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A Decade of Digital Assets: From Experiments to a New Financial Architecture

Oct 2025

About

The Global Finance & Technology Network (GFTN) is a Singapore-headquartered organisation that leverages technology and innovation to create more efficient, resilient, and inclusive financial systems through global collaboration. GFTN hosts a worldwide network of forums (including its flagship event, the Singapore FinTech Festival); advises governments and companies on policies and the development of digital ecosystems and innovation within the financial sector; offers digital infrastructure solutions; and plans to invest in financial technology startups through its upcoming venture fund, with a focus on inclusion and sustainability.

For more information, visit www.gftn.co

The Singapore FinTech Festival is a global nexus where policy, finance, and technology communities converge. Designed to foster impactful connections and collaborations, SFF is a platform to explore the intersections of cutting-edge financial solutions, evolving regulatory landscapes, and the latest technological innovations.

Through insightful sessions, roundtables, workshops, exhibitions and much more, SFF is an immersive discovery and dialogue of the future trajectories of financial services and the overarching digital transformation reshaping global economies.

For more information, visit www.fintechfestival.sg

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Executive Summary

The decade from 2016 to 2025 represents one of the most transformative periods in the history of finance and technology. What began as a niche experiment with Bitcoin has evolved into a robust, multi-trillion-dollar digital assets ecosystem, challenging and complementing traditional financial services.

This report, the second in a series commemorating the 10th anniversary of the Singapore FinTech Festival (SFF), charts this remarkable journey. Part I celebrates this progress: the maturation of blockchain technology, the emergence of meaningful regulatory frameworks, the shift of institutional capital, and the groundbreaking innovations of decentralized finance (DeFi) and tokenization.

Looking ahead, Part II outlines the critical pathways for sustainable growth over the next decade. The future lies in seamless interoperability, preserving the role of central bank money, building out of institutional infrastructure, the powerful convergence of AI and blockchain, and a steadfast commitment to sustainability.

Our inaugural Global Digital Assets Report[1] to be launched at this year's SFF will also study these key themes, sector development and regulation in greater detail.

Part III addresses the significant, unresolved challenges that must be collectively overcome - solving the blockchain trilemma, harmonising global regulation, simplifying user experience, balancing transparency with privacy, and fortifying security against sophisticated threats.[2]

The next decade will increasingly be defined by utility. The foundational work of the past ten years has set the stage for a new financial architecture - one that is more open, programmable, inclusive, and efficient. Through continued collaboration between innovators, regulators, and traditional institutions, this potential can be fully realised.

1. GFTN (2025), Global Digital Assets Report
2. FSB (2024), G20 Crypto-Asset Policy Implementation Roadmap: Status report

1 Celebrating a Decade of Progress

1.1 Introduction: A Decade of Disruption and Discovery

The inaugural Singapore FinTech Festival in 2016 coincided with a pivotal moment – Ethereum went live, introducing the concept of a programmable blockchain and smart contracts. The initial conversation was dominated by ICOs (Initial Coin Offerings), wild price volatility, and a profound sense of both excitement and scepticism.

Ten years on, the landscape has changed vastly. The term "crypto" has been expanded to encompass the broader, more mature concept of "digital assets". The narrative has shifted from purely "disrupting banks" to "transforming financial market infrastructure". This evolution has been driven by relentless technological innovation, a painful but necessary process of market cycles, and crucially, the proactive engagement of regulators and policymakers in forward-thinking jurisdictions like Singapore.

This report caps this tumultuous, and incredibly productive decade. It aims to provide a balanced, comprehensive analysis for policymakers, financial institutions, technologists, and investors gathering at the 2025 Singapore FinTech Festival. We celebrate the progress, map the future opportunities, and confront the challenges that remain. The journey of digital assets is a testament to human ingenuity and a preview of a more digitized, efficient, and accessible global economy.[3]

The first decade of the modern digital asset era can be characterised by key pillars of progress – technological, regulatory, decentralized finance (DeFi), tokenization and institutional adoption - that moved digital assets from theoretical concepts to functional, value-generating systems.

1.2 The Technological Progress of Blockchain

The underlying blockchain technology has evolved through distinct generations, each solving critical limitations of its predecessor.

The Currency Era (2009-2015): Bitcoin's innovation was proving that digital scarcity and decentralized consensus were possible. Its blockchain served as an immutable ledger for a single asset: bitcoin. The focus was on security, resilience, and decentralization, but functionality was limited.[4]

The Programmable Era (2015-2021): The 2015 launch of Ethereum was a paradigm shift. By introducing an Ethereum virtual machine (EVM), it allowed developers to write smart contracts and build decentralized applications (dApps) to perform and manage conditional transactions on a blockchain network. This unlocked a multitude of possibilities beyond simple payments, including tokens, early DeFi and Non-Fungible Tokens (NFTs). However, scalability issues became apparent, leading to high gas fees and slow transaction times during periods of congestion.[5]

The Scalability and Specialization Era (2021-2025): This period has been defined by development of a variety of technical architectures designed to solve the blockchain trilemma. Key innovations include:

- **Layer-2 Scaling (L2s):** Rollups (optimistic and zero-knowledge) that batch transactions on a secondary layer of off-chain network before settling on a base layer such as Ethereum, dramatically increasing throughput and reducing costs.[6]
- **Alternative Layer-1s (L1s):** High-performance networks like Solana, Avalanche, and Sui that prioritise speed and low cost through novel consensus mechanisms beyond the traditional Proof-of-Work or Proof-of-Stakes (PoS) such as hybrid Proof-of-History/PoS, Byzantine Fault Tolerance and subnets and parallel execution.
- **App-Chains:** The rise of sovereign blockchains or dedicated application-specific chains (e.g., leveraging Cosmos SDK, Polygon Supernets) that sacrifice some decentralization for maximum performance and customisation for a single dApp.[7]
- **Modular chains:** Led by platforms like Polkadot and Celestia represent a paradigm shift by separating core blockchain functions of execution, consensus, settlement, and data availability into dedicated, modular, interoperable layers compared to monolithic architecture where all core functions are on a single chain. This enables better scalability as multiple specialised layers could run in parallel, each optimised for specific function.[8]
- **Interoperability protocols:** Due to the proliferation of different blockchain networks, interoperable protocols like LayerZero and Chainlink's CCIP (Cross Chain Interopera-bility Protocol) has emerged to solve the

3. New York Fed (2024), The Financial Stability Implications of Digital Assets
4. US News (2025), The History of Bitcoin - Investing
5. Marr (n.d), Blockchain: A Very Short History Of Ethereum Everyone Should Read
6. Butherin (2024), Scaling Ethereum L1 and L2s in 2025 and beyond
7. Gate (2024), Appchains: The Future of Specialized Blockchain Solutions
8. Polkadot (2025), What is a modular blockchain? Polkadot's architecture explained

cross-chain interoperability, liquidity, and communication challenges introduced by multi-chain ecosystems.

This rapid technological evolution has provided a rich toolkit for builders, moving the industry to a diverse, multi-chain ecosystem.

1.3 The Regulatory Evolution

The Wild West (2017-2019): The early ICO boom was characterised by a regulatory vacuum, leading to rampant fraud and investor losses. Enforcement actions, notably by the United States (US) Securities and Exchange Commission (SEC), began to define boundaries and assert that many tokens were securities, establishing a clear precedent and beginning regulatory enforcement in the sector.[9]

The Formative Period (2020-2023): Regulators began to engage the industry more constructively. The Financial Action Task Force (FATF) issued its "Travel Rule" guidance for VASPs (Virtual Asset Service Providers) mandating the collection and transmission of originator/beneficiary information for crypto transfers over specific thresholds to combat money laundering.[10] Jurisdictions such as Singapore, Switzerland, Japan and the European Union (EU) started building comprehensive licensing regimes (e.g., Singapore's Payment Services Act 2019, Japan's Payment Services Act 2022 Amendment, and EU's Markets in Crypto-Assets (MiCA) regulation).

