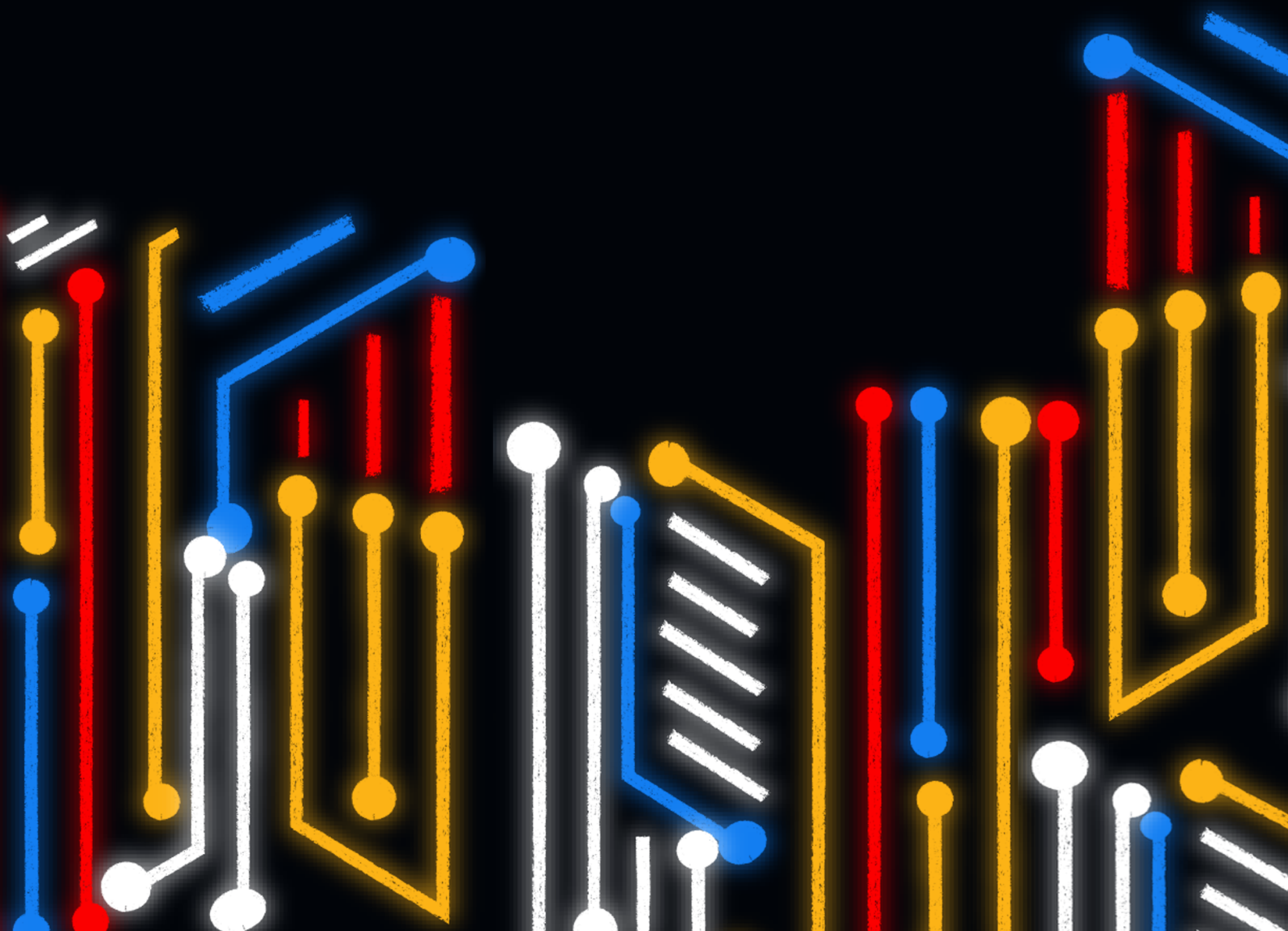


DIGITAL ASSETS AND WEB3

Insights from the Singapore FinTech Festival 2022





The Singapore FinTech Festival (SFF), the world's largest FinTech festival and global platform for the FinTech community, is organised by the Monetary Authority of Singapore (MAS) and Elevandi, in partnership with Constellar and in collaboration with The Association of Banks in Singapore.

SFF brings together the global FinTech community to engage, connect, and collaborate on issues relating to the development of financial services, public policy, and technology. For more information, please visit www.fintechfestival.sg

The theme of the Singapore FinTech Festival 2022 (SFF2022) was *Building Resilient Business Models amid Volatility and Change*. Key stakeholders comprising government leaders, regulators, financial services leaders, entrepreneurs, investors, digital asset firms, and technology leaders explored this theme across three key questions:

VIABLE

How are organisations building and redefining business models that can be more resilient to volatile market conditions?

RESPONSIBLE

How are organisations balancing corporate responsibility and profitability in order to achieve greater stakeholder satisfaction and engagement?

INCLUSIVE

How are organisations designing inclusive business models that cater to the needs of the unbanked and underbanked?

Oliver Wyman hosted the Digital Assets and Web3 Knowledge Plenary, roundtable sessions at the Elevandi Insights Forum, and was a sponsor of SFF2022.



Elevandi is set up by the Monetary Authority of Singapore to foster an open dialogue between the public and private sectors to advance FinTech in the digital economy. Elevandi works closely with governments, founders, investors, and corporate leaders to drive collaboration, education, and new sources of value at the industry and national levels. Elevandi's initiatives have convened over 300,000 people to drive the growth of FinTech through events, closed-door roundtables, investor programmes, educational initiatives, and research. Its flagship product is the Singapore FinTech Festival alongside fast-rising platforms, including the World FinTech Festival, Point Zero Forum, and the recently launched Elevandi Insights Forum.

For more information, please visit www.elevandi.io



Oliver Wyman is a global leader in management consulting. With offices in more than 70 cities across 30 countries, Oliver Wyman combines deep industry knowledge with specialised expertise in strategy, operations, risk management, and organisation transformation. The firm has more than 6,000 professionals around the world who work with clients to optimise their business, improve their operations, and risk profile, and accelerate their organisational performance to seize the most attractive opportunities. Oliver Wyman is a business of Marsh McLennan.

Oliver Wyman's Digital Asset team works with disrupters, incumbents, investors, and public policy makers to navigate the rapidly evolving digital assets landscape, assisting clients to redefine existing business models and create new ones, operate in a complex and uncertain regulatory environment, evaluate risks, and gain a deep understanding of the new ecosystem.

