# MULTIPLICITY AND CONVERGENCE IN THE DIGITAL ASSETS ECOSYSTEM

Insights from the

15–17 NOV 2023 SINGAPORE FINTECH FESTIVAL™

# CONTENTS

The Singapore FinTech Festival (SFF), the world's largest fintech festival and global platform for the fintech community, is organized 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 eighth edition of Singapore FinTech Festival 2023 (SFF2023) focused on the intersection of policy, finance, and technology. SFF2023 drew a record 66,000 participants, up from 62,000 attendees in 2022. The Festival extended its global reach this year, with participants hailing from 150 countries and regions, an increase from the 115 countries represented in 2022, and attracted a line-up of over 970 speakers.

The five core themes at SFF2023 were:

### DIGITAL ASSETS

Real world use cases for digital assets, asset tokenization, and distributed ledger technology

### ESG TECHNOLOGY AND DATA

The technologies, standards, networks, and data accelerating the transition to a low carbon future

### APPLICATIONS OF AI

Deep-dive into AI, the tangible use cases within financial services and the roadmap towards adoption

### GOVERNANCE AND RISK

Governance of business, environment and regulatory changes by leveraging technology to redefine risk models and frameworks

### FINANCIAL INCLUSION

A focus on implementing digital public goods, driving adoption of new technologies and scaling real-time cross-border transactions

ELEVANDI

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 industry and national levels. Elevandi's initiatives have convened over 350,000 people to drive the growth of FinTech through events, closed-door roundtables, investor programmes, educational initiatives, and research. Elevandi's flagship product is the Singapore FinTech Festival, which runs alongside other fast-rising platforms such as the Point Zero Forum, Inclusive FinTech Forum, Elevandi Insights Forum, The Capital Meets Policy Dialogue, The Founders Peak and Green Shoots.

For more information, visit www.elevandi.io

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Oliver Wyman has a dedicated digital assets platform that supports industry powerhouses including i) regulators and public policymakers who are setting transformative requirements and norms, ii) traditional finance companies that are pioneering the digital asset landscape with blockchain-driven products and services, iii) trailblazing crypto natives that have established themselves as leaders in crypto and digital assets, and iv) investors. The team's unparalleled industry experiences have also positioned us as thought leaders, evidenced by a series of publications on digital assets, including centerpieces in collaboration with leading institutions in the domain.

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

# FOREWORD

In a year defined by both economic volatility and continued technological progress, the Singapore FinTech Festival 2023 (SFF2023) was a landmark event, attracting a record 66,000 participants from diverse sectors and bringing together unique perspectives and expertise. Featuring 970 speakers across 400 sessions, this conversation championed resilience and forward-thinking, fostering collaborative dialogues aimed at enhancing understanding and catalyzing the integration of innovative advancements in the financial technology (fintech) ecosystem. The festival hosted curated workshops, exhibitions, roundtables, and engaging discussions, complemented by innovation lab crawls and a plethora of side events, offering attendees ample opportunities for deep collaboration and knowledge exchange.

SFF2023 delved into the future of finance which will be shaped by innovations across the digital asset landscape. From exploring the future of money, which is likely to include Central Bank Digital Currencies (CBDCs), stablecoins, and tokenized deposits, to discussing the wide-reaching implications of tokenization, the festival offered fresh perspectives on how digital assets are reshaping financial services and the broader economy. The conversation focused on the infrastructure the industry must develop to realize the potential of this new technology. SFF2023 brought together different worlds, connecting dynamic innovators from the industry with seasoned policymakers and regulators, and showcased the many experiments and initiatives that are forging the path towards an expansive and inclusive future for digital assets.

This report aims to distill the insights and dialogues from SFF2023, offering a comprehensive view of the digital asset landscape and its future implications. We anticipate the ongoing impact and developments in fintech and digital assets that SFF2023 has sparked. We look forward to welcoming you to another enriching SFF experience in 2024, continuing our journey at the forefront of fintech innovation. Until then, let us continue to build and innovate at the forefront this ever-evolving field.