The Maturing Framework (2024-2025): This period has been defined by the implementation of landmark, holistic legislation. The EU's Markets in Crypto-Assets (MiCA) regulation, enacted and implemented in phase from 2024, provides a comprehensive rulebook for the 27-nation bloc, creating clarity and a passporting regime. The Guiding and Establishing National Innovation for U.S. Stablecoins (GENIUS) Act was also signed into law in July 2025. The US House of Representatives also passed the Digital Asset Market CLARITY Act which defines when tokens are treated as either a security or commodity clarifying the jurisdiction of SEC and Commodity Futures Trading Commission (CFTC), and the Anti-CBDC Surveillance State Act to prevent launch of a US central bank digital currency (CBDC) without Congressional approval, specifically preventing the Federal Reserve from issuing retail CBDCs. Hong Kong's Legislative Council had also passed its Stablecoins Ordinance in May 2025, establishing a mandatory licensing regime for fiat-referenced stablecoin[11].

Other jurisdictions have followed with their own tailored frameworks (see Figure 1 on page 7). The focus has shifted from outright prohibition to regulating entities and activities, protecting consumers, ensuring market integrity, and preventing financial crime.

The result is a more stable and predictable environment for legitimate businesses to operate, attracting institutional capital and fostering responsible innovation.

We delve deeper into regulatory development in our Global Digital Asset Report to be launched at this year's SFF.

1.4 The Institutional On-Ramp: Mainstream Adoption and Sophisticated Financial Instruments

The increasing entry of traditional financial institutions has been the single most important validator of the digital assets class.

- **Corporates:** Tesla and MicroStrategy (now Strategy) multi-billion dollar Bitcoin treasury allocations in 2020 and 2021 signalled that digital assets were a legitimate store of value and hedge against inflation. Both companies disclosed their purchases in SEC filings and public earnings calls, sparking widespread corporate interest in digital assets.[12]

  While large accumulators like Strategy continue to grow their bitcoin positions, more broadly corporates that employ such Digital Assets Treasury (DAT) strategies are seeking diversification. As of October 2025, 228 public companies have announced DAT strategies channelling US$148 billion into bitcoin and alternative digital assets such as Ether, and Solana although longer-term sustainability[13] and wider acceptance of DAT strategies by Asian stock exchanges remains to be seen.[14]

- **Asset Managers:** The launch of Bitcoin and Ethereum Futures exchange traded funds (ETFs) in 2021 and 2023 respectively provided a familiar, regulated wrapper for traditional investors. The subsequent approval of Spot Bitcoin ETFs in the US in early 2024 unleashed a wave of institutional capital, effectively commoditizing bitcoin exposure for the wealth management industry.[15] As of September 2025, Bitcoin and Ethereum ETFs held over US$175 billion in digital assets up 169% from US$65 billion a year ago.[16]

- **Banks and Custodians:** Major institutions like BNY Mellon, JPMorgan, DBS and State Street launched digital assets custody and trading services, using secure enterprise-grade custody tech, and regulated operational processes.[17] These platforms are integrated

9. U.S. Securities and Exchange Commission (2017), Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO
10. 21 Analytics (n.d), What Is the FATF Travel Rule
11. New York Law Journal (2025), Cryptoweek
12. Decrypt (2021), Elon Musk's Tesla Has Invested US$1.5 Billion Into Bitcoin
13. Forbes (2025), Inside The $150 Billion Bitcoin Treasury Boom Shakeout
14. Bloomberg (2025), Asia's Biggest Stock Exchanges Push Back Against Companies Hoarding Crypto
15. Investopedia (2024),Spot Bitcoin ETFs: Everything You Need to Know
16. A16zcrypto (2025), State of Crypto 2025: The year crypto went mainstream - a16z crypto
17. Safeheron (2025), Top Banks Offering Crypto Custody Services in 2025

Fig. 1: Digital Assets Regulation Landscape by country

	Regulatory Framework	Licensing / Registration	Travel Rule	Stablecoins
United States	✓	✓	✓	⧖
European Union	✓	✓	✓	✓
United Kingdom	⧖	✓	✓	⧖
Argentina	⧖	✓	⧖	☰
Australia	⧖	⧖	⧖	⧖
Bahamas	✓	✓	✓	✓
Bahrain	✓	✓	✓	⧖
Brazil	⧖	⧖	⧖	⧖
Canada	⧖	✓	✓	⧖
Cayman Islands	✓	✓	✓	✓
Gibraltar	✓	✓	✓	✓
Guernsey	✓	✓	✓	✓
Hong Kong SAR	✓	✓	✓	⧖
India	⧖	☰	✓	☰
Isle of Man	✓	✓	✓	✓
Japan	✓	✓	✓	✓
Kenya	⧖	⧖	☰	☰
Liechtenstein	✓	✓	✓	✓
Mauritius	✓	✓	✓	⧖
Norway	⧖	✓	✓	⧖
Qatar	⧖	⧖	⧖	☰
Saudi Arabia	⧖	✓	⧖	☰
Singapore	✓	✓	✓	⧖
South Africa	✓	✓	✓	⧖
Switzerland	✓	✓	✓	✓
Taiwan	⧖	⧖	✓	☰
Turkey	⧖	⧖	✓	☰
UAE	✓	✓	✓	✓
Ukraine	⧖	⧖	⧖	⧖

✓	Legislation/regulation in place	Signifies that extensive crypto legislation/regulations have been established.
⧖	Active legislative/regulatory engagement	Indicates that there is ongoing activity, such as regulatory discussions, consultations, or pending implementation of crypto-related laws and regulatory frameworks.
☰	Legislative/regulatory process not initiated	Implies that the jurisdiction has not yet started formulating or considering specific crypto asset legislation or regulatory frameworks.

Source: PwC (2025), Global Crypto Regulation Report

with institutional market structure, ensuring lawful, insured, and seamless allocation of digital assets for asset managers, funds, and wealthy individuals - critical infrastructure for the next era of institutional participation.

- **Government Reserves:** As one of the first major economies to do so, the US established a Strategic Bitcoin Reserve and a Digital Asset Stockpile through Presidential executive order in March 2025.[18] This is in addition to buildup of Bitcoin reserves by countries such as Bhutan and El Salvador.[19]

- **Financial Instruments:** The ecosystem started to develop its own sophisticated financial instruments: derivatives (futures, options, perpetual swaps), lending markets, and structured products, creating a mature market structure akin to traditional finance. Reflecting this, CME Group crypto products saw a 140% year-on-year increase in average daily volume to reach US$10.5 billion in notional daily value traded in the second quarter of 2025. Regulated trading volumes in Micro Ether and Ether options are also at record highs.[20]

This institutionalisation has increased liquidity, and reinforced digital assets' role in global portfolios.

1.5 The Rise of DeFi

Decentralized Finance (DeFi) emerged as the "killer app" for programmable blockchains, recreating core financial services - like trading, lending, and stablecoins - in a permissionless, transparent, and composable way. This demonstrated the possibility and flexibility of blockchain technology for constructing new forms of market infrastructure.

The DeFi Summer (2020): The explosive growth of protocols like Uniswap (automated market makers), Aave and Compound (lending/borrowing), and Dai (stablecoins) demonstrated a new model for financial infrastructure. For the first time, users accessed permissionless lending, decentralized exchanges, and algorithmic stablecoins, sparking the movement dubbed “DeFi Summer”.[21]

Key Innovations include:

Automated Market Makers (AMMs): Replaced traditional order books with liquidity pools, enabling seamless trading of token pairs.[22]

Yield Farming and Liquidity Mining: DeFi offered users incentives to supply liquidity, distributing rewards and governance tokens, rapidly expanding user bases and Total Value Locked (TVL) across protocols.

Composability: The ability for protocols to seamlessly integrate and build on top of each other, enabling complex financial strategies executed in a single transaction.

