



# *DeFi's Next Frontier*

Institutional Opportunities, Challenges,  
and the Path Forward

AN IN-DEPTH REPORT BY INTOTHEBLOCK & TRIDENT DIGITAL  
OCTOBER 2024

 **IntoTheBlock**  **Trident Digital**

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## ***Purpose of the Paper***

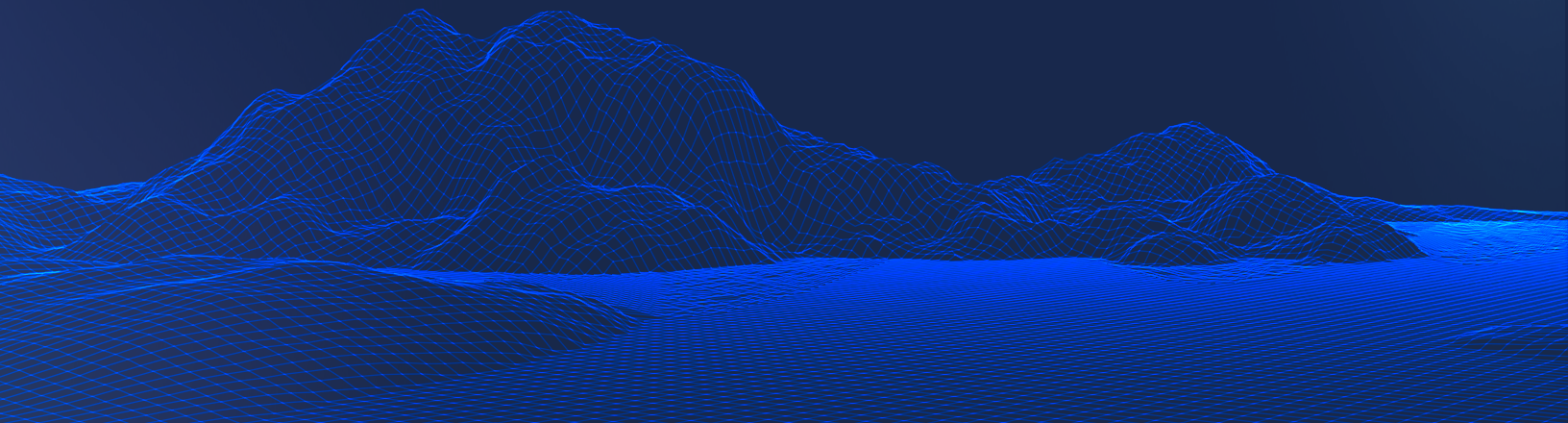
Decentralized Finance (DeFi) has quickly evolved from a niche innovation to a core component of the cryptocurrency landscape, increasingly making its presence felt within traditional financial markets. As DeFi advances, it's becoming evident that traditional finance stands to gain from these decentralized technologies, while DeFi itself can harness the stability and structure of traditional finance to enhance yield opportunities and improve resilience.

Rather than aiming to disrupt existing systems entirely, DeFi acts as a catalyst that strengthens traditional frameworks by reducing intermediaries and unlocking new channels for financial innovation. As DeFi's influence continues to expand, its growing synergy with traditional finance underscores the importance for institutions to grasp these developments and identify pathways for seamless integration.

This paper provides a comprehensive review of DeFi's evolution, its current landscape, emerging trends, and its trajectory for the future. By examining the unique opportunities and challenges DeFi presents, we aim to deliver a clear perspective on how DeFi can drive innovation in financial markets, equipping institutions with the essential knowledge to shape the future of finance and position themselves at the forefront of this transformation.

01

# *A Brief History and Evolution of DeFi*



**To fully grasp the potential and impact of DeFi, it's essential to understand its origins. DeFi's growth is deeply intertwined with the development of blockchain technology and smart contracts, which have revolutionized how financial transactions are conducted without intermediaries. By exploring the historical advancements that paved the way for DeFi, we can better appreciate its evolution and the innovative forces that continue to shape its future.**

DeFi's origins trace back to blockchain and smart contract technologies, building on advancements in cryptography and digital currencies. Bitcoin's creation in 2009 and Ethereum's launch in 2015 established the foundation for decentralized finance. Early innovations like MakerDAO, Uniswap, and automated market makers enabled DeFi's rapid growth, driving it into mainstream finance. Despite its success, DeFi faces ongoing challenges in scalability, regulation, and security.

## Background: Understanding DeFi's Foundations

The emergence of Decentralized Finance (DeFi) is inextricably linked to the development of blockchain technology and smart contracts. To understand the history of DeFi, it's crucial to first grasp these foundational concepts first.

Blockchain technology, introduced by Satoshi Nakamoto with the creation of Bitcoin in 2009, is a distributed ledger that allows for secure, transparent, and immutable record-keeping without the need for a central authority. This breakthrough laid the groundwork for truly decentralized financial systems. However, the groundwork for blockchain technology and DeFi was laid over several decades through key technological and conceptual developments (image 1). These include the creation of TCP/IP in 1974, which established the foundation for internet communication, and significant advancements in cryptography, such as the invention of public-key cryptosystems (RSA) in 1978. David Chaum's work on untraceable electronic mail (1981) and blind signatures (1983) was crucial for digital privacy and anonymous transactions. The cypherpunk movement emerged in the early 1990s, advocating for privacy-enhancing technologies. Early attempts at digital currencies like DigiCash (1989), CyberCash (1994), and E-gold (1996) paved the way for future cryptocurrencies. Adam Back's development of proof-of-work systems (HashCash, 1997) and Nick Szabo's concepts of smart contracts (1996) and bit gold (1998) were also pivotal in shaping the blockchain landscape that would eventually give rise to Bitcoin and the broader DeFi ecosystem.

These innovations, along with the 2008 financial crisis context (Lehman Brothers bankruptcy), set the stage for Bitcoin's creation, demonstrating that it was built upon a rich prehistory of technological and ideological developments in cryptography, computer science, and digital privacy.



# Bitcoin Prehistory

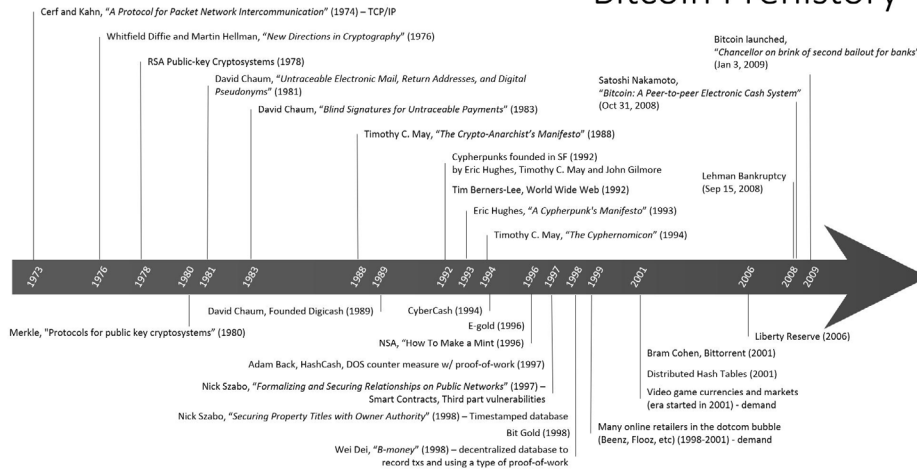


Image 1: Timeline showing the key developments in blockchain and smart contracts prior to the Bitcoin launch. [Source](#)

Years prior to the launch of Bitcoin, an article written by Nick Szabo in 1996 and published in the transhumanist magazine called Extropy, introduced the concept of “smart contracts” to the world. Szabo defined smart contracts as computerized transaction protocols that execute the terms of a contract automatically. He outlined their potential to minimize fraud, reduce enforcement costs, and decrease reliance on intermediaries. The article explores how emerging cryptographic and computer science technologies could be applied to create self-executing contracts, touching on digital cash protocols, synthetic assets, and even the concept of smart property. Szabo’s visionary ideas laid the groundwork for much of the decentralized finance (DeFi) ecosystem we see today, predating the invention of blockchain technology by over a decade. His work on smart contracts is considered foundational in the fields of cryptocurrency and blockchain-based financial applications.

The collage features several key elements:
 

- Extropy #16 Cover:** 1st Qu. 1996, vol.8, no.1. Main title: **EXTROPY #16**. Section: **Neuroscience Pioneers**. Profile of a man with page number 18.
- Intelligent Information Filters and Enhanced Reality:** By Sasha Chislenko, page 13. Subtext: "From personalizing the way information is presented to you, to virtual overlays on your 'natural' perception of the world. In the coming years Enhanced Reality will allow us to boost our senses and customize our window on the world. VR will never be the same again!"
- Complacency & Conservation:** By Julian L. Simon, page 33. Subtext: "The author of *The Ultimate Resource* responds to criticisms of his ideas on complacency about the environment. Simon refutes the allegations and explains the need for trade-offs."
- Idea Futures on the Web:** By Duane Hewitt, page 35. Subtext: "A betting market on ideas, especially scientific and technological questions, has been implemented on the World Wide Web. We will carry the latest market prices in a regular Idea Futures column."
- Smart Contracts: Building Blocks for Digital Free Markets:** By Nick Szabo, page 50. Subtext: "What parts of our hard won legal tradition will still be valuable in the cyberspace era? What is the best way to apply these common law principles to the design of our on-line relationships? Smart Contracts discusses principles of observability, verifiability, privacy, and enforceability."
- THE TRANSHUMAN TASTE: REVIEWS:**
  - Better Sex Through Chemistry 54
  - NANO: The Emerging Science of Nanotechnology 56
  - River Out of Eden: A Darwinian View of Life 57
  - Dr. Walford's Interactive Diet Planner 59
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  - 06 Editorial
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  - 39 Extropy Institute
  - 42 Bio-Enhancement Update: Melatonin, pt 2: Dreams like you've never dreamed. Dr. Ray Sahelian
  - 43 ENIGMA: Murder at the Liar's Club M.I.P. Wolf
  - 50 Mindsurfing: How the Internet is Like a Baby's Head. Yow
  - 66 Back Issues

Magazine Extropy #16, first publication about Smart Contracts by Nick Szabo. [Source](#)

Smart contracts, first conceptualized by Nick Szabo in 1994, are self-executing contracts with the terms of the agreement directly written into code. The launch of Ethereum in 2015 brought smart contracts to life on a large scale, enabling complex financial operations to be executed automatically and trustlessly on a blockchain.

## Early DeFi Precursors (2009–2015)

While Bitcoin itself is primarily designed as a peer-to-peer electronic cash system, it represents the first instance of programmable money and decentralized value transfer. These concepts are fundamental to DeFi.