**Sopnendu Mohanty**

Chief FinTech Officer, Monetary Authority of Singapore
Chairman of the Board of Directors, Elevandi

**James Gordon**

Partner and Asia Pacific Digital Assets Lead
Oliver Wyman

# EXECUTIVE SUMMARY

Digital assets have the potential to shape a new era of responsible and inclusive finance. The value of the underlying technology is no longer under debate, as experiments showcased at the Singapore FinTech Festival 2023 (SFF2023) demonstrate its potential for cost savings, innovation, and inclusion. The path forward is characterized by a multiplicity of solutions and possibilities, as the industry has developed multiple forms of money, many tokenization products, and a wide array of possible network solutions.

The challenge ahead is how to achieve convergence across these multiple pathways. By convening financial services executives, policymakers, and technologists, SFF2023 began to set out some possible answers and create alignment on the critical challenges ahead.

### THE MANY FUTURES OF DIGITAL MONEY

Money today exists in many forms. The possibilities have only increased with digital money, with the new options including central bank digital currencies (CBDCs), stablecoins, and tokenized deposits. The success of digital assets depends on a digitally native form of money that enables the payment, clearing, and settlement of digital assets on the same network. While conference participants debated which forms of money are most likely to scale and compete, most agreed on the likely coexistence of its many forms. This means that we need continued work on both achieving interoperability across the various forms of money, both new and old, and harmonizing regulatory frameworks to ensure financial stability.

### GROWING MOMENTUM IN TOKENIZATION

Tokenization represents the next stage of evolution in finance. By combining recordkeeping and the transfer of value, the process of tokenization allows multiple assets to be exchanged without intermediaries. In the long run, this could substantively transform the financial system, but success depends on providing valuable and tangible use cases. SFF2023 participants showcased a diversity of experiments, including tokenization of money market funds and asset-backed securities, native issuance of bonds, and leveraging tokenization for portfolio construction. Tokenization can enjoy continued momentum with further progress on regulatory clarity, and by focusing on adoption.

### TOWARDS CONNECTIVITY ACROSS NETWORKS

A central theme at SFF2023 was the critical importance of connectivity, both across the diverse set of emerging blockchain networks, and between these new networks and existing financial systems. Without interoperability, the promise of an integrated global financial ecosystem cannot be achieved. SFF2023 participants discussed emerging efforts at the global level, as well as technical solutions. Achieving interoperability also requires harmonization of policy and regulatory efforts. This quest underscores the necessity of collaboration between stakeholders, including regulators, technologists, and financial institutions.

### INNOVATING FOR REAL USE CASES AND INCLUSION

SFF2023 participants showcased how digital assets can address long-standing challenges in accessibility and inclusivity. Digital assets have proven their value in crisis situations, providing reliable alternatives when traditional financial systems have faltered. Continued progress in expanding access depends on user-centric solutions that simplify blockchain technology for everyday users. Advances also depend on further education, and direct collaboration with end users to provide useful financial products and services.

### FORGING A PATH FORWARD

Building a shared future across the multiple possible pathways depends on collaboration between the public and private sectors. Policymakers are needed to not only establish adaptable regulatory frameworks that combine innovation and safety, but also help coordinate on issues of governance, interoperability, and privacy. The private sector plays a pivotal role in driving technological advancements and discovering practical applications of digital assets in line with consumer and policy concerns, so as to realize the broader societal benefits of digital finance. Together, both sectors can ensure an innovative, secure, and equitable digital financial ecosystem.