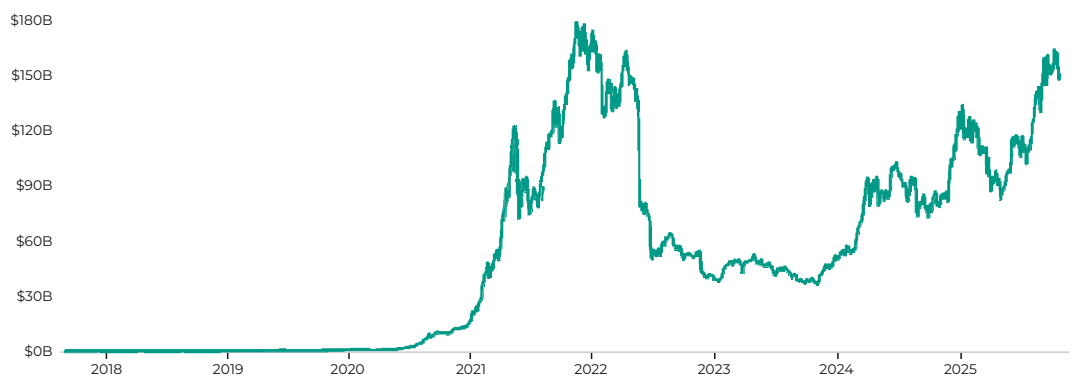
Total Value Locked (TVL): Represents the total value of cryptocurrency / digital assets staked or locked within DeFi protocols is a key indicator of the health and popularity of a DeFi project. TVL grew from less than US$1 billion in early 2020 to over US$159 billion at its 2025 peak (see Figure 2), representing massive capital formation in a decentralized system.[23]

Despite setbacks from hacks and scams, DeFi has proven its resilience and utility, creating a parallel financial system with global access and unprecedented transparency.

1.6 The Tokenization of Assets, Identity, and Money

The concept of representing real-world and digital assets on a blockchain has moved from theory, through large-scale pilot, into active production.

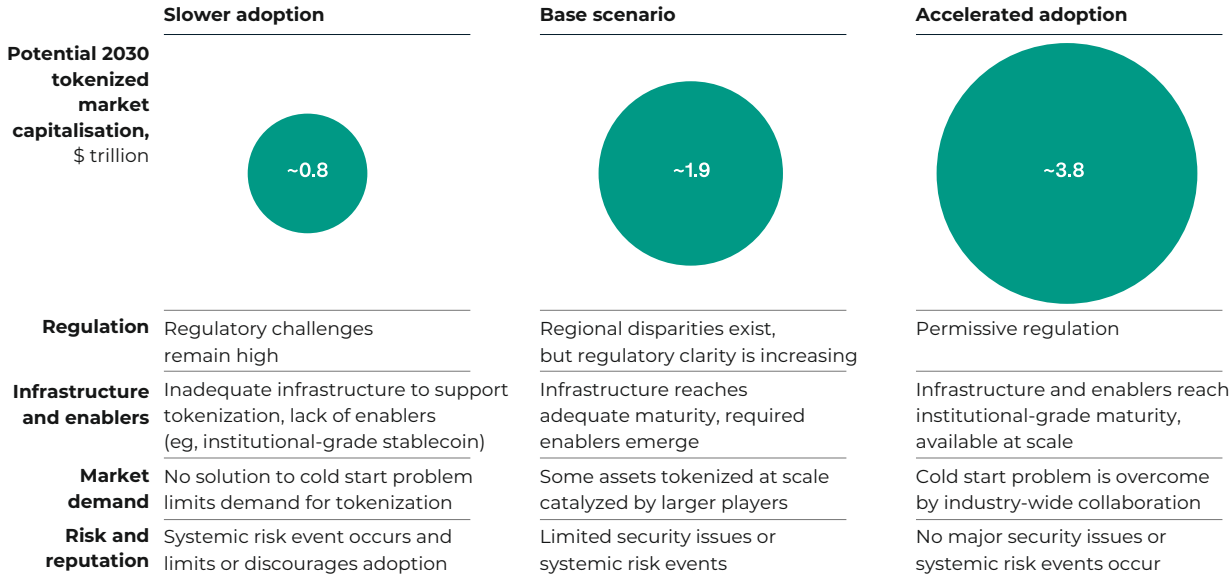
Fig. 2: Total Value Locked (TVL) in DeFi



Source: DeFiLlama DeFi Dashboard (accessed 15 Sep 2025)

[18] White House (2025), Establishment of the Strategic Bitcoin Reserve and United States Digital Asset Stockpile
[19] Cointelegraph (2025), Top Countries Secretly Holding Bitcoin in 2025
[20] CME Group (2025), Crypto Insights July 2025
[21] Rika (2025), Breaking Down Decentralized Finance (DeFi)
[22] Coinrank (2025), Uniswap: The Past, Present, and Future of Decentralized Trading
[23] DefiLlama (2025), DeFi Dashboard

Fig. 3: Potential Scale of RWA Tokenization



Source: McKinsey (2024), Tokenized financial assets: From pilot to scale

Real-World Assets (RWA): Tokenization of real-world financial assets including Treasury bonds, private credit, real estate, and commodities, has become a leading sector. According to McKinsey, the market capitalisation for tokenized traditional assets could reach US$1.9 trillion by 2030 in a base-case scenario (Figure 3)[24], as more institutions and investors adopt blockchain for operational efficiency, accessibility, and fractional ownership.

Tokenized U.S. Treasuries market size surged past US$7.45 billion in the third quarter of 2025, led by both institutional demand and increasing regulatory clarity, with platforms like BlackRock's BUIDL representing a defining move by the world's largest asset manager into tokenized finance and Abu Dhabi's Realize funds enabling on-chain exposure to sovereign debt.[25]

Private credit, characterised by high barriers to entry, limited liquidity, and cumbersome back-office operations has its tokenization market size surged to more than US$16 billion.[26]

Non-Fungible Tokens (NFTs): Evolved beyond digital art and collectibles (e.g., Bored Ape Yacht Club) to represent tangible utility: ticketing, membership passes, intellectual property rights, and academic credentials. NFT-backed ticketing systems eliminate fraud, support programmable benefits, and integrate with major platforms such as Eventbrite. Credentials and professional certificates are increasingly issued as NFTs, allowing secure, verifiable proof of qualifications or rights on-chain.[27]

The World Wide Web Consortium (W3C) Verifiable Credentials Data Model v2.0, standardized in May 2025, provides the global open standard for structuring, issuing, and verifying digital credentials, enabling a broad range of applications from university degrees to government identities, health records, and travel documentation.[28]

Central Bank Digital Currencies (CBDCs): Central banks consider CBDCs as a tokenized form of sovereign currency, offering settlement finality, efficiency, and programmable features unattainable with traditional cash.

According to a Bank of International Settlements (BIS) survey released in August 2025, 91% of central banks (85 out of 93 surveyed) were working on retail or wholesale CBDCs or both.[29] This includes active retail usage in countries such as Nigeria's CBDC e-Naira, China's digital yuan/e-CNY pilot rolled out in 29 cities, and pilot launches in the euro area (digital euro). Monetary Authority of Singapore (MAS) launched SGD Testnet pilot in November 2024 under Project Guardian for financial institutions to market test Singapore Dollar wholesale CBDC as a common settlement asset. The Swiss National Bank also piloted a Swiss franc wholesale CBDC to settle transactions with DLT-based, tokenised bonds on the trading and settlement platform SIX Digital Exchange.