Bitcoin's scripting language, while limited, allowed for basic financial operations such as multi-signature wallets and time-locked transactions. However, its limitations in terms of complex financial logic became apparent as the cryptocurrency ecosystem evolved.

During this period, several projects emerged that laid the groundwork for what would later become DeFi:

- **Colored Coins (2012):** This project aimed to extend Bitcoin's functionality by "coloring" specific coins to represent real-world assets, effectively creating the first tokenization system on a blockchain.
- **Ripple (2012):** While not typically considered DeFi due to its centralized nature, Ripple introduced the concept of a distributed financial technology network for global payments.
- **Mastercoin (2013):** Later renamed Omni, this was one of the first attempts to build a layer on top of Bitcoin to enable more complex financial operations.
- **Counterparty (2014):** Another Bitcoin-based protocol that allowed for the creation of custom assets (like NFTs) and decentralized exchanges.
- **BitShares (2014):** introduced the concept of a decentralized exchange and stablecoins, albeit on its own blockchain rather than Ethereum.

A pivotal moment in this period was the publication of the Ethereum whitepaper by Vitalik Buterin in late 2013, with the formal paper following in early 2014. Ethereum proposed a blockchain platform with a Turing-complete programming language, allowing for the creation of complex smart contracts and decentralized applications (dApps). This breakthrough laid the foundation for the modern DeFi ecosystem by providing a flexible, programmable blockchain that could support a wide range of financial applications beyond simple value transfer. The Ethereum whitepaper effectively bridged the gap between the limited functionality of Bitcoin and the complex financial operations required for a full-fledged decentralized financial system.

## The Birth of Modern DeFi (2015–2018)

The launch of Ethereum in 2015 marked the beginning of the modern DeFi era. Ethereum's Turing-complete programming language and smart contract capabilities opened up a world of possibilities for decentralized applications (dApps), including financial ones.

Key developments during this period include:

- **MakerDAO (2014–2017):** While conceptualized in 2014, MakerDAO launched on the Ethereum mainnet in December

2017. It introduced the DAI stablecoin, which maintains its peg to the US dollar through a complex system of smart contracts and collateralized debt positions.

- **Ethereum ERC-20 Standard (2015):** This token standard, proposed by Fabian Vogelsteller, simplified the process of creating new tokens on Ethereum, paving the way for the explosion of tokenized assets.
- **EtherDelta (2016):** One of the first decentralized exchanges built on Ethereum, EtherDelta allowed for permissionless trading of ERC-20 tokens using an on-chain order book.
- **Ox Protocol (2017):** This open protocol facilitated the peer-to-peer exchange of assets on the Ethereum blockchain, providing infrastructure for decentralized exchanges.
- **Kyber Network (2017):** Another decentralized exchange protocol that focused on providing liquidity for other DeFi applications.
- **Bancor (2017):** Introduced the concept of automated market makers (AMMs) and continuous liquidity for token exchanges.
- **Compound v1 (2018):** Launched its first version, introducing the concept of algorithmic, autonomous interest rates for lending and borrowing crypto assets.
- **Uniswap v1 (2018):** Revolutionized decentralized exchanges with its simple and efficient automated market maker model.

This period was characterized by the establishment of core DeFi primitives: decentralized exchanges, lending protocols, and stablecoins. These building blocks would form the foundation for the explosive growth in the following years. Total Value Locked (TVL) emerged as a key metric for measuring the growth and adoption of DeFi protocols. TVL represents the total amount of assets deposited in DeFi protocols, effectively measuring the size and liquidity of the ecosystem. It's considered an effective measure as it indicates liquidity, user adoption, and allows for comparison between protocols. However, TVL has limitations, as it doesn't account for the velocity of money or the quality of locked assets. Despite this, it remains a widely accepted metric in the DeFi space.



TVL Evolution from 2015 to 2018. [Source](#)

## DeFi Summer and Explosive Growth (2019–2020)

The years 2019 and 2020 saw DeFi transition from a niche interest to a major force in the cryptocurrency ecosystem. This period, particularly the summer of 2020, is often referred to as “DeFi Summer” due to the explosive growth in both the number of projects and the total value locked (TVL) in DeFi protocols.

Key developments during this period include:

- **Synthetix (2019):** Introduced liquidity mining, a concept that would become crucial in the DeFi boom of 2020.
- **Compound v2 (2019):** Launched with significant improvements, setting the stage for its COMP token distribution in 2020.
- **Multi-Collateral DAI (November 2019):** MakerDAO expanded its system to accept multiple types of collateral beyond just ETH.
- **“Black Thursday” (March 12, 2020):** A significant market crash tested the resilience of DeFi protocols, particularly MakerDAO, leading to important lessons and improvements in risk management.
- **Compound’s COMP Token (June 2020):** The launch of Compound’s governance token and its distribution model kicked off the “yield farming” craze.
- **Balancer (June 2020):** Introduced its BAL token, further fueling the liquidity mining trend.
- **Curve Finance (August 2020):** Launched its CRV token with a novel token distribution mechanism.
- **yearn.finance (July 2020):** Introduced yield optimization strategies, automating the process of finding the best yields across DeFi protocols.
- **SushiSwap “Vampire Attack” (August 2020):** Demonstrated the power of fork-and-incentivize strategies in DeFi, by forking Uniswap.
- **Uniswap v2 and UNI Token (September 2020):** Uniswap’s upgrade and subsequent token launch marked a major milestone in DeFi’s growth.
- **Aave (October 2020):** Introduced flash loans, allowing users to borrow without collateral for a single transaction.

This period saw the TVL in DeFi protocols skyrocket from around \$600 million at the start of 2020 to over \$20 billion by the end of the year. The introduction of governance tokens and liquidity mining programs created powerful incentives for users to participate in these protocols, driving rapid growth but also raising questions about sustainability and value creation.

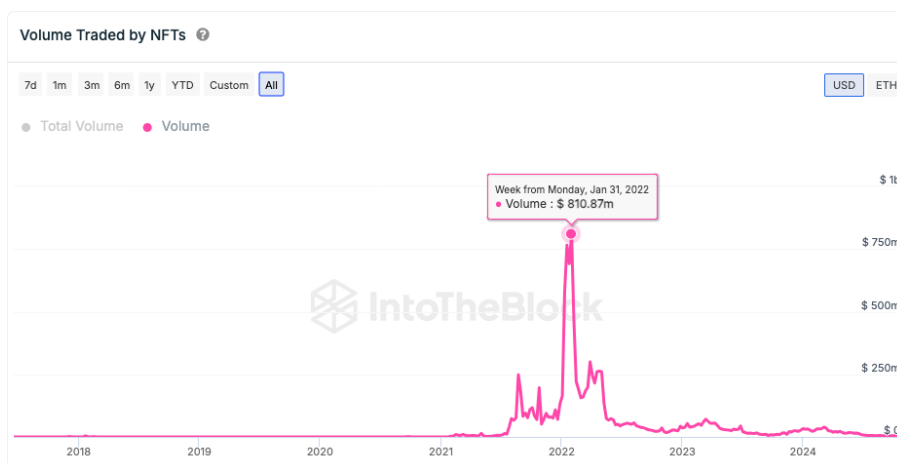
TVL Evolution during 2020. [Source](#)

## Maturation and Challenges (2021–Present)

From 2021 onwards, DeFi entered a phase of maturation, facing both new opportunities and significant challenges. **This period has been characterized by increased mainstream attention, regulatory scrutiny, and the expansion of DeFi beyond Ethereum.**

Key developments during this period include the rise of DeFi on other chains. While Ethereum remained the dominant platform for DeFi, other blockchains gained traction. Binance Smart Chain (BSC), launched in September 2020, saw rapid growth in 2021 due to lower fees and Binance's backing. Solana gained popularity for its high speed and low transaction costs. Avalanche, Fantom, and others attracted DeFi projects with various incentive programs. The high gas fees on Ethereum led to increased adoption of Layer 2 scaling solutions like Optimism and Arbitrum, as well as sidechains like Polygon. Cross-chain DeFi also emerged, with projects like THORChain and RenVM facilitating cross-chain liquidity and asset transfers.

The NFT boom led to intersections with DeFi, such as NFT-collateralized loans and fractionalized NFT ownership. “DeFi 2.0” innovations also appeared, with Olympus DAO introducing the concept of protocol-owned liquidity in April 2021, Convex Finance optimizing yields on Curve Finance and becoming a major player in the “CRV Wars” in May 2021, and Alchemix pioneering self-repaying loans in February 2021.

The boom of NFT trading during 2021–2022. [Source](#)



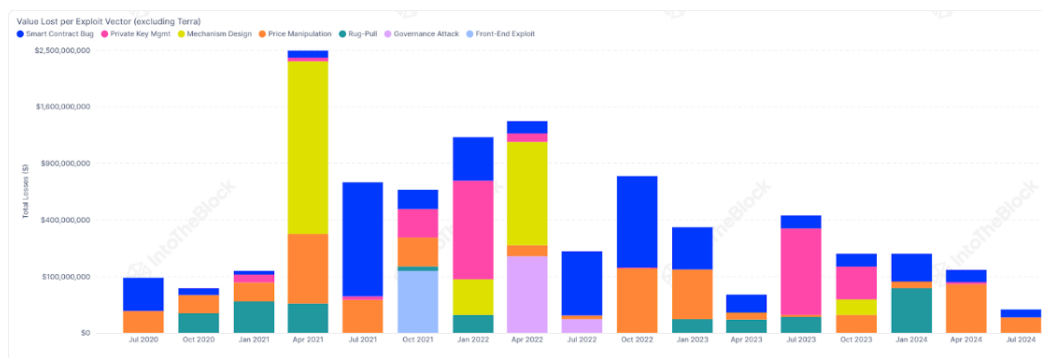
Regulatory challenges increased, with heightened attention, particularly from the US SEC raising questions about the legal status of many DeFi protocols. Security remained a significant concern, as evidenced by several high-profile hacks and exploits, such as the Poly Network hack (\$611 million, August 2021) and the Cream Finance exploit (\$130 million, October 2021).

Institutional adoption grew, with traditional finance institutions showing more interest in DeFi, some even launching their own initiatives or investing in DeFi projects. Decentralized Autonomous Organizations (DAOs) gained prominence as a governance model for DeFi protocols, with some like MakerDAO taking significant steps towards full decentralization. The stablecoin market cap grew exponentially, with USDC and USDT playing crucial roles in DeFi liquidity.

Efforts to bring real-world assets (RWAs) on-chain gained momentum, with projects like Centrifuge leading the way. Miner (now Maximal) Extractable Value (MEV) became a significant topic, leading to solutions like Flashbots to mitigate its negative effects.

This period has seen DeFi grow from a niche interest to a significant part of the broader cryptocurrency ecosystem, with the TVL in DeFi protocols reaching over \$100 billion at its peak in 2021. However, this growth has also brought challenges, including scalability issues, regulatory concerns, and the need for improved technical and economical security measurements as well as consolidated practices of risk management focussed on the different types of DeFi protocols.