For more information, please visit www.oliverwyman.com/our-expertise/hubs/digital-assets



Monetary Authority
of Singapore

The Monetary Authority of Singapore (MAS) is Singapore's central bank and integrated financial regulator. As a central bank, MAS promotes sustained, non-inflationary economic growth through the conduct of monetary policy and close macroeconomic surveillance and analysis. It manages Singapore's exchange rate, official foreign reserves, and liquidity in the banking sector. As an integrated financial supervisor, MAS fosters a sound financial services sector through its prudential oversight of all financial institutions in Singapore — banks, insurers, capital market intermediaries, financial advisors and financial market infrastructures. It is also responsible for well-functioning financial markets, sound conduct, and investor education. MAS also works with the financial industry to promote Singapore as a dynamic international financial centre. It facilitates the development of infrastructures, adoption of technology, and upgrading of skills in the financial industry.

For more information, please visit www.mas.gov.sg.

FOREWORD

Singapore FinTech Festival (SFF2022) was a celebration of being together in person again, bringing together an energised ecosystem of global visionaries, founders, and leaders from all facets of the industry. As the world's largest FinTech festival, we had 62,000 participants from 115 countries, including 850 speakers and 295 government, policy makers, and regulator organisations discussing the most pertinent issues in the world of financial services today.

Digital assets and Web3 were a core theme of SFF2022. We saw 19 digital assets and Web3 plenary sessions covering topics as diverse as building resilient Web3 companies, unlocking TradFi with DeFi, and programmable money in Singapore. In addition, there were multiple meet-ups, networking events, exhibition booths, and round-table sessions in the Elevandi Insights Forum, exploring aspects of the ecosystem and the overarching theme. Speakers and panellists ranged from FinTech CEOs to leaders of financial institutions and regulators, and brought regional and global perspectives.

Attendees were cognisant of the turbulent macroeconomic climate ahead, rising interest rates, and the 'crypto winter', which set the scene for pragmatic yet optimistic discussions around how we as an industry can tackle the challenges and reap the rewards offered by digital assets and Web3.

We saw discussion invigorated by the prospects and opportunities presented by the underlying technology of digital assets and Web3. As the industry continues to mature with new use cases, applications, and business models, both FinTechs and large financial institutions have a unique range of opportunities ahead of them and have the potential to provide increased access to banking products for the underbanked, as well as increased efficiency of transactions, transparency, and support for the underprivileged through programmable subsidies.

During the week of SFF2022, the Monetary Authority of Singapore (MAS) announced projects underway with the industry to explore the opportunities and foster greater FinTech innovation. Through Project Ubin¹, MAS looks to collaborate with international partners to explore the cross-border exchange and settlement of foreign currency transactions using wholesale central bank digital currencies (wCBDC). MAS' Project Orchid² introduces the concept of purpose bound money (PBM) which enables the sender to define specific purpose for which recipients could use funds for by exploring use cases such as learning grants and government disbursement in Singapore. Finally, Project Guardian³ tests the feasibility of applications in asset tokenisation and decentralised finance (DeFi) while managing risks to financial stability and integrity. Importantly, Project Guardian explores the role of regulated

1 [Project Ubin+](#)

2 [Project Orchid](#)

3 [Project Guardian](#)

institutions to act as ‘trust anchors’ to issue and verify identity for transacting parties and validated the importance of having agreed technical business and token standards for interoperability.

This report reflects on the digital asset and Web3 discussions, key trends, use cases discussed at SFF2022, and the factors contributing to building resilient companies in the ecosystem. We look forward to welcoming you all again at an even more significant and impactful SFF in 2023.

A stylized, handwritten signature in black ink, consisting of a series of loops and a final dot.

Sopnendu Mohanty

Chief FinTech Officer, MAS,
and Chairman of the Board, Elevandi

A stylized, handwritten signature in black ink, featuring a large 'J' and 'G' with a '+' sign in the middle.

James Gordon

Partner and Asia Pacific Digital Assets Lead,
Oliver Wyman

CONTENTS

Executive Summary	1
Digital Assets and Web3	4
Institutional Adoption	13
Outlook	18
Acknowledgements	23

EXECUTIVE SUMMARY

This report provides reflections on the digital assets and Web3 discussions at the Singapore FinTech Festival (SFF2022).

SFF2022's theme of *Building Resilient Business Models amid Volatility and Change* was incredibly pertinent to the digital assets ecosystem, which has experienced both the macroeconomic pressures felt in traditional markets, and a series of large-scale idiosyncratic challenges that continue to rock the industry.

Digital assets and Web3 were a core knowledge pillar of SFF2022, and a pervasive topic throughout the Festival. This report explores what it takes to ensure business models and the ecosystem remain viable, responsible, and inclusive, how digital assets facilitate the creation of new or more efficient products and services, how we can accelerate institutional adoption, and how we manage risks and regulate the ecosystem. Whilst discussions and topics varied considerably over the course of the Festival, this report brings together common themes, perspectives, festival optimism, and points of contention. It provides a snapshot of industry sentiment across SFF2022 participants and focuses on the opportunities, challenges, and risks of digital assets and Web3 in financial services.

New functionality that promises financial inclusion, operational and cost efficiencies, and novel products and services

Digital assets cover a wide and varied set of protocols, tokens, networks, and structures, and support products and services that are sometimes skeuomorphic to traditional finance and sometimes fundamentally different to those found in traditional markets. Cryptocurrencies, the recipients of substantial speculative attention over the last few years, represent just a fraction of the ecosystem. The discussions at SFF2022 explored the full range of innovation emerging from digital assets.

The innovation provided by digital assets has the potential to change how financial services work. Early distributed ledgers offered immutable and distributed transaction records and changed the way multi-party transactions could occur, promising faster and cheaper ways for settlement. But, it is the programmability and composability that these distributed ledgers provide that opens up the opportunity for innovative new products and services. The ability to tokenise almost anything, and have applications interact with one another autonomously via these systems, has the potential to enable the development of whole new ecosystems. This provides great opportunities but also needs careful design, management, and regulation.

Accelerating institutional adoption

Traditional financial institutions, and super-regional and global players are increasingly establishing their role in the digital asset ecosystem, with leading firms participating in cross-jurisdiction experiments with central banks, regulators, and peers. They are launching products and services that leverage digital asset technology and provide sophisticated digital asset services to institutional investors.

Whilst products and services vary widely, some common themes are emerging across institutions. For example, cross-border payments and programmable money promise efficiency and cost benefits and drive financial inclusion. Similarly, tokenisation has transformative potential, allowing financial and real economy assets to be fractionalised and exchanged securely, atomically, and 24/7, without the need for intermediaries. Finally, institutional-grade custody provides a fundamental building block for the deployment and use of institutional offerings.