Uptake has been mixed - China's digital yuan processed 7 trillion (US$986 billion)[30] in cumulative transactions by mid-2024, yet the pace of adoption among consumers remains gradual. The euro area is finalising the digital euro rulebook, with pilots underway.[31]

Stablecoins: These are designed to maintain a stable value by pegging to fiat currencies, commodities, or other assets, making them important to the evolution of digital finance

[24] McKinsey (2024), Tokenized financial assets: From pilot to scale
[25] Chainup (2025), How Tokenized Treasury Bonds & Private Credit Are Redefining Traditional Finance
[26] InvestaX (2025), The Institutional Guide to Tokenizing Private Credit
[27] Onchain Magazine (2025), The Changing NFT Landscape: A Market in Evolution
[28] EBSI (2025), W3C VCs and VPs
[29] BIS (2025), Advancing in tandem - results of the 2024 BIS survey on central bank digital currencies and crypto
[29] Forbes (2024), A 2025 Overview Of The E-CNY, China's Digital Yuan
[31] ECB (2025), Progress on the preparation phase of a digital euro – Third progress report

and payments. 2025 has seen an explosion of interest especially for fiat based stablecoins with the regulatory clarity offered by US Genius Act, EU's MiCA, Singapore's Stablecoin Framework and Hong Kong's Stablecoins Ordinance. Financial Institutions such as Bank of America, Citi, BBVA, ING, and FinTech such as Stripe and Fiserv, and even commercial firms like Walmart and Amazon, have announced their intention to launch stablecoins.[32]

The stablecoin market capitalisation has expanded by 451% since the first quarter of 2020, reaching US$253 billion as of June 2025. According to the International Monetary Fund (IMF) and BIS, the market size could jump ten-fold to approximately US$2 trillion by 2028.[33]

Tokenization is the bridge between the traditional economy and the blockchain world, promising to unlock trillions of dollars in latent value.

1.7 Digital Assets Milestones in Singapore Fintech Festival Journey

Singapore FinTech Festival (SFF) served as a platform to announce and showcase major international collaborations on digital assets led by the Monetary Authority of Singapore (MAS).

Project Ubin (2016–2020)

DLT for Payments and Settlement: In its early years, Project Ubin explored using Blockchain/Distributed Ledger Technology (DLT) for clearing and settling payments and securities. The project's first two phases explored proof-of-concept and software prototypes, inter-bank payment, and settlements using DLT. Phase 3 demonstrated DLT's Delivery versus Payment (DvP) settlement finality, interledger interoperability and investor protection capabilities. For Phase 4, MAS collaborated with the Bank of Canada and the Bank of England to jointly assess alternative models to enhance cross-border payments and settlements.

Following the conclusion of Project Ubin in 2020, MAS and Temasek worked with international banks DBS, J.P. Morgan, and Standard Chartered to launch Partior in 2021. This blockchain-based platform facilitates real-time, cross-border payments for financial institutions.

Project Guardian and Ubin+ (2022–2023)

Project Guardian[34], launched at SFF 2022, became an international collaborative initiative to explore asset tokenization in financial markets. It brought together a diverse ecosystem of over 40 central banks, regulators global financial institutions, and industry associations across seven jurisdictions.

Multi-jurisdictional collaboration: In October 2023, MAS expanded Project Guardian by forming a policymaker group with regulators from Japan (Financial Services Agency), Switzerland (Swiss Financial Market Supervisory Authority), and the United Kingdom (Financial Conduct Authority). The group aims to promote common standards and regulatory frameworks for digital assets.

Ubin+, launched at SFF 2022, built on the foundation of Project Ubin to expand cross-border CBDC pilots, notably collaborating with the New York Fed's Project Cedar to explore atomic settlement of cross-border cross-currency transactions using wholesale CBDC and the BIS's Project Mariana automated market making for wholesale CBDCs.

Global Layer One (2023)

Launch of Global Layer One (GL1): MAS and a core group of global banks including Citi, J.P. Morgan, and Societe Generale-FORGE, defined the business and governance requirements for GL1, a shared ledger infrastructure for tokenized assets to enable seamless, cross-border tokenized asset and payment transactions.

These projects have positioned Singapore as a global hub for digital asset innovation. They provide a blueprint for how regulators can engage proactively with the industry - not as a passive observer, but as an active participant in shaping a safe and efficient future for finance.

[32] Webopedia (2025), 14 Companies Launching Their Own Stablecoins
[33] DBS (2025), Insights_digital_asset
[34] MAS (2025), Guardian

2 Building Future Pathways for Growth

The next decade will be about building on this foundation, focusing on interoperability, integration, and infrastructure to achieve mass adoption.

2.1. The Interoperable Future: Cross-Chain and Multi-Chain Ecosystems

With users, liquidity, and data now spread over hundreds of distinct blockchains the future of digital assets is likely to be multi-chain. Seamless interoperability, the ability for value and information to freely flow across these siloed ecosystems, is increasingly seen as the next critical catalyst for mainstream growth.

The Interoperability Imperative: The rapid proliferation of L1 and L2 blockchains such as Ethereum, Solana, BNB Chain, and polygon fragments users and assets, creating "walled gardens". Growth, composability, and user experience demand frictionless connectivity that allows tokens, NFTs, and smart contracts to function cross-chain without introducing unacceptable security or user risks.[35]

Cross-Chain Bridges: Evolving from hack-prone, trusted models to more secure, trust-minimised bridges using advanced cryptographic proofs.[36]

Inter-Blockchain Communication (IBC) Protocols: Standards like the IBC protocol from Cosmos enable sovereign or app-specific chains to relay messages and tokens natively and securely.

Layer-0 Protocols: Networks such as Polkadot (with parachains) and Avalanche (with subnets) act as foundational layers that host interoperable blockchains, enabling shared security and scalability.

In a fully interoperable world, users can move tokens from one chain to another, interact with decentralized apps (dApps), or even trigger complex cross-chain transactions without needing to consciously manage underlying technical differences.[37] Ultimately, this “internet of blockchains” stands as the essential architecture underpinning the true Web3 economy delivering composability, choice, and access on a global scale.

2.2 Institutional-Grade Infrastructure: Custody, Trading, and Data

Institutional adoption of digital assets now hinges on infrastructure meeting the highest standards of traditional finance for security, compliance, and efficiency.

Custody: The industry has evolved from basic self-custody (a barrier for institutions) to regulated, insured, and technologically advanced custodial solutions using Multi-Party Computation (MPC) and hardware security modules (HSMs) to eliminate single points of failure and support advanced, programmable custody for billions in assets.[38]

Custodians like Standard Chartered (through Zodia), State Street, Coinbase Institutional, and Cobo offer global bank-grade custody, integrating KYT (Know Your Transaction), automated compliance, and cross-chain asset support.

Trading & Execution: The rise of institutional crypto venues (TP ICAP, Marex, Zodia Markets, Fireblocks) enables deeper liquidity, large-block trading, and complex order types, coupled directly with custodial settlements for seamless risk management and regulatory compliance. CME Group report US$13.6 billion daily notional volumes on regulated crypto trading networks in 2025. Bitcoin and Ethereum ETFs continue to drive institutional inflows and asset recognition.[39]

Data & Analytics: Reliable, real-time blockchain data (for pricing, risk scoring, compliance) is essential for institutional scale investments. Firms like Chainalysis, Glassnode, Elliptic, Nansen, and TRM Labs power institutional analytics: transaction monitoring, on-chain credit scoring, DeFi risk assessment, and suspicious wallet filtering.

The “Picks and Shovels” Layer

This infrastructure, from custody to analytics, is fast becoming an industry in itself, accelerating global institutional participation while enabling compliant, auditable, and liquid digital asset markets.

[35] Rubin (2025), Why interoperability in digital finance is now more than a 'nice-to-have'
[36] Brave New Coin (2025), Cross-Chain Interoperability in 2025: The Glue Holding DeFi Together
[37] Chainlink (2024), Blockchain Agnostic: What, Why, and How?
[38] State Street (2025), The future of digital asset custody: Building trust at scale
[39] Marex (2025), Meeting institutional demand for digital assets

2.3 Investments

Institutional investment is now the single most important force driving the maturation and adoption of the digital assets sector in 2025.