The maturation of DeFi has also brought to light the complex landscape of technical and economic risks associated with smart contracts. As illustrated by the “Value Lost per Exploit Vector” chart:

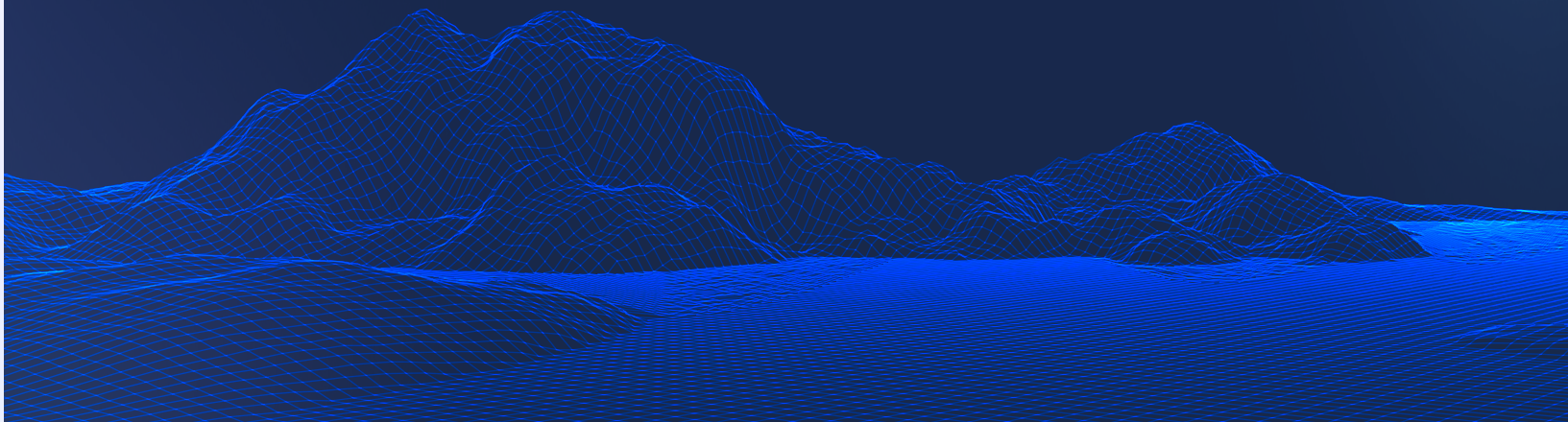


Value Lost per Exploit Vector in DeFi Protocols, excluding Terra (2020-2024). [Source](#)

DeFi protocols have faced a variety of exploit types, each causing significant financial losses. Smart contract bugs consistently represent a major vulnerability, often resulting in the largest losses. Other prominent risk vectors include mechanism design flaws, private key management issues, and price manipulation attacks. The chart demonstrates that while the DeFi ecosystem has evolved, security challenges persist and even diversify over time. This underscores the critical need for robust security practices, comprehensive audits, and innovative solutions to mitigate these risks. As DeFi continues to grow, addressing these vulnerabilities becomes paramount to ensure the long-term viability and trustworthiness of decentralized financial ecosystem.

02

# *Understanding DeFi Metrics and Some of Their Shortcomings*



Before exploring specific DeFi protocols and categories, it is crucial to consider how to measure their size and success. Metrics are at the core of how we evaluate DeFi protocols, serving as a guide to measure performance, trustworthiness, and the overall health of the ecosystem. While these indicators provide crucial insights into the effectiveness of a protocol, they can also have their flaws and limitations. In this section, we'll break down some of the most widely used DeFi metrics, highlighting both their importance and the potential pitfalls to watch out for.

## The Importance of Total Value Locked (TVL)

Total Value Locked (TVL) is one of the most widely-used metrics in DeFi, providing a straightforward way to gauge the liquidity and reliability of a protocol or blockchain. At its core, TVL measures the total value of assets deposited into the smart contracts of a protocol. Despite its name, these assets aren't necessarily locked for a fixed period and can often be withdrawn by users at any moment. Protocols with consistently high TVL levels typically signal robust liquidity, enabling large transactions with minimal impact on pricing.

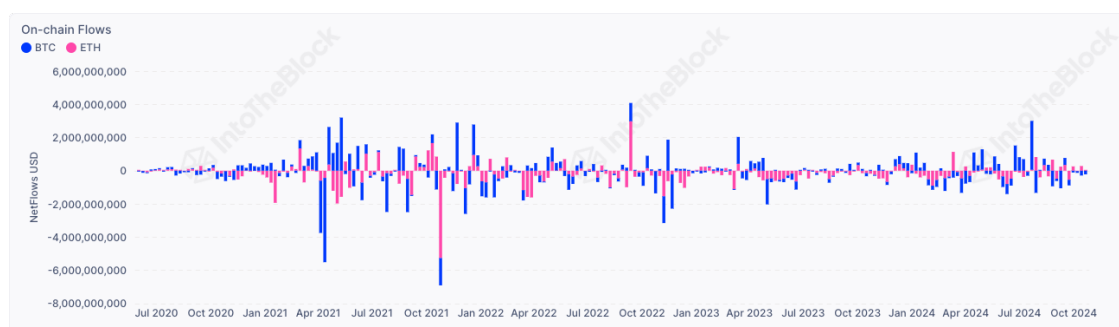
High TVL over an extended period also hints at a protocol's security and reliability. Since protocols with substantial TVL are prime targets for hackers, maintaining these levels without security breaches suggests a certain degree of resilience and trustworthiness.

However, a common issue with TVL, like many DeFi metrics, is its susceptibility to manipulation. Protocols can artificially inflate their TVL by offering incentives to attract deposits, leading to high TVL figures that don't necessarily reflect the protocol's true value or strength. This is why analyzing TVL over time becomes crucial—it helps distinguish between short-lived spikes driven by incentives and genuine, sustained growth in a protocol's liquidity and user trust.

## On-chain Flows

Tracking flows between centralized exchanges (CEXs) and on-chain addresses is a crucial metric for assessing the growth of blockchains and the broader DeFi ecosystem. When assets move from the blockchain to CEXs, it often signals that users are taking profits, possibly converting their crypto into fiat currencies. On the flip side, when funds flow from CEXs into DeFi, it's usually a sign of growing participation and a higher risk appetite among users.

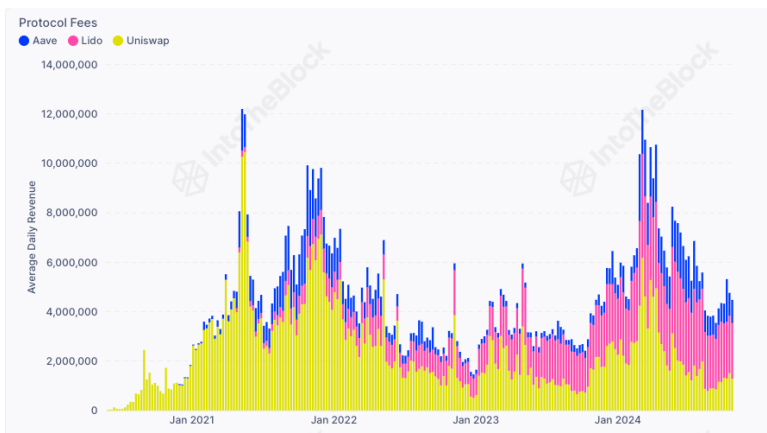
However, this metric comes with significant limitations due to the assumptions it relies on. Since on-chain data doesn't reveal the full picture of what's happening on the CEX side, these flows might not always mean what they seem. Assets could be moved for reasons other than selling, like seeking yield opportunities on the CEX or simply transferring funds between wallets. Access to more detailed data from CEXs would help clarify these movements, but such information is often limited or comes at a high cost.



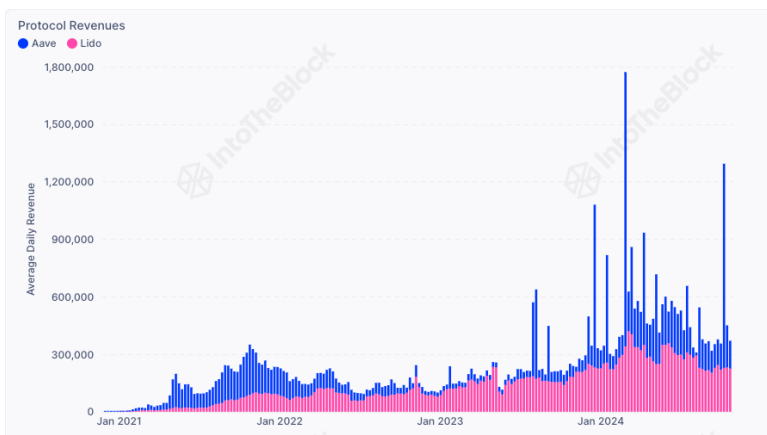
On-Chain Flows. [Source](#)

## Fees and Revenue

Fees and revenue are key metrics that offer a glimpse into the long-term viability of a protocol. A protocol that fails to consistently generate fees or net revenue to sustain its treasury is unlikely to survive in the competitive DeFi landscape. However, it's equally important to account for the costs involved in generating this revenue, particularly when protocols use their own native tokens to incentivize user activity. Often, these incentive costs are overlooked in reported figures, leading to distorted views of a protocol's true financial performance. Understanding both sides of the equation—revenue generation and the associated costs—paints a clearer picture of a protocol's sustainability.