Several notable digital asset and CBDC experiments as part of new project launches were announced at SFF2022. These include Project Guardian⁴, the exchange of tokenised assets on a public blockchain; Project Orchid⁵, programmable money experiments with Purpose Bound Money (PBM) to enhance the transparency of transfers and reduce the administrative costs of distribution; and Project Ubin+⁶, using wholesale CBDCs to enhance cross-border Foreign Exchange (FX) by exploring atomic settlement, allowing for simultaneous exchange of two or more digital currencies in real-time to improve efficiency and reducing risks.

Sustained pressure on ecosystem participants

As the ecosystem navigates the current pressures, developing resilient business models and building for the long-term is critical.

For FinTechs, a renewed focus on expending resources on must-win products and markets, building propositions with clear utility value to customers, and having profitable business models as opposed to a singular focus on customer acquisition or top-line growth (which was often an afterthought when a balance sheet could be topped up with VC funding or a token pre-sale) were identified to be key objectives. For institutional players, the maturity of the technology, the available talent in the market as crypto-natives shed staff to manage their cost-base, and the increasing regulatory clarity provide an opportunity to speed up innovation and serve their clients in new and more efficient ways. Regulators must continue to find the balance between safety and innovation, and use experiments to explore the risks and implications of new rules or adjustments to existing frameworks as they set policies for the ecosystem.

4 [Project Guardian](#)

5 [Project Orchid](#)

6 [Project Ubin+](#)

Despite the wide-ranging and ongoing pressure facing ecosystem participants, the downturn could mark an inflection point for the ecosystem. We could see a shift from speculative investment to a focus on infrastructure and utility, from retail heavy consumption of crypto assets to more institutional adoption, and from fragmented platforms to open, interoperable systems. How this evolution unfolds, and its influence on traditional finance remains unclear, but FinTechs, institutions, and regulators must be involved and contributing to that evolution, or risk being left behind.

DIGITAL ASSETS AND WEB3

The digital assets and Web3 theme was a core theme of SFF2022, both within dedicated plenary sessions and across a wide range of discussions around business models and opportunities.

Our speakers were energised by the promise of increased financial inclusion, cost and efficiency benefits that would flow through to consumers, the economic benefit of reduced friction for cross-border payments, and the possibility for new products and services enabled by the programmability, composability, and efficiency of digital assets.

Perhaps most exciting was the extent to which crypto-natives, institutions, and regulators were coming together and looking to collaborate to navigate the risks inherent in the ecosystem, establish the guardrails needed to stabilise the ecosystem without stifling innovation, and realise the potential benefits to ecosystem participants and the financial services industry.

The recent and ongoing market turmoil was well acknowledged at SFF2022, but many made the distinction amongst business, reduced investor enthusiasm and cryptocurrency valuations, and the infrastructure and opportunities arising in the wider digital asset ecosystem. The speakers touched on the poly-crises experienced over the past six months and the contagion that spread as valuations collapsed, along with the liquidity and solvency challenges striking major Web3 players. The discussions turned to what it takes for participants to remain viable and thrive under these conditions. Furthermore, there was discussion on the potential benefit of cleaning out the unsustainable business models, discouraging excessively risky behaviours, and exposing vulnerabilities. Together, these actions could accelerate the maturing of the industry, by helping regulatory attention focus on where it is most needed and promote infrastructure development rather than speculative investing.

Many expressed caution that there would be further internal and external challenges facing the ecosystem, and participants should expect further volatility and pressures. However, with increasing institutional adoption, regulatory clarity, and technological progress, the long-term role of digital assets and Web3 in the financial services industry was confirmed to be both significant and potentially revolutionary in terms of its impact.

PRIMER

Whilst definitions and visions differ, many describe Web3 as an evolution of the Web where ownership and control are distributed amongst users, and token-based incentives and economics enable trustless interactions. This represents an evolution from Web1, which was characterised by static, one-way information sharing and users were predominantly consumers of content, and Web2, comprised of user-centric platforms facilitating a wide range of two-way interactions powered by user-created content.



In Web1 you could read content, in Web2 you could read and write content, in Web3 you can read, write and own.

Dante Disparte, Chief Strategy Officer
and Head of Global Policy, Circle

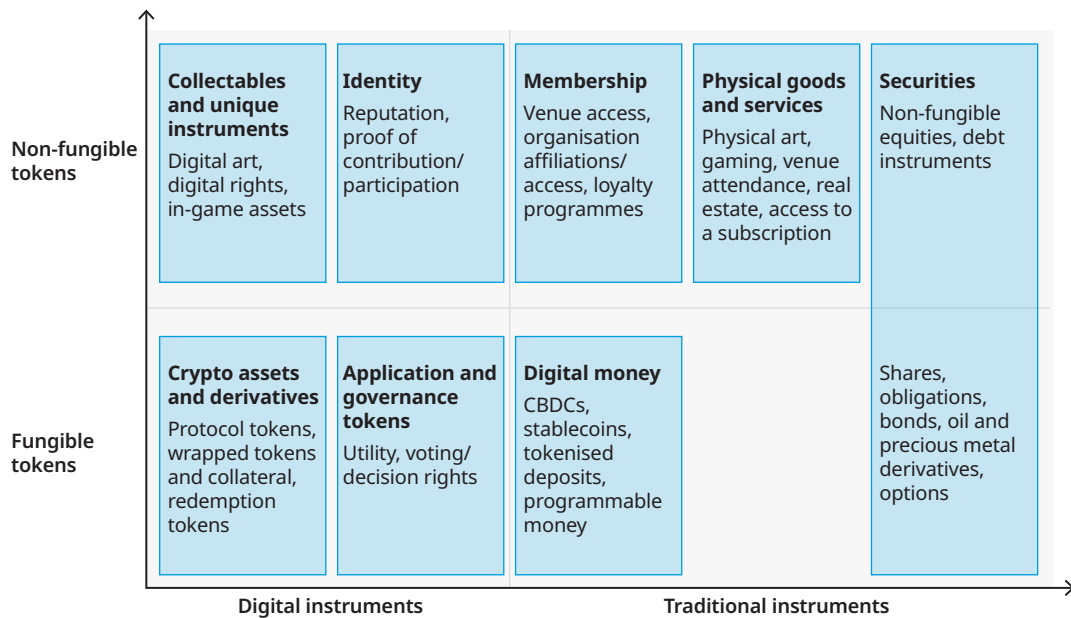
Exhibit 1: The three phases of internet evolution