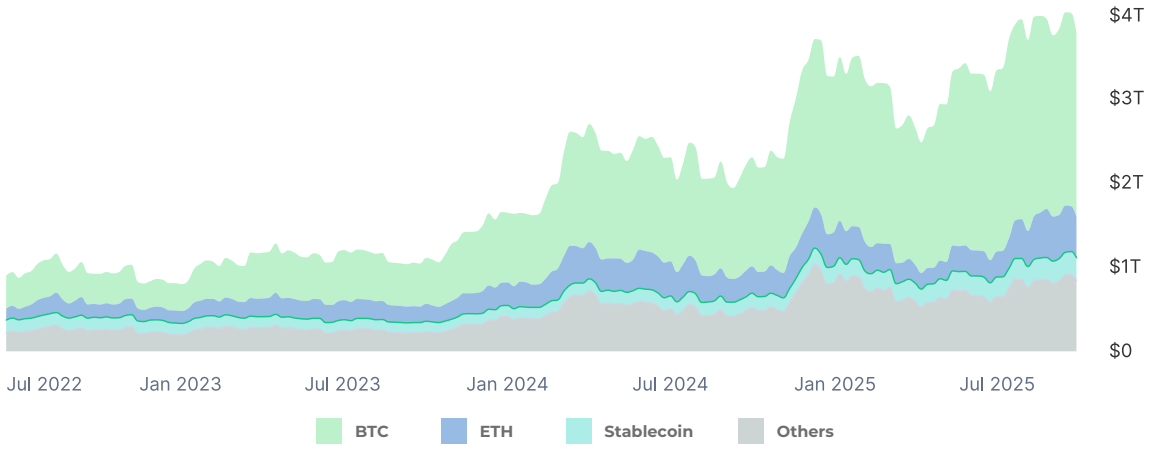
As of January 2025, an EY industry survey of 350+ global institutional investors found that 86% already have exposure to digital assets or plan to allocate to the sector this year. 85% of these institutions increased allocations to digital assets and related products in 2024; 59% plan to allocate more than 5% of their assets under management (AUM) to digital assets in 2025 - a marked shift from cryptocurrency as a peripheral asset toward it being a core component of institutional portfolios.[40]

Drivers cited include growing regulatory clarity, a rapidly expanding set of use cases, and opportunities for diversification, yield, and transactional efficiency. In the second quarter (Q2) of 2025, public cryptocurrency markets saw significant gains due to increased institutional interest, the rise of companies holding digital assets as treasury reserves, supportive US regulations, and positive macroeconomic trends to reach US$4 trillion in market capitalisation as of September 2025 (see Figure 4). Both Bitcoin and Ether have hit record highs (BTC US$122,000; ETH US$4,500) in the month of August.

However, despite this strong performance in public markets, venture capital (VC) investment in the crypto space experienced one of its weakest quarters since Q4 2020. This downturn reflects growing investor selectivity, a trend seen across the venture ecosystem, and the rise of vehicles like ETFs and digital asset treasury companies competing for investment allocation within the asset class.

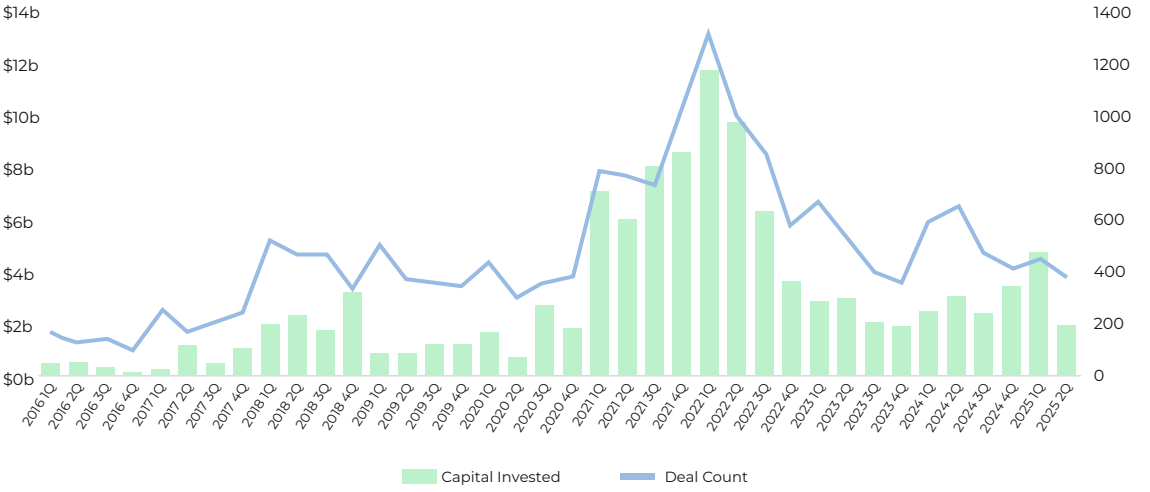
VC investments fell 59% to US$1.97 billion in Q2 2025 from US$4.8 billion in Q1 2025. Excluding the Binance mega deal of US$2 billion in Q1, the decline was 29% (see Figure 5). The top 3 verticals that saw VC investments in Q2 2025 were (i) Mining, (ii) Security/Privacy and (iii) Infrastructure (see Figure 6 on page 13).

Fig. 4: Cryptocurrency Market Cap



Source: Coinmarketcap Live Cryptocurrency Charts & Market Data (accessed 15 Sep 2025)

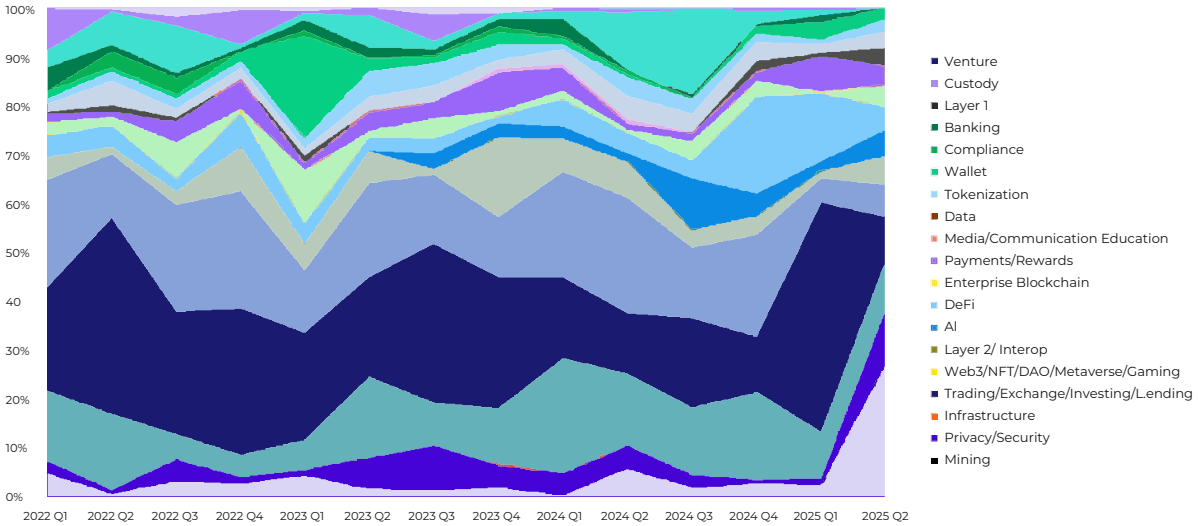
Fig. 5: Venture capital investment in Digital Assets



Source: Galaxy Research (2025), Crypto VC Trends Q2 2025: Deals, Capital & Sector Insights

[40] EY (2025), Growing enthusiasm propels digital assets into the mainstream

Fig. 6: Share of VC Investment by Vertical Q2 2025



Source: Galaxy Research (2025), Crypto VC Trends Q2 2025: Deals, Capital & Sector Insights

2.4 AI and Blockchain Convergence

The fusion of AI and blockchain is accelerating the transition to autonomous, intelligent digital economies. Each technology amplifies the other's strengths, creating a new paradigm for transparency, automation, trust, and value creation.

Decentralized Finance Artificial Intelligence (DeFAI): Autonomous AI agents are now starting to be deployed in DeFi potentially rebalancing portfolios, executing cross-protocol yield strategies, and detecting arbitrage, all trustlessly on-chain.[41] While autonomous AI agents offer operational efficiency and adaptive decision-making, its deployment in wider financial markets requires oversight, explainable architecture, and a process that is compliance by design. Regulatory convergence, between AI safety standards and financial conduct supervision, will determine their legitimate usage in decentralized and institutional finance.