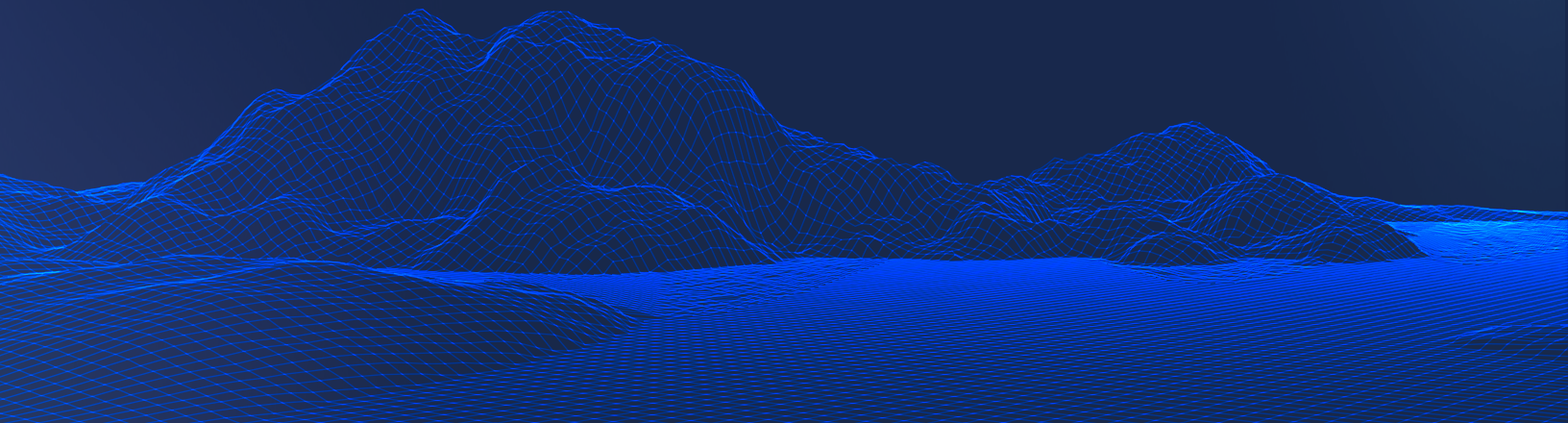
Protocol Fees. [Source](#)



Protocol Revenues. [Source](#)

03

*Navigating the  
Present: Key  
Protocols  
Driving DeFi*





With the DeFi ecosystem still relatively new, the first categories of protocols that have gained success look vaguely familiar to services that are found in traditional finance. Exchanges and lending platforms have seen the most success so far and have found product market fit that has enabled them to flourish in the ecosystem. Other categories from traditional finance have also started to gain traction in the last year, with RWA and derivatives protocols being the most successful among them.

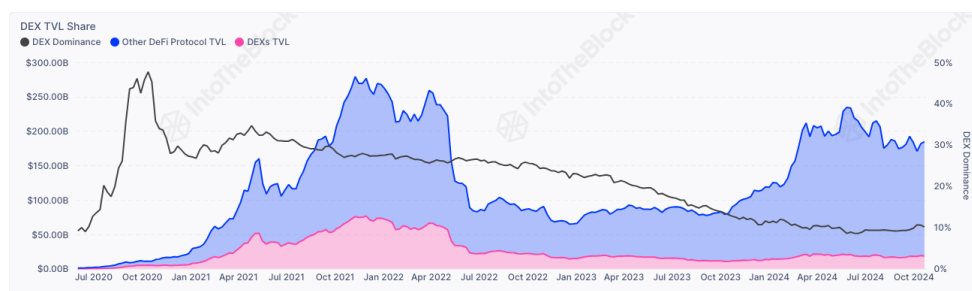
However, there has also been substantial success among more DeFi native product categories. Liquid (re)staking protocol, collateral backed and trading strategy backed stablecoins are among the types of protocols that have arisen to satisfy certain blockchain-specific needs.

## Dominant Protocol Types in DeFi

Protocol Type	Category Leader	Category TVL
Decentralized Exchanges	Uniswap	\$16.81 Billion
Lending Protocols	Aave	\$32.78 Billion
Liquid Staking Protocols	Lido	\$45.18 Billion

### Decentralized Exchange (DEX) Protocols

DEXs are the DeFi equivalent of a Centralized Exchange (e.g., Coinbase) or a marketplace for buying and selling stocks such as Robinhood. DEXs are a core component of a functioning DeFi ecosystem and have continued to develop and iterate over time. The evolution of the DEX category has produced multiple types of fully on-chain automated market makers (AMMs) with different algorithms dictating asset exchange rates based on asset type and asset correlations. There have also been advancements in hybrid models that make a portion of calculations off-chain and then execute trades on-chain.



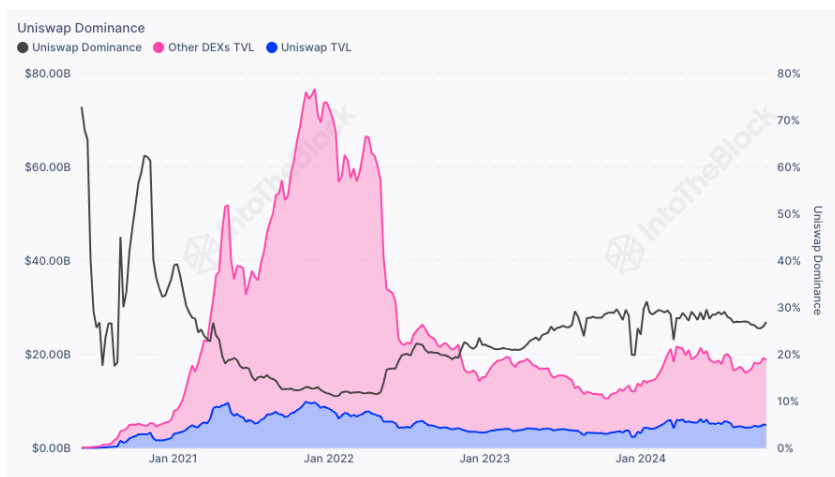
DEX TVL Share. [Source](#)

In the last cycle between 2020 and 2022, the TVL share in DEXs was substantially higher than in the current cycle, peaking at just over \$75B TVL and almost 28% market share. Overall, there has been a continuing decrease in the share of TVL found in DEXs compared to other parts of DeFi. This is largely due to increased innovations within DEXs such as concentrated liquidity models (e.g., Uniswap V3) and more sophisticated market makers and liquidity allocators that have a more active approach to managing liquidity in DEX pools.

have a more active approach to managing liquidity in DEX pools.

### DEX Category Leader: Uniswap

One of the first DEXs to launch, Uniswap established dominance early and has maintained this position. Its permissionless design, numerous integrations, and its reliably strong codebase have helped Uniswap maintain its dominance and has made TVL much stickier within Uniswap compared to other DEXs.

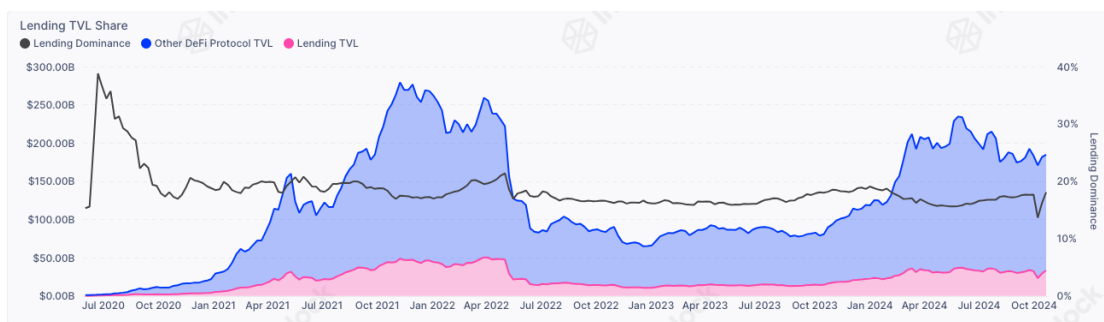


Uniswap Dominance. [Source](#)

### Lending Protocols

Outside of DEXs, the other protocol category similar to traditional finance that has found large success is lending. While many types of lending markets exist in DeFi, the most successful design has been over-collateralized lending. The primary reason for over-collateralized lending’s success in DeFi is its natural ability to adapt to a permissionless and trustless infrastructure. Borrowers post their collateral and then borrow assets. Suppose the value of the collateral gets too close to the value of borrowed assets. In that case, the position is opened for liquidation by anyone who wants to pay off the loan and collect the collateral alongside a liquidation premium.

While over-collateralized lending protocols have seen the most success, there is a continued demand for under-collateralized lending. Though protocols do exist to support this lending design, success is still elusive due to the trust assumptions required and lack of asset recovery methods on-chain from borrowers.



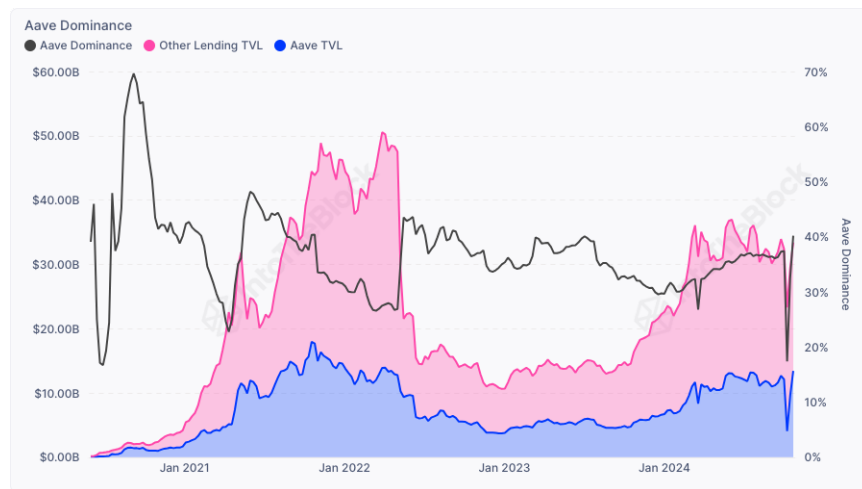
Lending TVL Share. [Source](#)

Lending TVL comprises a share of the total TVL in DeFi, which has remained relatively constant over the last several

years. This will likely persist until new or alternative lending designs such as under-collateralized borrowing manage to gain traction.

### Lending Category Leader: Aave

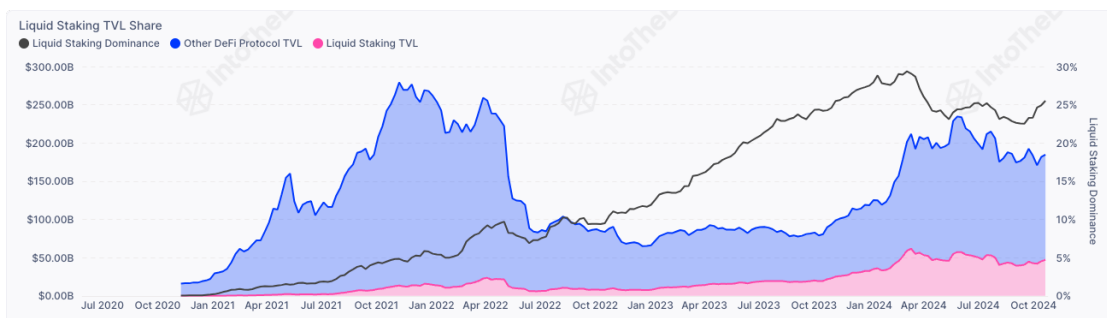
With one of the strongest market dominance ratios among categories, the Aave protocol has maintained a strong position since its inception. Consistent innovations in lending mechanisms and a strong emphasis on monitoring and adjusting to economic risk threats have helped Aave become the primary lending market for large institutions and whale users on almost all blockchains where they have deployed instances.