	WEB1 Internet of Information (1995-2003)	WEB2 Internet of Commerce and Sharing (2003-2018)	WEB3 Decentralised Internet (2018-Present)
Participation model	One-way information sharing — users are consumers Broadcasters and publishers Read-only static/image-based searches	Closed-loop, user-generated content, and participative Social media and profiles Centralised with no portability	Open-loop metaverses, shared data Decentralised web/control Owned by users (data, identity, privacy) Personalisation, engagement
Delivery model	Websites, portals, and directories Powered by servers, walled gardens Browsers	Platforms, SaaS Credit cards, app store, marketplaces	Blockchain, DLT, dApps Wallets, transparent P2P transactions UI and service layers, interoperability Tokenisation/governance of tokens
Monetisation model	Software licenses and proprietary hardware No commerce	User-generated/subscription content Pay-to-play/in-game purchases Referrals, interactive advertising, pay per click	Consumer-owned media, peer-to-peer trading In-game economies, play to earn Minting, staking, lending

Source: Oliver Wyman analysis

Underpinning Web3 are digital assets represented by uniquely identifiable digital tokens that are created, stored, and transferred on a blockchain. Digital assets provide for the ownership of items of value, which can range from cryptocurrencies to digital media rights, to the digital representations of physical assets. Whilst cryptocurrencies and non-fungible tokens (NFTs) associated with digital art have experienced headline-grabbing valuations and volatility, digital asset landscape is much wider, as summarised in exhibit 2.

Exhibit 2: Digital asset token landscape



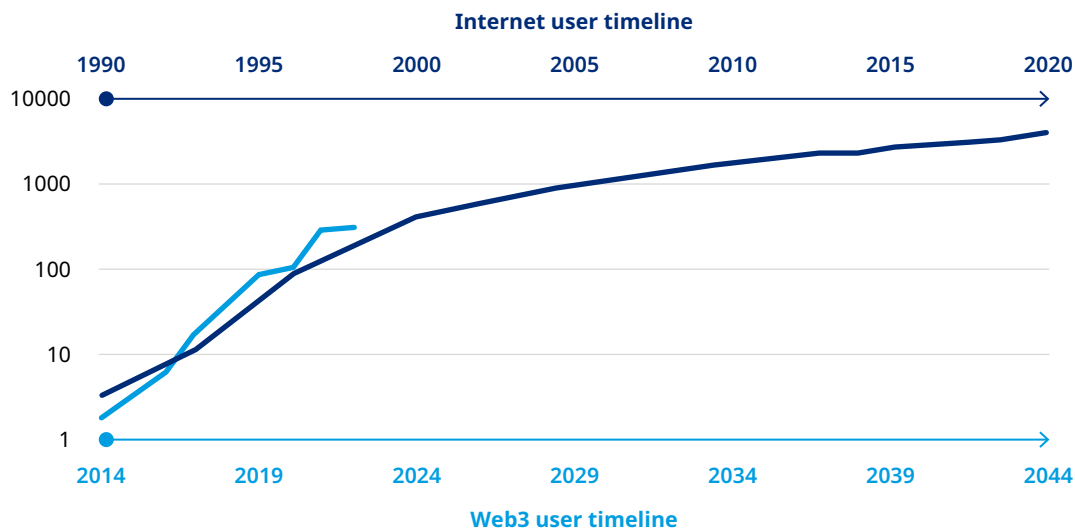
Source: Oliver Wyman analysis

A BRIEF HISTORY

Distributed ledgers received widespread public attention with the launch of Bitcoin in 2009. Digital assets enjoyed particularly significant growth from April 2019 to their peak in November 2021, driven by speculative activity, and the adoption of new use cases and maturing technology. Enormous government stimulus and quantitative easing during the COVID-19 pandemic further elevated the capital deployed by venture capital funds. According to Forbes and White Star Capital, total VC funding for Web3 companies reached US\$30 billion globally and US\$1.45 billion in Asia in 2021. The market value of digital assets subsequently increased from US\$5 billion in 2015 to nearly US\$3 trillion in 2022⁷, as reported by Merchantmachine. On 8 November 2021, Coinbase recorded Bitcoin's all-time high of US\$68,789. The Web3 ecosystem user base also expanded exponentially, with CNBC reporting that US adult adoption rose from 1% in 2015 to approximately 13% in 2021. This mirrors the rate of early adoption of the internet, which increased from 1% in 1990 to 16% in 1996, according to the World Bank. Today, Chainalysis estimates that about 300 million people own cryptocurrency globally and 35% of those owners are in Asia.

Exhibit 3: Comparison of internet and Web3 user adoption

Total users in millions



Source: The World Bank and Crypto.com

⁷ This is perceived market value but most of these valuations are unbacked and could turn out to be much less in real world terms.

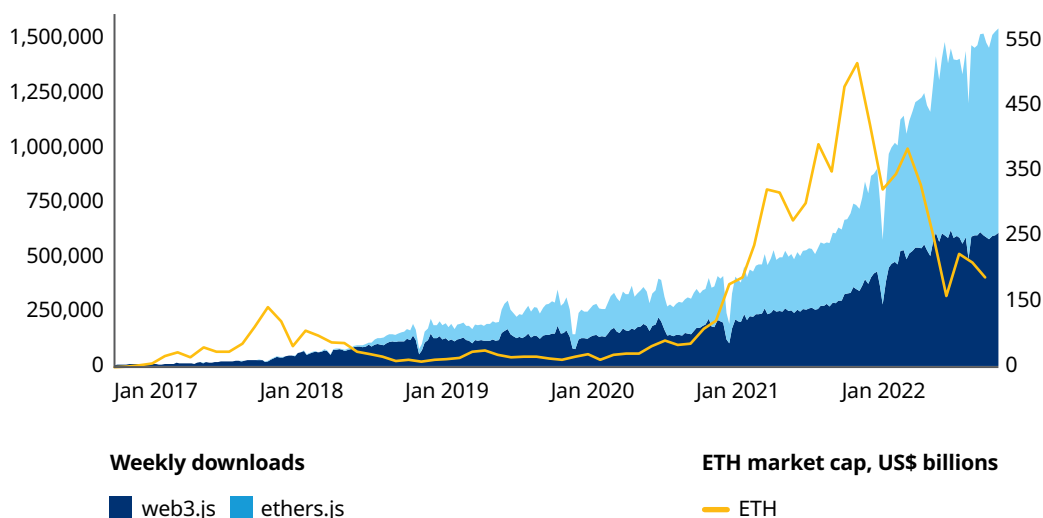
The market has experienced a major correction since November 2021, as rising inflationary pressures, the war in Ukraine, and a change in Federal Reserve (FED) policy led to a large drop in risk appetite across the globe. The algorithmic stablecoin Terra and its sister coin Luna collapsed, as destabilising trades and a cascade of negative sentiment created a liquidity crisis that quickly became unrecoverable. The subsequent collapse and bankruptcies of several Web3 enterprises, notably Celsius, Three Arrows Capital, and Voyager, rippled through the ecosystem, and added to the consumer losses inflicted by dramatic reductions in valuations and a string of exploits that drained major platforms of funds.