Decentralized AI Training and Data Markets: Blockchain can create decentralized marketplaces for data and AI models, allowing individuals to monetize their data while preserving privacy and ensuring fair compensation for data contributors. These open data economies reward contributors with tokens, democratise access to AI infrastructure, resist censorship, and provide full transparency on data/model lineage.[42]

Enhanced Security and Analytics: AI can be used to audit smart contracts for vulnerabilities in real-time, simulate exploits, and automatically generate fixes, improving overall protocol security and resilience. On-chain fraud analytics, powered by AI and blockchain forensics such as Chainalysis is also able to operate transaction tracking at scale.[43]

Verifiable AI: Blockchain can provide an immutable audit trail for AI decision-making processes, addressing the "black box" problem and ensuring accountability.[44]

Our AI in Finance: A Decade of Progress and Pathways for Growth report further explored how ethical, explainable, and auditable AI, are essential for critical financial applications.[45]

These combined AI tech stacks enable new levels of automation and self-governing digital organisations, from trading to insurance, with agents optimising returns, enforcing rules, and adjusting strategies in real-time - all underpinned by verifiable data and unbreakable audit trails.

2.5 Quantum Computing and Blockchain

The relationship between quantum computing and blockchain technology is rapidly becoming a focal point for industry innovation, risk management, and future-readiness. Current blockchains are vulnerable to quantum attacks that could break their cryptographic security, but the development of "quantum-safe" or "post-quantum" cryptography (PQC) is addressing these risks. Additionally, researchers are exploring how quantum mechanics can enhance blockchain technology itself.

Blockchains, especially public protocols, primarily rely on elliptic curve cryptography (ECC) for digital signatures and public-key security. Quantum computers equipped with Shor's algorithm could break ECC and Rivest-Shamir-Adleman (RSA) encryption, posing existential risks to blockchain encryption and user keys, and consensus structures.[46] "Harvest now, decrypt later" attacks where

[41] Polkadot (2025), The rise of AI agents in crypto: how DeFAI is reshaping finance
[42] Gravity Team (2025), Decentralized AI: How Crypto and AI Are Shaping the Future
[43] Shinkai (2025), Unlocking the Future: How Crypto AI Agents Are Revolutionizing Digital Assets
[44] World Economic Forum (2024), How immersive technology, blockchain and AI are converging
[45] GFTN (2025), AI in Finance: A Decade of Progress and Pathways for Growth
[46] Ledger (2025), Bitcoin And Quantum Computing - is it a Threat?

hackers collect exposed public key data today to decrypt and steal funds when quantum computers become available. Quantum computers running Grover's algorithm could give certain groups or nations a quadratic speed-up in solving proof-of-work puzzles, potentially concentrating mining power in the hands of a few actors. If such an advantage became large enough, it could increase the risk of a 51% attack on the network. Leading quantum research at IBM, Google, and D-Wave shows accelerating progress, but most experts estimate a cryptographically relevant quantum computer may arrive between 2030 and 2035.[47,48]

Post-quantum cryptography (PQC): To secure blockchain networks against future quantum attacks, developers are integrating quantum-resistant cryptographic algorithms. The U.S. National Institute of Standards and Technology (NIST) has been leading efforts to standardise PQC algorithms such as lattice-based CRYSTALS-Kyber (Module-Lattice-Based Key-Encapsulation Mechanism) for general encryption, CRYSTALS-Dilithium (Module-Lattice-Based Digital Signature Algorithm), and hash-based SPHINCS+ (Stateless Hash-Based Digital Signature Algorithm) for protecting digital signatures.[49]

Quantum Key Distribution (QKD): QKD leverages quantum properties to create secure communication channels for distributing cryptographic keys, with eavesdropping attempts being physically detectable. Integrating QKD into a blockchain could make the key exchange process more tamper-proof[50] though large-scale implementation still faces significant infrastructure challenges.

Quantum randomness: Many cryptographic processes, including the generation of keys, rely on random numbers. Quantum mechanics can be used to generate truly random numbers (QRNGs), which are more secure and unpredictable than classical pseudo-random number generators.[51]

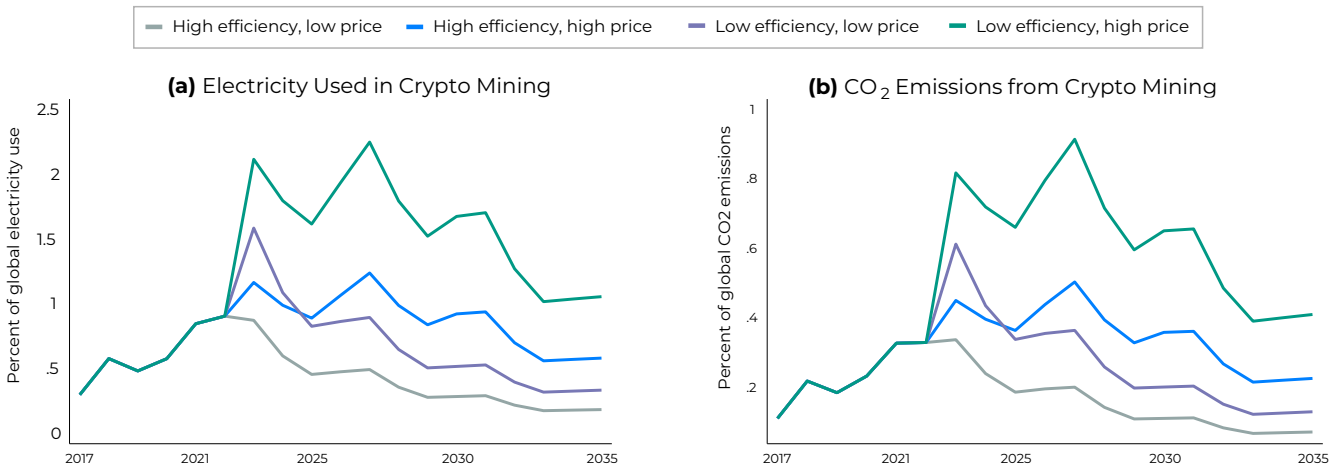
2.6 Sustainability by Design: Green Protocols and Regenerative Finance (ReFi)

The focus in blockchain space has dramatically moved away from energy-intensive Proof-of-Work (PoW) models to sustainability and positive environmental and social impact. IMF estimates crypto mining could generate 0.7% of global carbon dioxide emissions by 2027 (Figure 7).

The Merge (Ethereum's Transition to Proof-of-Stake): Ethereum's successful merge in 2022 shifted consensus from PoW to Proof-of-Stake, decreasing its energy consumption and greenhouse gas emissions by approximately 99.9%, according to the Cambridge Centre for Alternative Finance's latest benchmarking.[52] This move transformed Ethereum from one of the most energy-hungry blockchains to one closer in annual consumption to a small town, setting new industry standards and ambitions.

Green Protocols: Many new blockchains, including those using Proof-of-Stake (PoS), Delegated Proof-of-Stake (DPoS), or energy-optimized consensus, are launched with sustainability in mind, sometimes powered partially by renewables or featuring explicit carbon offset integration.[53] Projects like IOEN (Internet of Energy Network) connects Power Ledger which enables peer-to-peer energy trading of surplus via blockchain settlement showcase how blockchains can be core infrastructure for renewable energy management and local trading.[54]

Fig. 7: Projected Electricity Usage and Carbon Dioxide Emission of Crypto Mining



Note: Numbers up to 2022 are from Table 2. Numbers from 2023 onward are projected as described in Section 2 and the Appendix. CO_2 emissions are shown for a corresponding year, but not cumulatively.