Aave Dominance. [Source](#)

### Liquid Staking Protocols

One of the most successful categories in DeFi is the on-chain native product of liquid staking tokens (LSTs). As Ethereum has transitioned to a Proof-of-Stake (PoS) blockchain, the native ether (ETH) token has been locked up in growing amounts to help secure the blockchain. The locked-up (or staked) ETH earns rewards for helping secure the blockchain but inherently becomes illiquid when staked as it can no longer be traded. This has led to multiple protocols developing derivative tokens that represent 1:1 the ETH that is locked in the PoS staking contract. These new tokens, coined LSTs, are freely tradeable on the open market while still earning staking rewards from the underlying ETH.



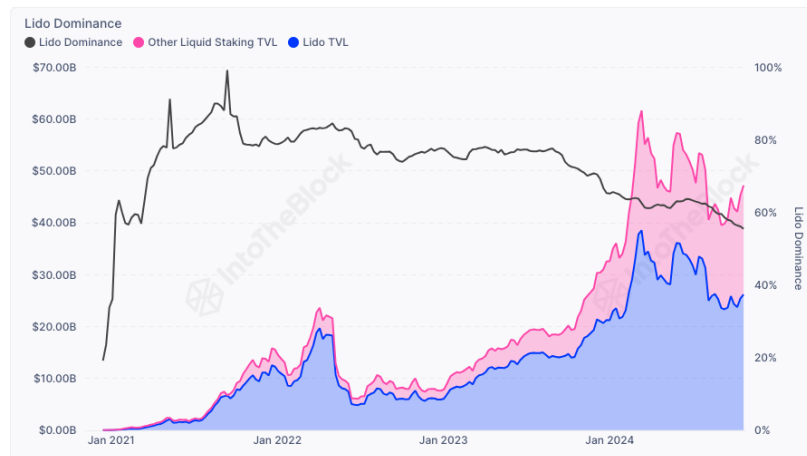
Liquid Staking TVL Share. [Source](#)

While Liquid Staking Tokens (LSTs) have been around since 2020, their popularity really started to take off after the

[Shanghai upgrade](#) in April 2023, which made it possible for users to unstake and withdraw their staked ETH.

### LST Category Leader: Lido

Before Ethereum officially transitioned to a Proof-of-Stake (PoS) blockchain, Lido had already started developing its widely-used stETH token. By maintaining its first-mover advantage, Lido now holds nearly 60% of the LST market, making it the largest player in the space. This achievement highlights the strong growth potential of blockchain-native products.



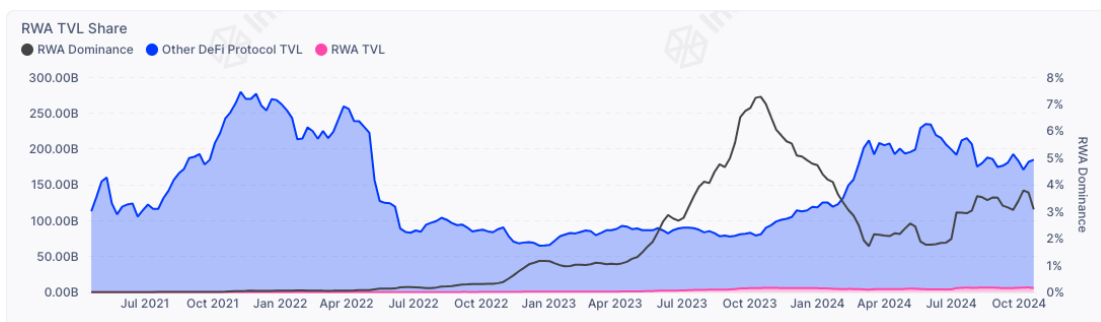
Lido Dominance. [Source](#)

### Emerging Protocol Types

While DeFi's foundations continue to solidify with established protocols like lending platforms and DEXs, a new wave of innovative protocols is emerging. In this section, we explore these promising developments, diving into how they're enabling new opportunities in DeFi.

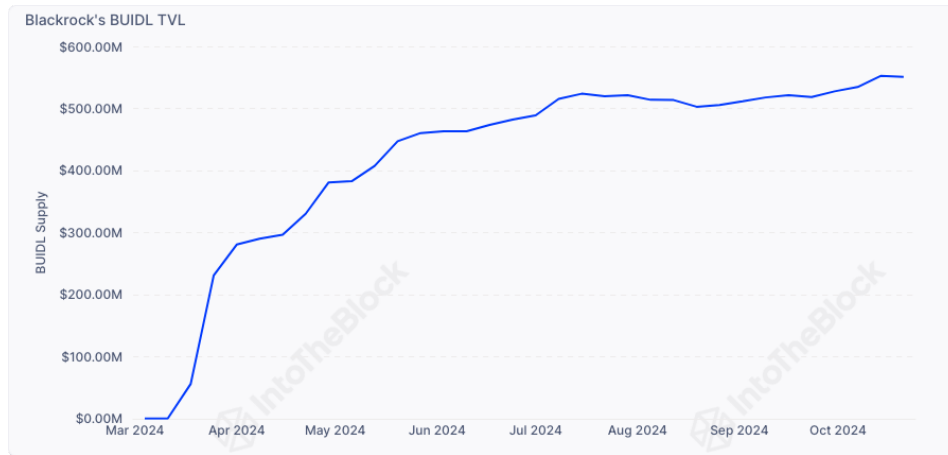
### Real World Asset (RWA) Protocols

While tokenizing Real World Assets (RWAs) is not a new concept in DeFi, it has recently gained significant traction due to the attractive interest rates available in traditional finance, especially in US Treasury bills. Stablecoins backed by these treasury bills are emerging as a popular on-chain asset class, offering a way to preserve value while earning competitive yields. More unconventional RWAs, such as real estate and business bond indexes, are also being explored, though they've seen slower adoption due to the inherent illiquidity of these assets.



RWA TVL Share. [Source](#)

From the chart above, we can see that RWA assets on chain are still in a nascent stage relatively to other categories, but new on-chain funds from traditional finance institutions like Blackrock have been growing quickly.



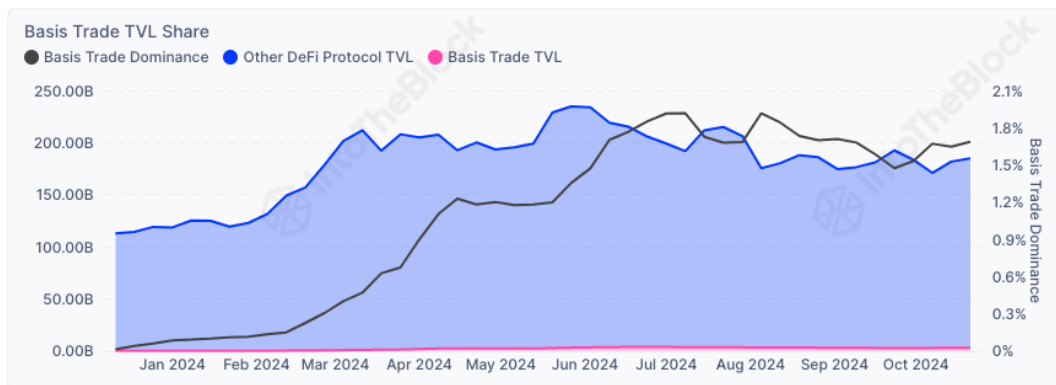
Blackrock's BUIDL TVL. [Source](#)

Having quickly grown to over \$500M in less than a year, funds like Blackrock's BUIDL will likely continue to see large amounts of growth as the markets get more regulatory clarity and the tokens see more adoption in the DeFi ecosystem.

### Trading Strategy Stablecoins Protocols

One of the most innovative categories in DeFi recently gaining traction is led by the Ethena protocol. Ethena has introduced a synthetic stablecoin backed by a cash-and-carry trading strategy that leverages ETH and BTC funding rates. The stablecoin's value is anchored by both the long and short positions of this strategy, allowing it to not only maintain a stable value but also generate yield from the strategy's interest. In essence, the stablecoin represents a tokenized share in the trade that the protocol executes.

This approach is highly novel, tapping into DeFi's tokenization capabilities to create new opportunities for stable value and interest generation. As the concept proves successful, it's likely that we'll see more protocols adopting similar models, exploring different trading strategy combinations in the near future.

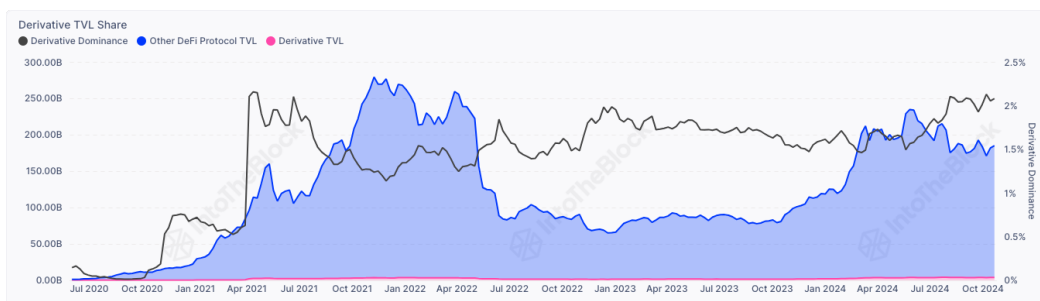


Basis Trade TVL Share. [Source](#)



## Derivatives Protocols

Perpetual and options protocols have been a part of DeFi since its early days, but their growth was often held back by the high transaction costs on the Ethereum mainnet. However, the rise of Layer-2 (L2) blockchains has dramatically reduced these costs, making derivatives trading much more accessible. As a result, the derivatives market is now flourishing, with numerous new protocols and even dedicated chains emerging to capture a significant share of this rapidly expanding space.