As of February 2022, Money.com reported that half of all bitcoin wallets were loss-making, and according to Coindesk, over 24,000 Web3 jobs were lost by November 2022. In November 2022, Cointelegraph reported the total market capitalisation for cryptocurrencies was below US\$900 billion, and in December 2022, Blockchain.com reported that Bitcoin's Market Value to Realised Value (MVRV) dropped below 1.0, meaning on average each coin sold was worth less than what was paid for it.

RESILIENCE SHOWN BY THE ECOSYSTEM

Despite the significant market downturn and headline-grabbing crises, the ecosystem is showing resilience. The old adage *"downturns are for building"* appears to be playing out. As Alchemy's Q3 2022 Web3 Development Report shows, weekly downloads of ethers.js and web3.js, the core libraries used by developers to build and interact with the Ethereum blockchain, have continued to grow despite the rise and fall of Ethereum's market capitalisation. Additionally, it is expected that many projects have multi-year runways, and cost pressures, primarily for developers, have started to ease.

Exhibit 4: Weekly downloads of key Web3 development libraries versus Ethereum's market capitalisation



Sources: Alchemy's Q3 2022 Web3 Development Report, npm, and coinmarketcap

According to Cointelegraph and Reuters, VC funding decreased during the last three quarters of 2022, yet was more than the industry attracted from 2017 to 2020 combined. Despite these declines, the number of seed deals in digital asset infrastructure continue to grow, and gaming remains the largest category (22 September 2022, Cointelegraph). Mergers and acquisitions activity rose during the first half of 2022, as valuations plummeted and market synergies offered revenue diversification or lifelines⁸, and while this activity is unlikely to surpass 2021 volumes, it is still expected to exceed the respective volumes of 2019 and 2020 by the end of the year, according to Token Data Research (8 August 2022).



We see a bifurcation in crypto-natives. There are those reliant on speculative value or traded volumes, who are at a difficult spot in their funding cycle or haven't hedged their balance sheets; these firms are struggling. But, there are those building infrastructure, launching projects with utility value, have raised capital, and are currently diversifying their revenue streams; they are benefitting. They are not focused on their next airdrop, or what their Discord followers are saying — they are building with a longer-term vision.

James Gordon, Partner and Asia Pacific
Digital Assets Lead, Oliver Wyman

DIGITAL ASSET FUNCTIONALITY

Digital asset functionality can be used by financial institutions to reduce friction, lower costs, and improve overall efficiency in multiple parts of the business. They have the potential to create new revenue streams and competitive advantages. Efficiencies created have the potential to flow through to consumers, improve financial inclusion, and benefit the economy.

⁸ Source: MergerMarket, Capital IQ, Crunchbase and Pitchbook, as of June/July 2022

We've long believed that [crypto] is going to go through these three phases: it's going to start off as purely an investment vehicle, a new asset class, then it's going to become a new set of financial services, and then it's going to become a set of applications that are not even financial-related at all.

Brian Armstrong, CEO, Coinbase



The underlying blockchain technology, and its ability to both execute and store transactions in an immutable, transparent, decentralised manner have wide-ranging benefits to several operations and functionalities for financial services.

Immutable, persistent, transparent ledger: Decentralised maintenance, control, and access to data allow multiple parties to simultaneously update and reference shared information without risk of deletion or modification, greatly reducing the need for reconciliation and trust. The shared infrastructures also enable business rules and logic, such as payments and asset transfers, to be executed in a transparent manner.

Programmability: Expressive programmes, known as smart contracts, enable the execution of instructions on a ledger. These smart contracts execute business, financial, and legal transactions between parties under predefined terms and conditions, for instance combining payment instructions with the exchange of value as a single transaction, or lending against collateral.

Composability: On-chain functional elements can be combined to create richer and more complex Web3 applications. Like the open-source code that powers much of the blockchain software infrastructure, programmes on blockchains that handle value are a rich ecosystem of composable building blocks.



When we look at Web3, we talk about distributed systems, open ecosystem, interoperability, we talk about programmability and composability. These are the things that allow a rich ecosystem to work together and have sustainable economics.

Jason Thompson, CEO, Partior

DEEP DIVE

FinTech in its Element: Water, Metal, Fire, Wood, Earth

In his address at SFF2022⁹, Ravi Menon, Managing Director, MAS, discussed his expectations for the future of the digital asset ecosystem, and the role he sees Singapore playing in its evolution.

KEY OUTCOMES FOR THE DIGITAL ASSETS AND WEB3 ECOSYSTEM

Ravi noted five key outcomes he wanted to achieve through collaborative FinTech projects, linking them back to Wu Xing's five fundamental elements that function as cosmic agents of change: Water, Metal, Fire, Wood, Earth



Flowing like water:
Instant remittance

Project Nexus

Real-time, 24/7 payments are increasingly common in many jurisdictions for seamless domestic transfers. However, cross-border payments remain costly, slow, opaque, and inefficient, attracting an average 6% of transfer value, according to the World Bank. Project Nexus explores an opportunity to link countries' real-time payment systems and provide a high speed, transparent, secure, low cost, and multi-lateral solution.



Strong like metal:
Atomic settlement

Project Ubin+

Atomic settlement is the simultaneous exchange of two linked assets in real-time. Today, settlement is often a multi-intermediary, multi-ledger, and multi-day process that attracts settlement risk and the need for large pre-funding accounts. One of the most promising ways to achieve atomic settlement is through tokenised assets which can be exchanged simultaneously on a distributed ledger, supporting cross-currency and securities transactions.



Reshaping like fire:
Programmable money

Project Orchid

Programmable money refers to the embedding of rules within the medium of exchange itself. These rules can include conditions on the beneficiaries and usage, and are retained even when the money is transferred. With programmable money, we can have better assurance that the money reaches its intended beneficiaries and used for its intended purpose.