# LEADING VOICES

**Financial services will be more impacted, or more quickly impacted, than other sectors, but this is going to be economy-wide and society-wide... It started off with sci-fi, then it became serious thinking, and now it is becoming reality.**

**Tharman Shanmugaratnam**
President of The Republic of Singapore

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**Blockchain is not about disruption... it is the next step in the digitalization of capital markets.**

**Dr Anna-Naomi Bandi-Lang**
Executive Director, Digital Assets Structuring, UBS

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**You can settle a transaction peer to peer in about 400 milliseconds at a tiny fraction of a cent in terms of transaction costs... That's very powerful, and I think as users, which will be households and firms, and frankly financial institutions, as [users and financial institutions] experience this, they'll say I don't ever want to go back.**

**Jeremy Allaire**
Co-founder, Chairman and Chief Executive Officer, Circle

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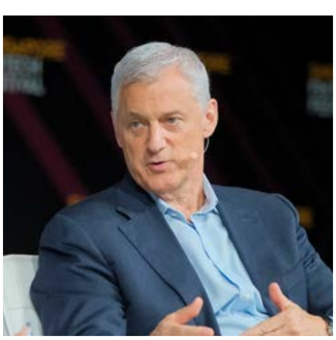

**[In terms of innovation,] the ecosystem around tokenized assets, digital assets, is extremely exciting.**

**Bill Winters**
Group Chief Executive, Standard Chartered

**No conversation about re-architecting any form of financial system is possible without having a conversation around financial inclusion.**

**Tan Su Shan**
Managing Director, Group Head of Institutional Banking, DBS Bank

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**Web3 technologies are enabling a new wave of digital transformation and digital collaboration, bringing innovations on the value movement.**

**Kelvin Li**
Head of Global Fund Platform, Ant Group

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**Programmability of digital money facilitates automated transactions, predefined conditions, as well as streamlined financial processes. This programmability extends to support atomic settlements of digital assets, making a significant shift in the way we handle financial transactions.**

**Laura Loh**
Director, Investment (Blockchain), Temasek

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**People coming together, sharing ideas, traditional companies, fintechs... Government agencies, the private sector coming together, and to build that through a convergence, I think that's important.**

**Dennis Tan**
Chief Executive Officer, Prudential Singapore

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# 1. SETTING THE FOUNDATIONS

Amid the crypto winter, builders and policymakers have continued to lay the foundation for the responsible innovation of digital assets through multiple experiments and regulatory developments.

**Digital assets have continued to attract attention from global institutions and policymakers.** SFF2023 participants highlighted the many promises of this technology: improving access and inclusion by lowering transaction costs; enhancing transparency through shared information; streamlining financial transactions through tokenization; and reducing risk through improved settlement mechanisms. The promises are many, but potentially so are the risks, as illustrated by the crashes that have impacted the cryptocurrency (crypto) industry.

**While the crypto winter has cast a shadow on industry developments, the discussion at SFF2023 highlighted the promise of developments in the regulated digital assets space.** The crypto industry has faced reduced market activity and retrenchment. Yet, this phase has also provided the opportunity for reflection and foundation-building within the digital assets space. This transition has been characterized by a growing appetite for responsible experimentation, particularly on tokenization and digital money.

**Exhibit 1: Selection of digital asset pilots and launches announced in 2023**

| | |
|---|---|
| **Q1** | **Hamilton Lane** opens tokenized fund on Polygon blockchain |
| | **Goldman Sachs**’ tokenization platform GS DAP goes live |
| | **Deutsche Bank** launches a tokenized fund on Memento blockchain |
| | **Siemens** issues digital bond on blockchain |
| | **HKSAR** announces the successful tokenization of HK$800 million |
| | **BlackRock**’s iShares Core S&P 500 ETF (CSPX) is turned into a token |
| | **HSBC Orion** tokenizes commercial bank money and sterling bonds |
| | **Swiss bank Cité Gestion** tokenizes its own shares |
| | **Brazilian private bank Bradesco** launches first tokenized credit note |

