chain consumer apps of the future stand the greatest chance of reaching mass adoption and fundamentally reshaping the crypto landscape once more.

# DISCLOSURES

This report is sponsored by the Solana Foundation. The content of this report contains views and opinions expressed by The Block's analysts which are solely their own opinions, and do not necessarily reflect the opinions of The Block or the organization that commissioned the report. The Block's analysts may have holdings in the assets discussed in this report and this statement is to disclose any perceived conflict of interest. Please refer to The Block's Financial Disclosures page for author holdings.

Beginning in 2021, Michael McCaffrey, the former CEO and majority owner of The Block, took a series of loans from founder and former FTX and Alameda CEO Sam Bankman-Fried. McCaffrey resigned from the company in December 2022 after failing to disclose those transactions.

This report is for informational purposes only and should not be relied upon as a basis for investment decisions, nor is it offered or intended to be used as legal, tax, investment, financial or other advice. You should conduct your own research and consult independent counsel on the matters discussed within this report. Past performance of any asset is not indicative of future results.

The Block has a partnership with Access Protocol, a company mentioned in this report. This partnership does not influence the content or opinions expressed in this report, which are based on objective research and analysis by The Block's team. The Block maintains editorial independence and this report is not intended to be an endorsement of Access Protocol or its products and services. Readers should conduct their own due diligence and consider their individual circumstances before making any investment decisions or entering into any partnership or agreement with Access Protocol or any other company mentioned in this report. The Block does not accept any liability for any actions taken based on the information provided in this report.