9 [Speech by Ravi Menon](#) at the Singapore FinTech Festival 2022



Growing like wood:
Tokenised assets

Project Guardian

Tokenisation is the digital representation of ownership rights over any item of value, be it digital or physical. It enables financial and real economy assets to be represented, fractionalised, and exchanged over the internet on a peer-to-peer basis securely and seamlessly without the need for intermediaries. It also facilitates Decentralised Finance, where borrowing, lending, and trading activities can be performed autonomously through smart contracts, potentially enhancing the efficiency and accessibility of financial services.



Grounded like earth:
Trusted sustainability data

Project Greenprint

Project Greenprint seeks to reduce the cost and increase the reliability of green data for environmental, social, and corporate governance (ESG) purposes. This can help mobilise capital to sustainable projects, monitor the climate commitments made, and measure the impact associated with investments.



The five desired outcomes — instant remittance, atomic settlement, programmable money, tokenised assets, and trusted sustainability data — remind us that everything we do in Finance, Technology, and FinTech must have a larger purpose. We want to expand economic opportunity, enhance social inclusion, reduce risk, and protect our planet.

Ravi Menon, Managing Director,
Monetary Authority of Singapore

VISION FOR SINGAPORE

Ravi was clear on Singapore's vision to establish itself as a crypto asset hub. His message was simple:

- ✓ If a crypto hub is about experimenting with programmable money, **yes we want to be a crypto hub.**
- ✓ If it is about applying digital assets for use cases like atomic settlement, **yes we want to be a crypto hub.**
- ✓ If it is about tokenising real and financial assets to increase efficiency and reduce risks in financial transactions, **yes we want to be a crypto hub.**
- ✗ But if it is about trading and speculating in cryptocurrencies, **that is not the kind of crypto hub we want to be.**

INSTITUTIONAL ADOPTION

It was clear during SFF2022 that major financial institutions are paying attention to the digital assets and Web3 ecosystem.

Many are engaged in experiments with central banks, other institutions, and crypto natives to explore the technology and better understand the risks and benefits. Furthermore, products and services are emerging that provide more sophisticated offerings for corporate and institutional participants. Senior leaders of major financial institutions recognised the potential of digital assets to provide a sustained competitive advantage, but the technological, reputational, and regulatory risks remained front of mind.

PAYMENTS

Digital money enables the efficiency and transparency of monetary transactions, and comes in several forms, each with unique attributes and challenges. CBDCs, stablecoins, and tokenised deposits are emerging forms of digital money that could enable a sophisticated Web3 economy with significant scale. Digital money allows for lower-cost, safe, real-time, programmable, and more competitive payments compared to what exists today. It can enable financial inclusion, and reduces settlement risks.



If we look at the addressable market for wholesale and digital tokenised assets, tokenised assets [are] projected at about US\$16 trillion in 2030. The wholesale money market movement is colossal, trillions — hundreds of trillions — of dollars but there's an inefficiency in that system of in excess of 100 billion dollars. Now, if we address that 100 billion dollars, that's an impact to GDP. That's sizeable, but when you look at the size of those markets, without distributed systems, without interoperability, without an open methodology and principles, you cannot serve markets of that size. That's why they're inefficient today.

Jason Thompson, CEO, Partior

Central Bank Digital Currencies

CBDCs are digital money issued by a country's central bank. According to Reuters, about 26% of the world's central banks are already running a CBDC pilot whilst an additional 62% are experimenting in Proof of Concept stages. In the recent announcement of Project Mariana¹⁰, MAS is partnering with the central banks of France and Switzerland, and the BIS Innovation Hub, to explore the exchange and settlement of wholesale CBDCs with an automated market maker to settle foreign exchange trades in financial markets.

Stablecoins

Stablecoins provide an alternative mechanism for instant payments and settlement. Whilst the majority of stablecoins in circulation as of Dec 2022 are US Dollar denominated, StraitsX, a payments infrastructure provider has launched stablecoins pegged to the Singapore Dollar and Indonesian Rupiah designed to lower merchant fees and drive financial inclusion. StraitsX allows the offline acceptance and disbursement of payments via off-chain signing between the consumer wallet and merchant terminal, followed by an on-chain verification step.



We firmly believe that stablecoins are redefining the very fundamentals of the payment ecosystem.

Romain Zanolio, Managing Director APAC, IDEMIA

Tokenised deposits

Tokenised deposits are the digital representation of existing deposits held by a licensed depository institution, such as a commercial bank, but recorded on a blockchain and transformed into a blockchain-native instrument. The functional characteristics of blockchains make new business models possible, such as intraday repos, which could revolutionise short-term funding and liquidity management.

Project Guardian has explored the feasibility of using tokenised Singapore Dollar deposits as the settlement leg of tokenised assets on a public blockchain.

¹⁰ [Project Mariana](#)



We really believe that [in] the future, you will have [a] coexistence of different digital assets, you will have CBDCs, you will have stablecoins, you will have crypto, you will have tokenised deposits, and possibly other things.

Umar Farooq, CEO, Onyx by J.P Morgan

PROGRAMMABLE AND PURPOSE BOUND MONEY

Programmable money enhances the transparency of transfers, reduces the administrative costs of distribution, and helps in the effective usage of monetary assets, with the potential to further accelerate financial inclusion.

Singapore is exploring Purpose Bound Money (PBM) as part of the Project Orchid Phase 1 trials. PBM serves as a digital bearer instrument that has specific conditions enabling the monetary asset to be used only for its intended purpose, such as for government pay-outs or managing learning accounts.

In practice, the holder can present their PBM to participating merchants in exchange for goods or services (a programmable payment feature) for a limited time. In some instances, the terms of the voucher scheme allow it to be transferrable between people (a programmable money feature) and retain its payment conditions. Hence, a consumer could purchase a gift voucher and transfer it to another person, who may then use it at a participating merchant. Vouchers could also be issued to support government disbursement programmes, and conceptually, the holder of the voucher could redeem it without requiring the need for a bank account.

Other jurisdictions have been exploring the potential of programmable money. For example, Ledger Insights reports that programmable money is being trialled for the distribution of agriculture subsidies in Brazil, and the JPM Coin has allowed corporate clients to make programmable, real-time, multi-currency payments using multi-bank shared ledgers.



Where you have many interested parties in settling a transaction and you need trusted infrastructure for all parties to... fulfill their conditions and requirements before the money is dispersed... I think that's where purpose bound money can go [to] the next level.

Melvyn Low, Head of Transaction Banking, OCBC

TOKENISED ASSETS

Tokenisation is the process of generating a digital representation of an asset that can be stored, verified, and transferred on a blockchain. The underlying asset can be digital or physical, and include tangible assets such as property, commodities, or currency, or intangibles such as licences, voting rights, or intellectual property.