Source: IMF Working Paper (2023), Cryptocarbon: How Much Is the Corrective Tax

[47] Cisco (2025), How Post-Quantum Cryptography Affects Security and Encryption Algorithms
[48] WEF (2022), Transitioning to_a_Quantum_Secure_Economy_
[49] NIST (2024), NIST Releases First 3 Finalized Post-Quantum Encryption Standards
[50] Uniblock (2025), Quantum Key Distribution (QKD) in Securing Blockchain Networks.
[51] Quantum Zeitgeist (2025), Researchers Demonstrate QuantumShield-BC Blockchain Framework
[52] CCAF (2025), New tool estimates environmental impact of blockchain networks - News & insight - Cambridge Judge Business School
[53] Rapid Innovation (2025), Sustainable Blockchain: Reducing Environmental Impact
[54] Wattcorp (2025), Blockchain and the Energy Sector in 2025: From Disruption to Infrastructure and why we need to start paying attention

Algorand: Carbon-Negative and Renewable-Powered

Algorand operates on a pure Proof-of-Stake (PoS) protocol, enabling energy use that is orders of magnitude below PoW blockchains. Algorand offset more emissions than it produces by buying carbon credits, making it one of the world's first "carbon-negative" blockchains.[55] The protocol also partners with renewable energy projects and commits to powering validator nodes with green energy, supporting Net Zero and eco-regenerative initiatives.

The **Crypto Climate Accord** a private sector-led initiative supported by Energy Web, RMI, the UNFCCC, and over 250 major organisations aim to drive all blockchains toward 100% renewable energy usage, with several networks already declaring full renewable operation.[56]

Regenerative Finance (ReFi): A movement aiming to use blockchain to create solutions that address global challenges like climate change and inequality. This includes:

- **Carbon Credit Tokenization:** Protocols like Toucan and KlimaDAO tokenize verified carbon credits, creating transparent, tradeable pools (e.g., Base Carbon Tonne which represents one tonne of carbon removed from the atmosphere) and integrating them into broader DeFi and climate action platforms. Hundreds of millions of dollars in carbon offsets have already been tokenized, allowing on-chain finance to help close the climate funding gap while increasing market transparency.[57]
- **Impact decentralized autonomous organisations (DAOs)** such as Gitcoin have directed over US$60 million to public-goods projects by leveraging quadratic funding and tokenized governance.[53] These models provide decentralised, democratic funding for green projects and broader ESG initiatives.

3 Addressing Unresolved Challenges

3.1 The Blockchain Trilemma: Security, Dencentralization and Scalability

No blockchain today has fully solved the trilemma of achieving peak scalability, high security, and maximum decentralization at the same time. Every design has to navigate trade-offs:

- **High-throughput chains** typically increase centralization (fewer validators) or accept weaker security parameters (e.g., Solana, some L2s).
- **Maximally decentralized or secure systems** can be slower, less scalable, and more expensive to use (e.g., Bitcoin, Ethereum mainnet).[59]

Data Availability Layers: Specialised blockchains like Celestia or EigenDA store and verify transaction data for rollups or L2s, allowing these secondary chains to inherit security without the main chain performing all computation.[60]

- **Data Availability Sampling (DAS):** A technical innovation pioneered by Celestia, DAS lets lightweight network participants confirm data is truly published-without downloading entire blocks-supporting scalable and secure rollups.[61]

Shared Security: Solutions like EigenLayer introduce "restaking," letting new chains or services 'borrow' security from Ethereum or other robust networks, instead of building a validator set and economic guarantees from zero.[62]

- **Actively Validated Services (AVS):** Modules such as oracles, data layers, and privacy protocols leverage pooled restaked ETH, aligning security incentives across the whole ecosystem.[63]

Continued L2 and Rollup Innovation

- **Zero-Knowledge (ZK) Technology:** Protocols like zkSync and Scroll leverage ZK-rollups to achieve high throughput and privacy while retaining strong security; by 2025, ZK-rollups routinely combine sub-cent transaction fees with thousands of TPS on Ethereum L2s.[64]

[55] Coingape (2025), Top 13 Carbon Negative Cryptos For 2025
[56] Crypto Climate Accord (2025), Crypto Climate Accord
[57] Carbon Credits (2023), Top 5 Carbon Crypto Companies to Watch in 2024
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[60] Symbolic Capital (2024), A Deep Dive into Data Availability: The Promises and Challenges of Scaling Web3
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[62] BlockSec (2024), Examining EigenLayer and Restaking from the Security Perspective - BlockSec Blog
[63] Coinbase Research Report (2025), A Panoramic Overview of the EigenLayer AVS Ecosystem
[64] Tap Chí Bitcoin (2025), ZKsync releases roadmap for 2025 with goals to improve performance and security on Binance Square

- **Validiums and hybrid solutions** allow massive scaling by posting data off-chain with on-chain proofs, addressing cost and bandwidth limits faced by base layers.

Solving the trilemma is a continuous, iterative process- not a one-time breakthrough. Each cycle brings new design paradigms (modular blockchains, pooled security, ZK proofs) that push the frontier, but nuanced trade-offs remain central to protocol architecture.

3.2 Global Regulatory Fragmentation and Compliance Hurdles

Fragmentation persists in definitions, licensing, and compliance: What qualifies as a security, commodity, or payment instrument continues to vary significantly. While the EU advances with MiCA, and the US navigates competing SEC and CFTC mandates, many Asia-Pacific regulators such as Hong Kong's Securities and Futures Commission, Singapore's MAS and Japan's Financial Services Agency are now formalising frameworks for digital assets through Digital Asset Service Provider (DASP/VASP) or stablecoin licensing regimes.

Licensing regimes and conflicting implementation of standards (such as the FATF Travel Rule) create significant operational burdens.[65] This "patchwork" has been flagged as creating complexity, legal risk, stifling innovation, and incentivising regulatory arbitrage.

International standard-setters push for global consistency: The Financial Stability Board (FSB), IMF, and FATF are intensifying efforts, via frameworks such as the FSB's "same activity, same risk, same regulation" and the G20 Crypto-Asset Policy Implementation Roadmap, to provide common guidance on digital assets activities that national authorities can adapt.

FATF's guidance on VASPs and Travel Rule are increasingly adopted, but enforcement and scope still diverge across regions, slowing progress.

Markets like the EU (with MiCA), UK, and the US (GENIUS, CLARITY Acts) are moving towards more unified and robust digital assets frameworks in 2025, but challenges to true cross-border equivalence remain.

Decentralized, non-custodial protocols remain a regulatory puzzle: DeFi platforms have no central entity and often lack a legal domicile, putting them outside many traditional regulatory perimeters.

The US Treasury's "Illicit Finance Risk Assessment of DeFi" (2023) highlights that most policy efforts will have to focus on "fiat on/off ramps" (centralized exchanges, stablecoin issuers, wallet providers), as these are where DeFi interacts with traditional finance and can be policed for anti-money laundering/counter terrorism financing (AML/CTF).[66]

Increasing international cooperation is observed in DeFi policy, with global bodies such as FSB and IOSCO releasing frameworks and principles for effective oversight, while the FATF Travel Rule is extended to cover DeFi actors where feasible.[67]

Our inaugural Global Digital Assets Report to be launched at this year's SFF studies these topics in greater detail.

3.3 User Experience and Onboarding: Bridging the Web2 and Web3 Gap

For mass adoption, using digital assets must become as simple and intuitive to use as current mobile apps and provide seamless user experience (UX).