Derivative TVL Share. [Source](#)

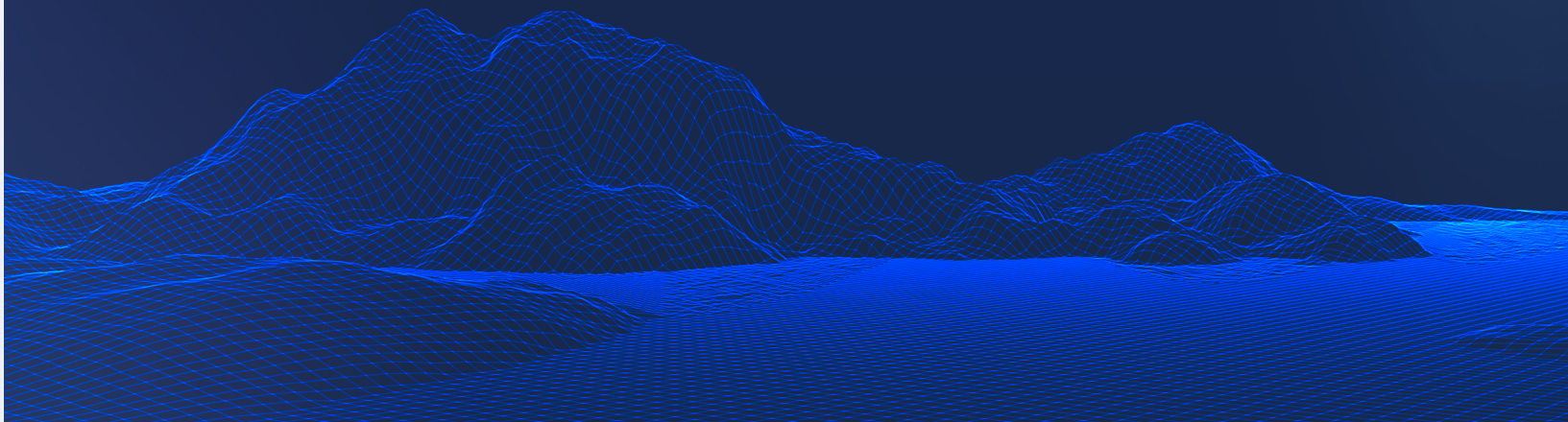
## Summary

The current state of DeFi reflects an ecosystem still in its early stages, yet rapidly maturing into a more sophisticated market. Core protocol categories like decentralized exchanges (DEXs) and lending platforms are advancing in capital efficiency, paving the way for the development of innovative products and services such as derivatives and stablecoins. Enhanced infrastructure is also fostering greater interconnectedness, unlocking new channels for capital flow into tokenized real-world assets (RWAs). This trend is expected to gain momentum as more traditional financial institutions integrate blockchain-based products and assets into their portfolios.

Both traditional financial derivatives and native DeFi products are demonstrating robust growth, signaling a continued evolution as the market matures and expands.

04

*Future Outlook:  
Innovations  
Shaping DeFi*



Decentralized Finance (DeFi) continues to evolve at an astonishing pace, reshaping how financial services are structured, delivered, and consumed. The growth of this ecosystem has given rise to new financial primitives, technological innovations, and reimagined financial structures that could fundamentally alter traditional finance. As DeFi primitives mature, they pave the way for further innovation, bringing us to a point where we can anticipate the next wave of decentralized financial tools and structures. This section explores some of the emerging DeFi primitives and trends that could define the future of decentralized finance, the role of technology in driving these changes, and how DeFi may eventually integrate with traditional financial systems to create hybrid models.

## New Financial Primitives

DeFi has already transformed fundamental financial services like borrowing, lending, trading, and saving. However, new and more complex financial primitives are on the horizon. These emerging primitives have the potential to broaden the scope of decentralized finance, catering to institutional investors, real-world asset tokenization, and more sophisticated market participants. Here are several key trends:

### Yield AMM Protocols: The Case of Pendle

Yield AMMs introduce an innovative financial primitive that allows users to separate the yield-generating component of an asset from its principal. Pendle Finance, a pioneer in this space, enables users to tokenize future yield, offering a way to trade the time value of assets. This approach provides a granular layer of yield management previously unavailable in traditional finance, unlocking a new dimension in yield speculation.

The impact of yield-stripping protocols like Pendle could be transformative, allowing for more precise portfolio management and liquidity optimization. Investors could buy or sell future yield without liquidating the underlying principal, enhancing capital efficiency. In a broader sense, yield stripping could revolutionize fixed-income products by enabling new forms of yield curve management and risk hedging.

### Yield Aggregators and Abstraction Protocols

Yield aggregators simplify the complex task of finding the best yield opportunities across multiple platforms, while abstraction protocols hide the complexity of DeFi interactions from the end user. By pooling liquidity and automating strategy execution, yield aggregators help users achieve higher returns with less effort. These protocols could evolve into even more powerful tools that act as fully automated robo-advisors for DeFi.

Protocols that abstract away the technical complexities of DeFi are essential for mainstream adoption. Users could invest capital in DeFi protocols without having to manually handle multiple token transactions, staking requirements, or wallet management. As institutional participation increases, these protocols will become indispensable for portfolio managers looking to optimize yield across multi-chain ecosystems.

### Derivatives DEXes with Integrated Borrow-Lend Markets

Derivatives markets in traditional finance are massive, offering a wide array of products such as options, futures, and swaps. In DeFi, derivatives trading is still nascent but evolving rapidly. The integration of derivatives decentralized

exchanges (DEXes) with borrowing and lending protocols is an emerging trend. This integration allows traders to use leverage more seamlessly and hedge positions effectively.

For instance, a trader on a DEX could collateralize assets, borrow stablecoins, and use the borrowed funds to trade derivatives without having to exit the platform. This holistic borrowing, lending, and trading experience could attract more sophisticated traders who seek capital efficiency. As more institutional participants enter DeFi, such combined functionalities will likely drive larger trading volumes and liquidity in derivatives markets.

### **Flash Loan Vaults and 1-Click Looping**

Flash loans, which allow users to borrow large sums of money without collateral as long as the loan is repaid within the same transaction, are a unique DeFi innovation. Emerging protocols are developing flash loan vaults that make it easier for users to perform complex financial strategies like looping in one click.

Looping refers to the process of borrowing and lending repeatedly to magnify yield. Currently, looping requires multiple transactions and can be technically challenging. By simplifying this process into a one-click feature, flash loan vaults will democratize access to sophisticated yield-enhancing strategies, reducing the barrier to entry for retail users.

### **Tokenization of Real-World Assets**

Tokenizing real-world assets (RWAs) is one of the most promising trends in DeFi. This process allows traditional assets such as real estate, commodities, or company shares to be represented as digital tokens on a blockchain. The tokenization of RWAs opens up vast new markets for liquidity, particularly for illiquid assets.

While RWAs are already making their way into DeFi by incorporating treasury yields, future advancements could take this concept further by enabling instantaneous, cross-border trading of any asset. Tokenized assets could be integrated into decentralized financial markets, unlocking capital trapped in real-world assets and making it easier to provide collateral for DeFi loans.

### **Credit Based on Protocols, Not Tokenizing Traditional Credit**

Another emerging trend is creating credit systems based on blockchain-native data and activities, as opposed to merely tokenizing traditional credit structures. In this model, a user's DeFi activity, governance participation, staking history, and other on-chain behavior could serve as collateral for creditworthiness.

This protocol-driven credit system would provide an alternative to traditional credit scoring mechanisms, potentially extending credit to a broader, more global population. By reducing reliance on legacy financial institutions, this new credit model could facilitate a decentralized, more inclusive credit market.

#### **Trade and Receivables Financing**

Providing liquidity to businesses through trade finance and receivables financing represents another frontier for DeFi. Stablecoins and tokenized invoices could serve as collateral for loans, making it easier for businesses to access capital. This form of financing would allow companies to tokenize their receivables and borrow against them in stablecoins, providing real-time liquidity for global trade operations.

## IP Fractionalization and Secondary Markets

Intellectual Property (IP) is an undervalued asset class that can be difficult to monetize. Fractionalizing IP into tokens and creating secondary markets for these tokens opens up new avenues for monetization. Companies could tokenize patents, copyrights, and other IPs, allowing investors to buy fractions of these assets. Secondary markets would enable more liquidity and a new method for financing innovation.

Key Trend	Potential Impact
Yield AMM Protocols	Enhances liquidity and yield management.
Yield Aggregators and Abstraction Protocols	Supports mainstream DeFi adoption.
Derivatives DEXes with Borrow-Lend Markets	Increases derivatives market liquidity.
Flash Loan Vaults & 1-Click Looping	Expands access to advanced DeFi strategies.
Tokenization of Real-World Assets (RWAs)	Brings real-world assets into DeFi.
Credit Based on Protocols	Creates decentralized credit markets.
Trade and Receivables Financing	Improves global trade financing.
IP Fractionalization and Secondary Markets	Boosts IP monetization and investment.

## Beyond Tokenization

Tokenization has emerged as a key driver behind the growing interest of institutional investors in DeFi, offering a bridge between traditional finance and the blockchain-based economy. However, the next evolution in this space goes beyond the straightforward tokenization of assets and delves into the realm of **programmable ownership structures**.

- **Programmable ownership** represents a transformative leap in asset management. It moves beyond simply creating digital tokens that represent real-world assets, enabling a more sophisticated framework where multiple parties can hold dynamic shares of an asset. These ownership structures allow for the automatic adjustment of rights, revenue distributions, and governance based on real-time data and conditions encoded into smart contracts. This could significantly streamline processes like profit-sharing and decision-making, reducing the need for intermediaries and manual interventions.
- **In industries like real estate**, programmable ownership could revolutionize how properties are managed and traded. Imagine a scenario where property shares automatically adjust ownership percentages based on market conditions, rental income changes, or other predefined triggers. For instance, if a property's rental income increases, the smart contract could redistribute ownership shares to reflect these changes, aligning stakeholders'



interests with real-time performance metrics. This would enable more agile and responsive asset management, opening up new possibilities for liquidity and fractional ownership in traditionally illiquid markets.

The implementation of programmable ownership has the potential to introduce a new era of flexible, real-time asset management, offering unparalleled transparency and efficiency.

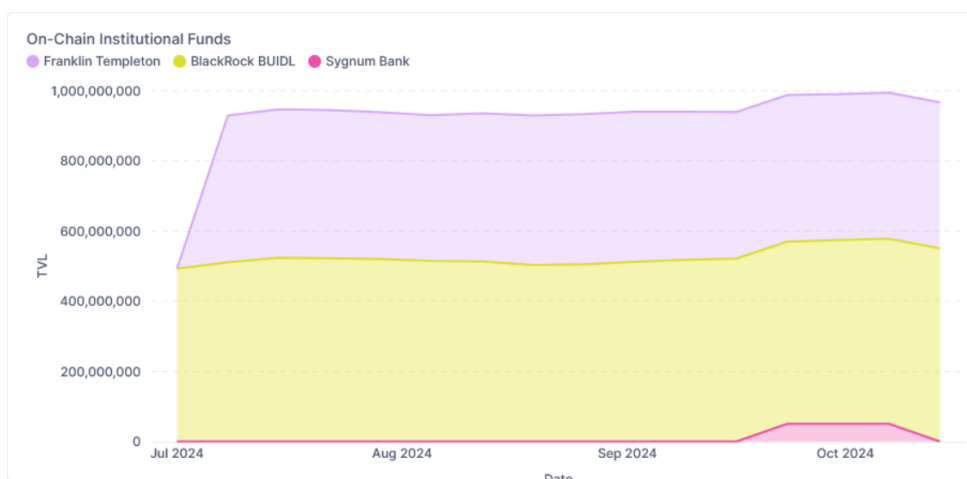
## TVL Composition Shifts

Total Value Locked (TVL) is a crucial metric in DeFi, representing the amount of capital deposited in various protocols. The DeFi industry's TVL currently stands at over \$100 billion. The composition of this is expected to shift significantly over the coming years, with growing institutional participation and multi-chain ecosystems playing a central role.