Through Project Guardian, MAS and the financial industry are laying the structures and protocols that will help harness the benefits of tokenised assets and DeFi while managing their risks.

Ravi Menon, Managing Director, MAS

Institutions are exploring the economic potential of tokenised assets, such as the issuance of tokenised bonds, where bond ownership is represented by a token on a blockchain, and smart contracts are used to automatically execute the terms of the bond. Singapore has launched Project Guardian seeking to determine whether tokenised real-world assets and deposits could be transacted on a public blockchain, leveraging DeFi protocols, in a compliant manner that preserves financial stability and integrity. Project Guardian has conducted foreign exchange and government bond transactions against liquidity pools comprising tokenised Singapore government securities, Japanese government bonds, Japanese Yen deposits, and Singapore Dollar deposits. It has demonstrated the feasibility and transformative potential of using DeFi protocols in financial markets with appropriate guardrails. It has also validated the crucial role of two key factors: 1) the use of regulated institutions to act as “trust anchors”, issuing and verifying the credentials of participating entities to establish the identities of the transacting parties and connect with existing legal frameworks, and 2) the need for an agreed-upon set of technical standards. Both are essential elements for Institutional DeFi and can be helpful across systems and jurisdictions to drive adoption and improve transaction efficiency for a globally integrated finance industry.



DeFi, blockchain, and tokenisation gives us the opportunity [to] standardise the actual data representation of these things and possibly have them on the same rails. That allows you to create value in ways that we cannot do today.

Umar Farooq, CEO, Onyx by J.P Morgan

INSTITUTIONAL GRADE CUSTODY

Institutional adoption has the potential to be a driving force for the digital asset ecosystem, however with the backdrop of exploits and bankruptcies, institutional-grade custody solutions are required to drive adoption for those offering, and consuming, digital asset products and services. Custody requires secure vaulting (storage of key devices in high security facilities), cryptographic hardware to protect secret keys, governance and controls around the movement of funds process, distributed backup sites to ensure business continuity, and reporting tools for customer transparency. Ecosystem participants are looking for custodians whom they trust to safeguard their digital assets, a role that financial institutions already fulfil for participants' traditional assets.

Many institutions are exploring custodial solutions, aimed at a range of markets from retail to institutional clients. BNY Mellon's recently launched proposition bridges the gap between traditional and digital asset classes for institutional clients, and ensures the safekeeping of private keys and wallet addresses.

We are the first... globally, systemically important financial institution that launched digital assets custody... but this is just the beginning. In many ways, we see digital assets as a new asset class... We think about all the offerings [of] tokenised assets, the opportunities are really limitless... limitless to our industry, limitless to consumers.

Roman Regelman, CEO of Securities Services and Digital, BNY Mellon



OUTLOOK

With market volatility and regulation still in flux, the digital assets and Web3 ecosystem is at an inflection point, with many holding different views as to how the industry will evolve.

From a gradual adoption of the underlying technology by retail users, we are now seeing the explicit signs of a transformation of how the financial system works.

Regardless, ecosystem participants will have to navigate industry-specific and macro-economic challenges. Continued volatility of crypto assets, shifting value pools, and a tighter funding environment will make the clarity of value proposition, customer utility, and role in the ecosystem increasingly important.

FUTURE SCENARIOS

The ecosystem could evolve in several different ways. On one end of the spectrum, digital assets remain niche and the ecosystem may only change incrementally from today. On the other hand, there could be a “DeFi system” revolution where financial systems as we know them today become completely transformed by new types of institutions and mechanisms for allocating funding and risks. Other paradigms in between include the progressive evolution of today’s banking sector, supported by digital assets or a system dominated by today’s crypto natives. These paradigms paint the corners of what change may take place, but the future will likely combine elements across the paradigms.

Exhibit 5: Potential paradigms for the evolution of the digital asset ecosystem

	1. NICHE USE OF DIGITAL ASSETS	2. TRADFI SUCCESSFULLY EVOLVES	3. RISE OF DIGITAL INTERMEDIARIES	4. DEFI SYSTEMS
Paradigms	The digital assets ecosystem only changes incrementally in the directions it is already moving	Evolution, not revolution, and banks continue to dominate Banks successfully evolve, digital assets support their continued centrality	In between evolution and revolution Significant changes undercut the banks, which do a poor job of adapting, while crypto natives become dominant	Revolution: Financial systems as we know them are transformed New types of institutions and ways of allocating funds/risk take hold
What you need to believe	The ecosystem survives current polycrisis	The functionality of digital assets delivers massive efficiencies and existing institutions can adapt	Digital assets proliferate in payments and investment faster than the existing system can adapt	Networks built around crypto “escape” into real world, can interoperate
How it could play out	Incumbents experiments on, for example, custody, mirroring, AMM FX, but regulatory uncertainty limits ambition Value add of specific offerings drives the extent of adoption Digital assets are adopted for specific, targeted purposes New networks emerge, rivalling but not replacing existing infrastructure New technology increasingly applied to solve legacy challenges	Banks become enablers of new data-sharing technologies, tokenising financial infrastructures including bank deposits and assets Flywheel effect as solutions cascade across the system, for example, B2C payments, corporate treasury, asset issuance Governments push industry to migrate to tokenised public/private networks Regulation slows down crypto natives, limits lending activity Banks, insurers, and asset managers maintain economic and intermediation roles, providing balance sheet to trading/lending in new infrastructures	Stablecoins, CBDCs become widespread, powering further expansion/adoption of digital assets Wallets replace bank accounts, with customers preferring vertically integrated players given convenience (versus self-custody) Profitability of crypto enables pioneers to innovate, launch compelling new services in lending, origination, liquidity Regulatory framework built as authorities seek to lead on innovation Providers across the value chain able to work together to provide integrated service (emergence of data sharing, interoperability)	Success of decentralised platforms, and potentially Web3, drives adoption of interoperable self-custodied wallets New protocols and automated marketplaces connect users and investors, increasing marketisation when raising capital Increased risk management of DeFi and tokenomics increase price stability Governance shifts from traditional institutions to DAOs with successful tokenomics Acceptance of digital collateral drives physical/digital convergence
Implications	The digital assets ecosystem exists largely in parallel to the existing financial system It remains a facilitator for ownership and value transfer in the metaverse, but fails to generate widespread institutional adoption Financial systems remain on traditional rails, and efficiencies, cost benefits, and new offerings are driven by alternative innovations and technological advancements	Certain traditional infrastructure functions become replaced with DLT-based asset registries and settlement, offering lower costs of custody and asset settlement Huge efficiencies for clients (for example, payments, FX, liquidity) drives down banking revenues and liquidity Potential market concentration as smaller players are squeezed out by cost of adopting new infrastructure, fight for talent Partnerships with digital asset technology providers critical — likely emergence of “digital assets as a service” Strong competition for client front-end functionality and access points, including by big tech	Powerful new companies emerge, operating globally, and squeeze other financial institutions out of client relationships (starting with younger, early adopters) Battle shifts to custody from operating accounts, smaller proprietary networks push for interoperability for relevance Banks, FMIs hit by multiple pressures: Loss of business, pivot required in business models, costs to accelerate digital asset capabilities Market leaders retain some influence; rest get hollowed out; digital assets as a service emerges given cost/capital expenditure, pace of innovation	Greater participation and innovation, but participation models will change dramatically via, for example, the metaverse, digital/physical lending platforms Blurring of lines between banking and commerce; activities embedded and seamless Data democratised; aggregators as the primary consumer touch-point — metaverse/physical integrate, creating powerhouses Shifting of risk onto investors, with growth and expansion of mechanisms for market-based finance, for example, large-pool staking Risk management becomes critical as the ecosystem figures out how to manage volatility and stability Proliferation of specialists serving key ecosystems between virtual and physical worlds; protocols enable interoperability