| | |
|---|---|
| **Q2** | **Singapore's OCBC Bank** launches tokenized structured notes |
| | **Franklin Templeton** launches tokenized mutual fund on Polygon blockchain |
| | **Mastercard** pilots tokenized bank deposits in New UK Testbed |
| | **European Investment Bank** launches a bond on SEB and Crédit Agricole CIB's platform |
| | **Crédit Agricole** leads tokenized small and medium-sized enterprise (SME) bond trials with Bank of Italy |
| | **Australian Stock Exchange** explores tokenized asset listings |
| | **Bank of China** and **OBCI subsidiary** launches tokenized securities on Ethereum |
| | **Swift** extends tokenization interoperability trials to public blockchain |
| | **Sumitomo Americas** invests in tokenized carbon credits through World Bank-backed fund |
| **Q3** | **Citibank** launches token services for institutional clients |
| | **Securitize** launches tokenized services for Spanish health care REIT Mancipi |
| | **Google** introduces new policy to permit NFTs |
| | **ABN AMRO** registers a digital green bond on blockchain |
| | **WisdomTree** goes live with Prime digital assets application that plans to tokenize funds, such as gold |
| | **Mastercard** plans to launch CBDC and tokenization project |
| | **Chainlink**, **Swift**, **Citibank**, **BNY Mellon**, and **others** complete tokenization tests |

Source: Oliver Wyman analysis

**Policymakers have been working towards establishing consistent and comprehensive regulatory frameworks worldwide.** According to the Monetary Authority of Singapore (MAS), many jurisdictions have made headway in the last year. For example, both Singapore and Japan introduced stablecoin regulation, emphasizing consumer protection and stability.[1] Outside Asia, according to the European Securities and Markets Authority (ESMA), Europe's Markets in Crypto-Assets Regulation (MiCA) offers clarity on crypto and stablecoins, while also encouraging experimentation and development.[2] At the international level, the International Organization of Securities Commissions (IOSCO) has proposed a global crypto regulatory framework to unify oversight.[3] Policymakers globally have also taken steps to clarify how distributed ledger technology (DLT) and digital assets can apply to traditional financial instruments, with both the European Union (EU) and United Kingdom (UK) launching regulatory sandboxes, and Singapore encouraging experimentation through Project Guardian.

1 MAS. MAS Finalises Stablecoin Regulatory Framework. Retrieved January 29, 2024.

2 ESMA. Markets in Crypto-Assets Regulation (MiCA). Retrieved January 29, 2024.

3 IOSCO. Policy Recommendations for Crypto and Digital Asset Markets. Retrieved January 29, 2024.

**This global regulatory shift is encouraging greater engagement from financial institutions and investors.** SFF2023 showcased results from multiple experiments and product launches, many of which were under Project Guardian. They included tokenization of money market funds, investment vehicles, and trade receivables; native issuance of new assets, such as structured notes; and cross-border foreign exchange (FX) payments and fund management.

**As the industry is gearing up for further growth in 2024, there is recognition of challenges ahead.** As the macroeconomic environment stabilizes, 2024 could be pivotal for digital assets. Participants highlighted that while the technology is ready, recent experiences are shedding light on new challenges which the industry will need to address. These challenges include questions around privacy and balancing customer confidentiality with the data sharing that enables greater efficiency and transparency, as well as ensuring financial stability. Further clarification is still needed on regulatory and legal frameworks, as experiments reveal more nuance around risks and boundaries. Reaching scale will require solving challenges around the whole value chain, starting with distribution and ensuring networks and infrastructures connect to avoid fragmenting liquidity

**If you track Singapore FinTech Festival events, there's a very distinct shift away from concepts to proof of concepts, to things actually going into production.**

**Pradyumna Agrawal**
Managing Director, Investment (Blockchain), Temasek

# 2. THE MANY FORMS OF DIGITAL MONEY

While there is continued debate on which emerging forms of digital money are likely to scale, SFF2023 participants acknowledged coexistence is most likely, driven by their unique characteristics and applicability to different use cases. Competition in parts is also inevitable. The focus then needs to be on ensuring their effective integration and operation within the financial system.