## Institutional Participation and TVL Growth

Institutional investors are starting to recognize the potential of DeFi, and their participation is likely to grow exponentially as regulatory clarity and infrastructure improves. As institutions allocate larger amounts of capital to DeFi, we can expect TVL to shift towards more stable and regulated protocols. The introduction of compliant DeFi platforms tailored to institutional needs will drive higher TVL in less speculative, lower-risk protocols.

Several institutional initiatives have already gained significant traction within the crypto space. Though still in its early stages, these funds have attracted close to \$1 billion in capital, highlighting a strong appetite for institutional-grade DeFi opportunities.



On-Chain Institutional Funds. [Source](#)

The emergence of multi-chain ecosystems and layer 2 solutions is leading to a more distributed landscape for Total Value Locked (TVL) within DeFi, as assets spread across numerous platforms and protocols. While this fragmentation may initially appear to dilute liquidity, it also marks a significant step forward in addressing some of DeFi's most pressing limitations.

- **Multi-chain ecosystems** and **layer 2 solutions** are poised to enhance scalability, making blockchain networks faster, more efficient, and cost-effective. By offloading transactions from the main blockchain and enabling

interoperability between different chains, these technologies significantly reduce gas fees and alleviate network congestion. This evolution paves the way for more seamless user experiences and lower barriers to entry, encouraging greater adoption and participation in DeFi.

- **As TVL becomes distributed** across multiple chains, it introduces both opportunities and challenges for liquidity management and yield optimization. Liquidity providers and investors will need to adapt their strategies to account for the dispersed nature of assets, finding new ways to efficiently allocate capital across diverse protocols. Cross-chain bridges and interoperability solutions will become crucial in aggregating liquidity, enabling users to access the best yield opportunities without being confined to a single network.

## Technological Innovations and Their Impact

Several advanced technologies are set to significantly reshape the DeFi landscape, driving both innovation and adoption:

- **Artificial Intelligence (AI)** has the potential to revolutionize DeFi by automating complex trading strategies and optimizing risk management. With AI-driven algorithms, users could achieve more precise yield optimization and quicker responses to market conditions, minimizing human error and enhancing returns. This level of sophistication could open the door for institutional investors seeking algorithmic precision in their DeFi portfolios.
- **Zero-Knowledge Proofs (ZKPs)** represent a breakthrough in privacy, one of the key hurdles for institutional adoption of DeFi. By allowing transactions to be verified without revealing underlying data, ZKPs will enable financial institutions to interact with DeFi protocols while maintaining compliance with privacy regulations and protecting proprietary information. This advancement will foster greater trust and broader participation from regulated entities.
- **Cross-chain infrastructure** is becoming increasingly vital as DeFi continues its evolution toward a multi-chain ecosystem. Seamless interoperability between blockchains will be crucial to unlocking liquidity and ensuring the efficient flow of assets across networks. As the demand for cross-chain DeFi solutions grows, robust infrastructure will underpin the next phase of decentralized finance, offering users greater flexibility and access to a wider range of opportunities.

## Hybrid Models: Integrating DeFi with Traditional Finance

As DeFi continues to mature, we are likely to witness the emergence of hybrid financial models that integrate the strengths of both decentralized and traditional finance. These models will serve as a bridge, enabling a gradual convergence of centralized institutions with decentralized technologies, reshaping the way financial services are delivered and experienced.

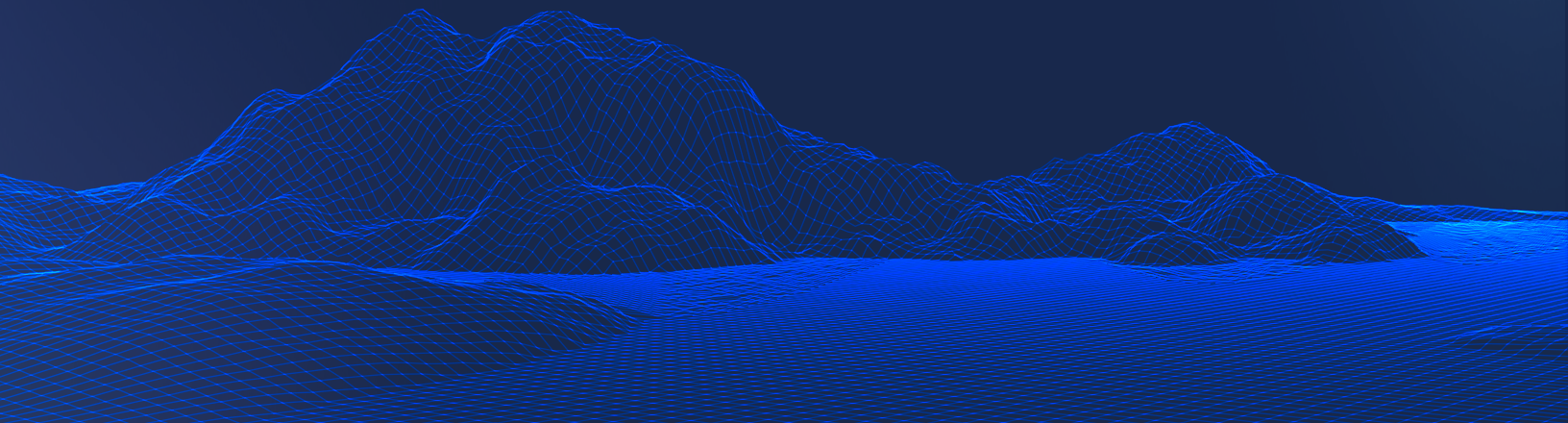
- Centralized institutions may begin to adopt DeFi innovations for critical functions such as settlement, liquidity provision, and compliance. By incorporating blockchain-based technologies, they can streamline operations, reduce transaction costs, and enhance transparency, all while adhering to the regulatory frameworks that traditional finance demands. This fusion of paradigms has the potential to create a new class of financial products and services that are both secure and agile.
- Hybrid models will empower traditional financial institutions to harness the benefits of DeFi, such as automated

smart contracts, global accessibility, and permissionless innovation, without completely abandoning the regulatory safeguards and institutional trust that conventional systems offer. This approach can lead to greater market efficiency and expanded access to financial products, making it possible for a wider range of participants to engage with both DeFi and traditional financial systems seamlessly.

The future of finance is likely to be a spectrum rather than a binary choice between centralized and decentralized solutions. While it may not be purely decentralized, it will undoubtedly be more open, transparent, and adaptable than the systems we have today, driven by the principles of DeFi.

05

# *Challenges in Institutional DeFi Adoption*



Despite the sector's explosive growth and over \$100 billion in total value locked (TVL), institutional adoption remains slower than expected. With DeFi's technical capabilities poised to transform finance, the question remains: what's holding institutions back?

The answer is multi-faceted, and begins with compliance and regulatory hurdles. However, to truly unlock institutional participation, DeFi must evolve its infrastructure, improve liquidity, and offer products tailored to the needs of large financial players.

## Regulation

The lack of regulatory clarity in the U.S. and other major developed markets has driven many market participants to seek jurisdictions offering a more predictable and supportive regulatory environment. Regions like the Cayman Islands, British Virgin Islands, Switzerland, Singapore, Liechtenstein, Gibraltar, and increasingly, the UAE, have emerged as key destinations due to their logical regulatory frameworks. Within the EU, countries such as Germany, France, and Malta have shown greater openness to digital assets but face constraints under the EU-wide MiCA framework.

Consequently, many core market players have followed a similar approach to establishing foundation companies and decentralized autonomous organizations (DAOs), leveraging the support of leading law firms, accountants, and auditors. This has helped create a more structured entry path for private institutional capital. However, broader integration with public markets remains constrained by regulatory uncertainty, particularly around the classification of securities in the U.S., EU, and UK. While recent guidelines from the UK's Financial Conduct Authority (FCA) have aimed to provide some clarity, political changes may slow regulatory progress.

Investment banks and insurance companies also face significant regulatory capital costs under regimes like [Basel III](#) and [Solvency II](#), which impose stringent requirements on holding or financing crypto assets, including stablecoins. This drives up the baseline cost of borrowing these assets and restricts direct investment. As a result, investment banks often operate through subsidiaries or portfolio companies (e.g., Nomura's Laser Digital and Komainu, or Standard Chartered's Zodia Markets) and typically avoid offering secured funding backed by crypto assets.

Stablecoins, which have become a key component of the DeFi ecosystem, have also seen limited institutional adoption in the U.S. due to regulatory uncertainty at both the state and federal levels. The conservative stance of the New York Department of Financial Services (NYDFS), which oversees some leading USD stablecoins, has further hindered growth. In the EU, MiCA regulations have exacerbated the situation by limiting stablecoin issuance primarily to banks, requiring a 2% capital reserve, and imposing strict caps on assets under management (AUM) and daily transaction volume to prevent systemic risk. These measures signal the EU's preference for central bank digital currencies (CBDCs) and suggest that a significant private EUR stablecoin market is unlikely to develop.

In short, regulatory challenges hinder institutional DeFi adoption by raising compliance costs, restricting stablecoin use, and creating uncertainty, making it difficult for institutions to deploy capital and access liquidity.

## Beyond KYC-AML: Addressing DeFi's Structural Gaps

A common assumption is that the lack of KYC and AML capabilities is the main barrier preventing institutions from embracing DeFi. However, while important, KYC-AML is only one piece of a more complex puzzle. During the 2021 bull market, several DeFi protocols introduced features to improve KYC-AML compliance, but saw limited institutional traction.

In reality, institutions are more concerned about fragmented liquidity, technical risks, and the absence of robust, institutional-grade financial products. Without addressing these core issues, even the most compliant DeFi protocols will struggle to attract meaningful institutional participation.

## Wallets and Access

A significant challenge to institutional DeFi adoption lies in the underlying infrastructure, particularly around wallets and direct access to liquidity. While popular wallets like MetaMask dominate the retail space, they don't meet the needs of institutional players. For institutions, Fireblocks integration is essential. Most institutional allocators will only deploy capital into ecosystems that support Fireblocks, meaning chains lacking this integration will see limited institutional participation.

In addition, direct access to exchanges for governance tokens and stablecoins is crucial. Without easy on-and-off ramps for capital, both institutional and retail investors face friction. Offering seamless minting and redemption of stablecoins, alongside high-quality bridges, can help alleviate these barriers and create more fluid capital flows.

## Asset Listings and Liquidity

Another key factor holding back institutional adoption of DeFi is the insufficient coordination of asset listings and liquidity across ecosystems. For borrowing and lending platforms to function effectively, deep and liquid swap markets are essential for the assets they accept.