Source: Oliver Wyman analysis

EVOLUTIONARY DRIVERS

For the near term at least, continued inflationary pressures, crypto market volatility, and contagion are likely to continue to affect investor risk appetite. The US Fed will continue to raise interest rates until they see a discernible break in inflation, and investors and consumers are likely to curtail spending until the economic clouds start to clear.



We are living in a poly crisis... The pandemic, war, record droughts, record floods, soaring inflation, interest rates, currency market volatility... We need to develop a “trampoline-like mentality” to bounce back from this crisis... Shocks are a given... The question is how will you absorb [them].

Taimur Baig, Chief Economist, DBS

If DeFi/Web3 is to prosper, they will need to strengthen governance and risk management practices similar to those of TradFi. They need to have a robust governance framework, operational resilience, transparent business practices, and a holistic risk framework that covers risk elements such as liquidity risk, market risk, credit risk, internal and external contagion risk, and operational risk. However, as the contagion risk to retail investors today is becoming higher, regulators are evolving and may respond with tighter regulations and risk management frameworks.



What we want to ensure [is] that the money which is available on the network to transmit these assets... can be considered a safe asset, safe currency, and as long as that is the direction, we are okay. But I think what is happening today, there’s a massive exposure to retail investors who perhaps didn’t understand the risk.

Sopnendu Mohanty, Chief FinTech Officer, MAS

History has shown that projects built on reliable infrastructure and having clear utility will “future proof” themselves and be sustainable/profitable. Key traits include security, decentralisation, the ability to solve an underlying problem/demand, usability, grassroots enablement, developer community engagement, scarcity of supply, and scalability.

IMPLICATIONS FOR ECOSYSTEM PARTICIPANTS

FinTechs

Many firms have been focused on growth at all costs, willing to pay to acquire customers on the assumption it will attract funding and provide future monetisation opportunities. However, with macroeconomic and geopolitical uncertainty the focus is shifting to sharper product-market fit and unit economics. FinTechs must focus and win in key markets, and ensure they are resilient to ongoing market pressures.



What are the actual key markets that you have to be in as a business in order to be successful? In a bull market, you don't actually know whether it's a great idea to be in a particular geography because every geography is scoring... So I think when people are thinking about where they're spending dollars today, you spend on... the must-win opportunities of the business.

Jonathan Levin, Co-Founder & Chief Strategy Officer, Chainalysis

Financial Institutions

Advancements in technology and the maturing regulatory environment pave the way for new products and services that utilise the underlying characteristics of DLTs in areas these institutions already participate. With the backdrop of exploits and bankruptcies, the role of established financial institutions as trusted service providers is likely to extend into the digital assets and Web3 ecosystem, with both institutional and retail customers looking for safer ways to store and transact the digital assets. Established firms can leverage the resilience offered by their diversified revenue streams and strong balance sheets to build during the downturn, and with many crypto natives shedding staff to lower their cost base, there is talent in the market interested in stable income rather than start-up shares that wasn't there before the downturn.



You have got to be consistent in your capacity to invest... and sensible. When the top line is weak, you sort of dial back, when the top line is strong, you can spend some more money.

Piyush Gupta, CEO, DBS Bank

Central Banks

Central banks should continue to play a key role in enabling a more resilient financial system. In the context of digital assets, this has emerged in the form of extensive research, experimenting and collaboration with international peers on CBDC development, large investments in core infrastructure (for example, DLT-based settlement rails), and supporting industry participants with the large-scale adoption of CBDC use cases. Regardless of the target state paradigm for the future of money, central banks are ultimately trust anchors and guardians of a new frontier for financial inclusion, providing real-time and granular levels of supervision, and facilitating fast and cheap payments both domestically and abroad.



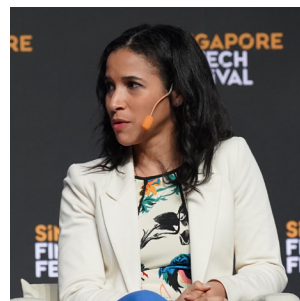
So, what is [the role of] central banks? Well, we are the providers, we sit at the heart of this, what we call a fiat money system, and as the technology moves it's a fantastic time to live in, because there are so many promising technologies coming our way. We need to carry on our role, building infrastructures that are open, so we don't end up in a lot of walled gardens, and incumbents or newcomers taking too large [a] share of the market, but actually an open infrastructure that provides competitiveness and inclusion, but also ensures stability.

Cecilia Skingsly, Head of BIS Innovation Hub,
Bank of International Settlements

Policymakers and Regulators

There is much to do, but it is increasingly clear what needs to be done. Policymakers and legislators must take a systemwide view on what is required, identifying gaps, working with ecosystem leaders, and introducing new policies in a self-consistent way across regulatory bodies and frameworks.

I think it will be incumbent upon policy makers and regulators to be engaged with a whole set of stakeholders, including industry, to be thinking responsibly about the existing frameworks we have, what needs to be tweaked and evolved, and how can we come up with frameworks that protect consumers, institutions, and markets, but also allow for responsible innovation in this space. And there are no easy answers and there are no quick fixes.



Adrienne A. Harris, Superintendent, New York
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