**SFF2023 delved into how emerging forms of money, such as CBDCs, stablecoins, and tokenized deposits, can support the digital economy.** Larissa de Lima, Senior Fellow at Oliver Wyman Forum, encapsulated the importance of the evolution of money, saying, "Tokenized money is the next generation beyond electronic money, as DLT combines the transfer of value and information." Tokenization allows multiple assets to coexist and be exchanged without intermediaries, and a digitally native form of money is critical to unlocking the value of digital assets while minimizing the introduction of new risks around settlement and clearing.

**Experts at SFF2023 agreed that multiple forms of money are likely to coexist, driven by their unique characteristics and applicability to different use cases.** Each of these forms of money vary in who issues them, who accrues their economic benefit, and what risks are most salient (see Exhibit 2). Their unique designs mean they will likely find different use cases and client segments where they are most relevant.

**Exhibit 2: Forms of digital money**

| | What is is | Issuer | Key risk |
|---|---|---|---|
| Wholesale CBDC | • New central bank liability, designed to be tokenized<br>• A kind of modern version of reserves | Central bank | Sovereign |
| Tokenized reserves | • Existing central bank liability is made available on new platform<br>• Money on new platform is "synthetic CBDC" | Central bank | Sovereign |
| (Joint) tokenized deposits | • Digital form of a bank deposit, issued by a regulated institution<br>• Recorded on blockchain and intended to settle digital asset trades | • Banks<br>• Bank consortia | Credit/ Counterparty |
| Tokenized government securities, MMFS | • Digital form of government securities or money market funds providing a yield and usable for payments<br>• Allows investors to access benefits of blockchain, DeFi | • Banks<br>• Asset managers | Liquidity |

| | What is is | Issuer | Key risk |
|---|---|---|---|
| Fiat-backed stablecoins | • Private sector-issued digital assets<br>• Backed by fiat currency reserves held by regulated financial insitutions | • Digital natives<br>• Many others | Liquidity |
| Decentralized stablecoins | • Private sector-issued digital assets<br>• Backed by overcollateralized digital or real-world assets<br>• Decentralized, with reserves visible on blockchain | Digital natives | Dependent on design |

— Narrow money tokens

Source: Oliver Wyman Forum (2023). Inside The Competition For Big Money

**CBDCs are a digital form of fiat money issued and regulated by central banks.** About 60% of the world's countries are exploring CBDCs in some form today. The reasons for engagement are many, as Kristalina Georgieva, Managing Director of the International Monetary Fund (IMF), noted, "CBDCs can replace cash, which is costly to distribute, especially in evolving economies. They can also offer resilience and improve financial inclusion where few hold bank accounts." The strong global interest spans the two types of CBDCs: retail CBDCs, intended for general public use like cash, and wholesale CBDCs, designed for transactions among regulated institutions. As experts at SFF2023 shared, the programmable nature of CBDCs introduces new capabilities in payments and settlement mechanisms, which could enhance both monetary and fiscal integrity.

**Stablecoins are a type of digital money designed to maintain a stable value by being pegged to a fiat currency, such as the US dollar, or other assets.** Stablecoins have over US$100 billion in market capitalization globally as of December 2023,[4] and have gained scale in crypto markets, and offering a low-cost means of payments in regions facing conflict or economic instability. SFF2023 discussants noted that stablecoins help bridge the innovation of cryptocurrencies and the stability of traditional fiat. However, this stability has at times faltered, with a recent Bank for International Settlements (BIS) paper noting that no stablecoins have been able to consistently maintain their peg in secondary markets.[5]

**Tokenized deposits are digital representations of traditional bank deposits.** Some established financial institutions have started issuing these types of deposits. Experts at SFF2023 highlighted that programmable tokenized deposits could improve liquidity management for assets that have been converted into digital tokens. This improvement would come from automating financial transactions, making them more efficient and responsive to market needs. Tokenized deposits are still nascent, with a small number of experiments in place by financial institutions. For the successful adoption of tokenized deposits, collaboration among these institutions will become increasingly important to allow for standardization and interoperability.