An example of an area of concern is the integration of Liquid Staking Tokens (LSTs) into these markets. Many platforms fail to support LSTs within their borrow-lend protocols, or they provide limited liquidity, which restricts capital efficiency and discourages participation. When LSTs have low liquidity in automated market makers (AMMs), Institutions face increased bad debt risk when lending at scale. For borrowing, Institutions face slippage and price impact risks for many strategies they might deploy.

## Proper Incentives Deployment

Incentive structures play a pivotal role in attracting institutional capital to DeFi ecosystems, but their effectiveness hinges on proper deployment and transparency. While institutions are drawn to incentive programs when allocating to new or existing chains, they require clear visibility into the scale, duration, and reliability of these programs. Without this clarity, short-term or volatile incentive structures can deter large institutional players from participating.

Institutions typically operate on medium-term capital allocation timelines, often looking to deploy funds for periods ranging from 1 to 3 months. Inconsistent or short-lived incentive programs not only create uncertainty but also fail to align with the strategic planning that institutions require. Consequently, larger players tend to avoid ecosystems with unpredictable or poorly structured incentives, as they cannot confidently assess the long-term value of their investments.

To successfully engage institutional participants, DeFi protocols must offer well-calibrated incentive programs that provide reliable timelines and measurable outcomes. A recent example is the PYUSD deployment on Solana, where a carefully structured incentive program led to improved liquidity, capital efficiency, and institutional participation.



## Risk Management: Addressing Security and Economic Models

Security and risk management are top concerns for institutions looking to invest in DeFi. DeFi protocols must not only provide robust security to protect against technical exploits but also offer clarity on economic model risks. Many incidents labeled as “hacks” are actually economic model exploits, which can result in significant losses for investors. Understanding macroeconomic factors that affect DeFi protocols is critical for institutions, and providing this level of insight is a key to unlocking larger allocations.

## Overcoming Liquidity Constraints

For institutional players, the ability to deploy and unwind large amounts of capital is more important than high-yield opportunities. Deep liquidity pools, tight spreads, and reliable exit routes are essential for minimizing risk and ensuring that institutions can efficiently manage their positions.

In the current DeFi space, one of the most significant barriers to institutional adoption is the fragmented liquidity across various chains and protocols. Lack of liquidity is one of the main drivers of [AMM](#) and [Lending](#) risks and these risks can be symbiotic. For a borrowing and lending platform to function effectively, there needs to be deep liquidity in the swap markets for accepted assets. When liquidity is shallow, bad debt risks can increase as it becomes more difficult for liquidators to liquidate positions for a profit. Ensuring that liquidity is concentrated, particularly in assets like liquid staking tokens (LSTs), can significantly reduce friction and make DeFi more appealing to large-scale investors.

Key Challenge	Impact
Regulatory Uncertainty	Drives institutions to seek clearer regulatory environments or prevent participation, limiting DeFi adoption.
Wallet and Access Issues	Lack of institutional-grade solutions limits participation and capital flow.
Asset Listings and Liquidity	Prevents the efficient usage of DeFi tokens across the ecosystem.
Inconsistent Incentives	Unpredictable or short-term programs deter medium-term capital allocations.
Risk Management Concerns	Lack of insight into economic risks and security concerns hinder large-scale investments.
Fragmented Liquidity	Increases borrowing risks and reduces capital efficiency.

## Bridging DeFi's Institutional Adoption Gap

The future of institutional DeFi depends on creating infrastructure that meets institutional standards. Solutions include offering institutional-grade wallets, seamless capital on-and-off ramps, incentive structures, and robust risk management solutions.

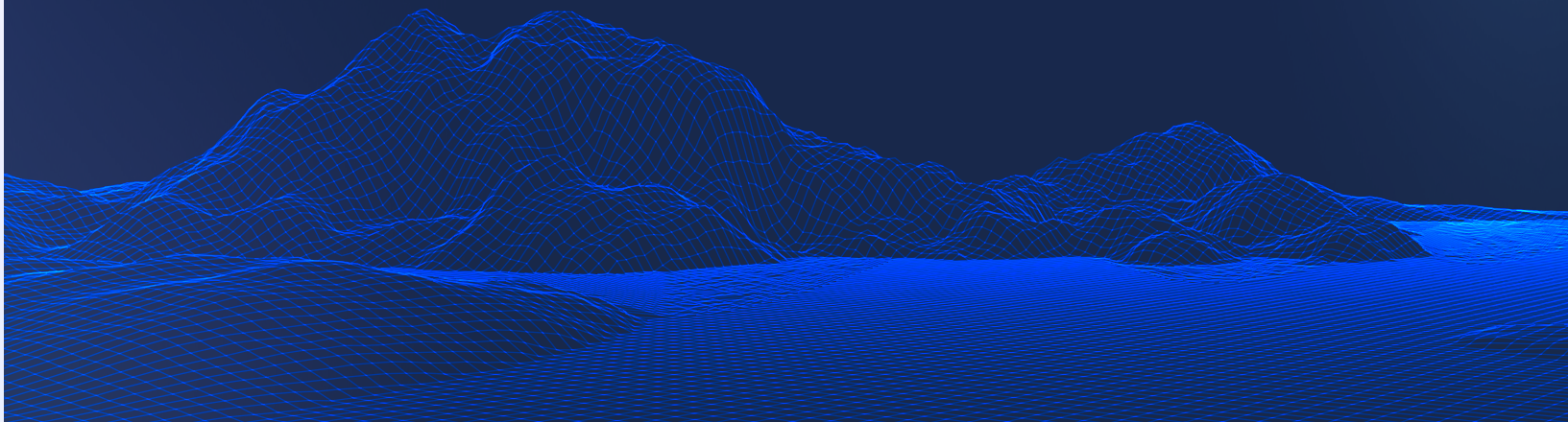
To enable institutional-grade capabilities, there are three primary approaches:

- **Top-Down Approach:** This focuses on building financial products that address the limitations of current DeFi protocols, such as improving capital efficiency and reducing capital fragmentation. For example, new decentralized exchanges (DEXs) or lending platforms could enhance scalability and interoperability, making them more attractive for institutions.
- **Bottom-Up Approach:** This involves developing native institutional capabilities directly within DeFi protocols, such as institutional-first liquidity pools or advanced insurance primitives. Protocols like Uniswap v4 or Aave v4 are beginning to explore this, offering opportunities to tailor DeFi products to institutional needs.
- **Shortcut Approach:** This approach brings existing financial products with significant institutional adoption into DeFi, such as tokenized assets or derivatives. Products like wBTC and stETH have gained traction in DeFi, and similar innovations could bridge institutional finance with decentralized markets.

By addressing these challenges head-on, DeFi can evolve into a parallel financial system capable of supporting the large-scale capital allocations that institutions bring.

06

# Closing Words



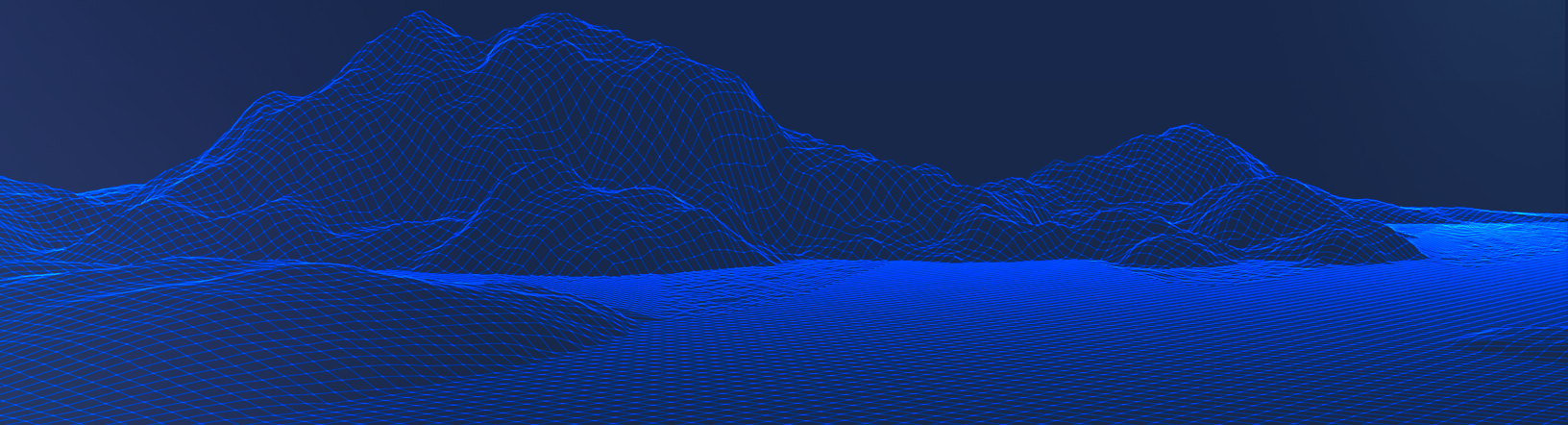
DeFi has come a long way since its inception in 2015, evolving into a dynamic ecosystem that spans decentralized exchanges, lending protocols, and liquid staking platforms, with billions of dollars of capital locked in these systems. Despite these achievements, DeFi's journey is far from over. The underlying technologies continue to drive fascinating innovations—like real-world yield through smart contract-enabled applications, IP fractionalization, yield aggregators, and protocol-based credit systems—signaling that DeFi is only beginning to reveal its true potential.

However, for DeFi to fully realize its transformative vision, significant hurdles remain, particularly in attracting traditional financial institutions. Addressing core infrastructure issues—such as institutional-grade access, risk management, and liquidity constraints—will be key to driving broader adoption. Solving these challenges will unlock an immense amount of capital, allowing institutional players to confidently engage with DeFi's opportunities.

As we solve the challenges discussed in this paper, the synergy between centralized finance and DeFi will likely strengthen, creating a financial system where blockchain powers the services behind the scenes, offering seamless and efficient solutions without the user even realizing it.

Looking ahead, traditional financial institutions must explore how to integrate DeFi technologies into their frameworks. At the same time, DeFi protocols must continue to innovate, focusing on solutions that not only advance the ecosystem but also support the maturity needed for institutional participation. By aligning innovation with institutional needs, DeFi could become a cornerstone of the future financial landscape.

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With over two decades of experience across top-tier banks like HSBC, Barclays, and UBS, DeMartino has excelled in trading and leadership roles. He transitioned to crypto in 2021, founding Coinbase Risk Strategies to focus on DeFi and derivatives trading. More recently, he launched Trident Digital Group, specializing in lending, safe yield generation, and stablecoin adoption.

[LinkedIn](#)



# *DeFi's Next Frontier*

Institutional Opportunities, Challenges,  
and the Path Forward

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