Currently, several key friction points remain: Seed phrase management, unpredictable gas fees, failed transactions, and fear of irreversible mistakes - all remain daunting for the average user and stifle onboarding.[68]

Solutions on the Horizon

Account Abstraction (ERC-4337): Smart contract wallets, enabled by Ethereum's ERC-4337, let users recover accounts through social or multisig methods (not just seed phrases), enable "sponsored" or gasless transactions where dApps pay fees, and allow complex batch actions like paying multiple people at once.[69] User operations are validated by customizable smart contract logic, making the wallet programmable and enabling new UX, such as recurring payments or quantum-safe security.[70]

Web2-like Onboarding & Decentralized Identity: Projects now integrate "Sign in with Google/Apple" and other familiar methods using Decentralized Identifiers (DIDs) and Verifiable Credentials, so users retain self-custody and privacy without needing to write down sensitive phrases. DID standards (e.g., W3C DIDs v1.0) and decentralized identity wallets are letting users control which credentials

[65] PwC (2025), Global Crypto Regulation Report 2025
[66] US Treasury (2023), Illicit Finance Risk Assessment of Decentralized Finance
[67] FSB (2024), G20 Crypto-Asset Policy Implementation Roadmap: Status report
[68] CoinDesk (2025), Crypto's Biggest Barrier to Adoption? It's Not Regulation — It's UX
[69] Crypto.com University (2025), What Is Account Abstraction, and What Does It Do for Crypto Wallets?
[70] Binance Academy (2025), Ethereum Account Abstraction Explained (ERC-4337)

to share, driving seamless access across dApps and protocols while avoiding single points of failure.[71]

Improved Education: Major wallet companies and protocols are releasing clear, simple onboarding resources. Still, “UX is the killer app”— making the tech invisible is as important as regulatory or scalability breakthroughs to realising the next billion users. UI improvements, such as biometric logins, real-time notifications, push alerts, and automated in-app recovery, are normalizing Web3 for mainstream users.[72]

3.4 Privacy versus Transparent: Zero-Knowledge Proofs and Identity

Public blockchains like Bitcoin and Ethereum are fully transparent by design - all transaction details, addresses, and balances are visible to anyone. While this transparency enables auditability, it is unsuitable for sensitive personal or enterprise information, posing a major barrier for mainstream and institutional blockchain adoption.

Zero-Knowledge Proofs (ZKPs) allow someone to prove a statement is true without revealing any information beyond the proof itself, making them pivotal for on-chain privacy across several dimensions.

Private Transactions: Protocols such as Zcash (using zk-SNARKs) and Aztec (on Ethereum) enable users to send shielded transactions - hiding the sender, receiver, and amount from public view while retaining public verifiability.[73] Solana and others are pioneering confidential transfers with ZKPs for select institutional use cases.

Private Identity and Selective Disclosure: Solutions like zkPass and "zero-knowledge KYC" let users prove their eligibility (e.g., over 18 years old, accredited investor status) without exposing private documents.

Financial institutions such as ING have piloted ZKP-based systems for privacy-preserving AML/KYC, enabling selective disclosure under regulatory oversight.[74] The proposed hybrid architectures process sensitive info off-chain but verify proofs on-chain, addressing both privacy and compliance.

Private Smart Contracts/Business Logic: EY Nightfall 4.0 and similar ZK-rollup architectures facilitate private, scalable business operations-allowing companies to automate and enforce confidential contract terms or flows on public blockchains without disclosing business logic or states.[75] Enterprises are now able to audit contract execution and regulatory controls, including GDPR requirements without public disclosure of details.

FATF's June 2025 guidance explicitly highlights that digital onboarding, automated KYC via cryptographic proofs, and risk-based approaches (not one-size-fits-all) are fully legitimate as long as providers demonstrate they control for money laundering and terrorist financing risks. National regulators are advised to permit systems that reduce exclusion while leveraging innovative regtech like ZKPs and verifiable credentials, provided AML/CFT controls are “proportionate” to risk.[76]

Around 31% of DeFi projects now use ZKPs for KYC/AML while protecting user privacy; 50% of new DeFi protocols in 2025 integrate KYC at the smart contract level through proofs or verifiable credentials.[77]

The key future challenge is integrating ZKPs with "selective disclosure", so compliance checks (AML, CFT, KYC) can be performed without exposing broader user or transactional information.

3.5 Security: Mitigating Smart Contract Risks and Systemic Vulnerabilities

Billions lost annually: According to Immunefi, crypto companies suffered over US$1.64 billion in losses across 40 incidents in Q1 2025 alone, with bridge hacks, oracle manipulation, and smart contract exploits dominating.[78] Key threats include logic bugs, unchecked external calls, flash loan exploits, bridge/protocol cross-chain security lapses, oracle dependency exploitation, and classic phishing/social engineering attacks.

Building a More Resilient System

Mitigating smart contract and systemic vulnerabilities requires a multi-layered security approach, integrating secure design principles, advanced auditing, formal verification, and continuous monitoring. Since smart contract code is immutable once deployed, proactively addressing flaws is critical to prevent irreversible and costly exploits.

[71] W3C (2022), Decentralized Identifiers (DIDs) v1.0
[72] Crypto.news (2025), UX is the killer app for mass adoption in web3 | Opinion
[73] AInvest (2025), Zero-Knowledge Proofs Revolutionize Privacy in Digital Transactions
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[75] EY (2025), EY upgrades Nightfall, a zero-knowledge roll-up enabling private transactions on the Ethereum blockchain
[76] Ripjar (2025), FATF Financial Inclusion and AML/CTF Guidance 2025: Key Takeaways
[77] Coinlaw (2025), KYC Compliance in Crypto Statistics 2025
[78] Immunefi (2025), Crypto_Losses_In_Q1_2025.pdf

Advanced Auditing: These professional smart contract auditors, such as Certora, OpenZeppelin, CertiK combine deep manual review with automated static/dynamic analysis and fuzz testing, revealing both “known” vulnerability classes and novel exploit paths.

Formal Verification: Tools and practices such as Certora Prover, Move Prover, and in-house static analysis are being adopted to mathematically verify that code functions as intended for all scenarios, not just those caught by manual audits/testing.[79] Formal verification is now becoming increasingly common for high-value DeFi and cross-chain bridge protocols.

Decentralized Insurance: Protocols such as Nexus Mutual and Unslashed offer smart contract hack insurance, with total active cover in excess of US$190 million and real claims processed for DeFi hacks such as FTX, Hodlnaut.[80] Insurance coverage is governed by DAO voting, risk pools, and sometimes underwriter staking models, creating a decentralized market safety net.

Upgradeable contracts: Proxy patterns like Universal Upgradeable Proxy Standard (UUPS) allow for bug fixes and feature updates after deployment. While useful, this adds complexity and introduces new risks, such as centralized control over the upgrade mechanism.

Time-Locks and Multi-Sigs: Multi-signature wallets (e.g., Gnosis Safe, SafeDAO) and governance timelocks are standard for securing protocol upgrades, treasury management, and high-value transactions. Timelocks give communities time to review and contest malicious or erroneous changes before they take effect, lowering risk of "lightning raids" or insider hacks.[81]

5 Conclusion

The first decade of the Singapore FinTech Festival has mirrored the rise of the digital assets industry - from bold experimentation to becoming a trusted pillar of the global financial system. Since 2015, tremendous progress has been achieved - digital assets are moving from niche to increasingly play a foundational role for how capital, value, and innovation will flow globally.

The groundwork is laid, the next decade is for building.

The period from 2025 to 2035 will be defined by creating interoperable networks that speak to each other, institutional-grade infrastructure offering security and resilience, harmonised frameworks that span borders, and intuitive user experiences that rival the best of Web2 user experience.

This construct relies on continued collaboration - technologists must work for security and sustainability, regulators must set clear but progressive rules, institutions must integrate and embrace new technologies, and the spirit of public-private experimentation such as those that underpinned Singapore's Project Guardian and global collaboration must be sustained.

The promise of a more open, programmable, and inclusive global financial system is within reach. The next decade will be shaped not only by technological leaps in areas like tokenization, AI, and quantum-safe infrastructure, but by global commitment to responsible growth - addressing open challenges with the same blend of ingenuity and resolve that made the first era possible.

By working together and embedding responsibility and innovation at the core, the industry can ensure **the next ten years transform this progress into global financial opportunity and impact for everyone**.

[79] Blockchain App Factory (2025), Build a Smart Contract Formal Verification Platform Like Certora
[80] Blockchain App Factory (2025), Create a DeFi Insurance Protocol Like Nexus Mutual
[81] Veritas Protocol (2025), Unlock Enhanced Security: A Comprehensive Guide to Multi Signature Wallets in 2025

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