4 DefiLlama. Retrieved January 29, 2024.

5 BIS. Will the real stablecoin please stand up?. Retrieved January 29, 2024.

**These forms of digital money can bring efficiency and security to cross-border transactions.** Melvyn Low, Head of Global Transaction Banking at OCBC Bank, highlighted the impact in this context, stating, “By using the DLT technology and blockchain, we’re able to program a lot of the checks and balances that a traditional cross-border remittance network would provide, including foreign exchange rates, identification of recipients, as well as a myriad of other conditions in foreign exchange regulations.” Moreover, panelists emphasized that integrating blockchain into specific aspects of the FX value chain could allow certain processes, such as trade execution, to continue utilizing legacy systems, thereby maintaining established efficiencies while adopting new innovations. Central banks globally have also recognized the value in using DLT to solve cross-border inefficiencies. A couple of weeks prior to SFF2023, the BIS announced that Project mBridge, an experiment focused on creating a common platform for wholesale cross-border payments using multiple CBDCs, had expanded to include 25 observing members, including the IMF, World Bank, and 23 central banks spread out globally.[6]

**Experts noted, however, that the coexistence of multiple forms of money also implies challenges, with maintaining financial stability being the chief concern.** In March 2023, the collapse of Silicon Valley Bank led to several stablecoins depegging over the weekend. The financial contagion had limited further impact, given the relative market size of stablecoins, but the risks will only increase as markets scale. Lim Tuang Lee, Assistant Managing Director, and Head of the Capital Markets Group at MAS, noted, “We need to continue to monitor, continue to work together with the FSB [Financial Stability Board], to make sure that if the issue [of financial stability] grows big enough, we have to have new measures or considerations on how to tackle it.” His words reflect a perspective shared by others, as financial stability is a paramount concern.

**Privacy and data protection are critical in the adoption of digital currencies, requiring a delicate balance between user privacy, transactional transparency, and security.** This balance is especially important for CBDCs, where public trust will be essential for adoption. Suvendu Pati, Chief General Manager of the Reserve Bank of India, emphasized this sentiment by stating, “The adoption is critically hinged on the level of anonymity that this new digital form of money provides.” CBDCs clearly require a delicately balanced approach.

**Relatedly, experts discussed how CBDCs encounter adoption challenges, including the need for easy access, user-friendliness, and interoperability across various platforms.** Addressing these challenges will require central banks to evolve their capabilities in facets such as technology management, cybersecurity, policy development, and risk assessment. Without new capabilities, central banks cannot effectively reshape policies and strategies to meet the demands of the contemporary ecosystem.

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6 BIS. Project mBridge: Experimenting with a multi-CBDC platform for cross-border payments. Retrieved January 29, 2024.

**The digitization of finance underscores the need for comprehensive global regulations, standards, and frameworks.** It is critical that these frameworks are both adaptable to the evolving digital landscape and robust enough to support innovation, while maintaining the integrity of the financial system. Experts at SFF2023 emphasized that the ongoing experiments and advancements have highlighted the critical need for collaborative efforts among diverse stakeholders. The objective is to forge a digital financial landscape that strikes a balance between innovation and stability, inclusivity and efficiency, and is prepared for a future that is still unfolding. The insights from SFF2023 suggest a collaborative path forward, advocating for the coexistence of various forms of money, and harnessing their unique capabilities to construct a more robust and adaptable financial ecosystem.

**Digital technology actually provides a rare opportunity to fix cross-border issues… That's why you see efforts of central banks coming together in the joint projects.**

**Dong He**
Deputy Director, Monetary and Capital Markets Department, IMF

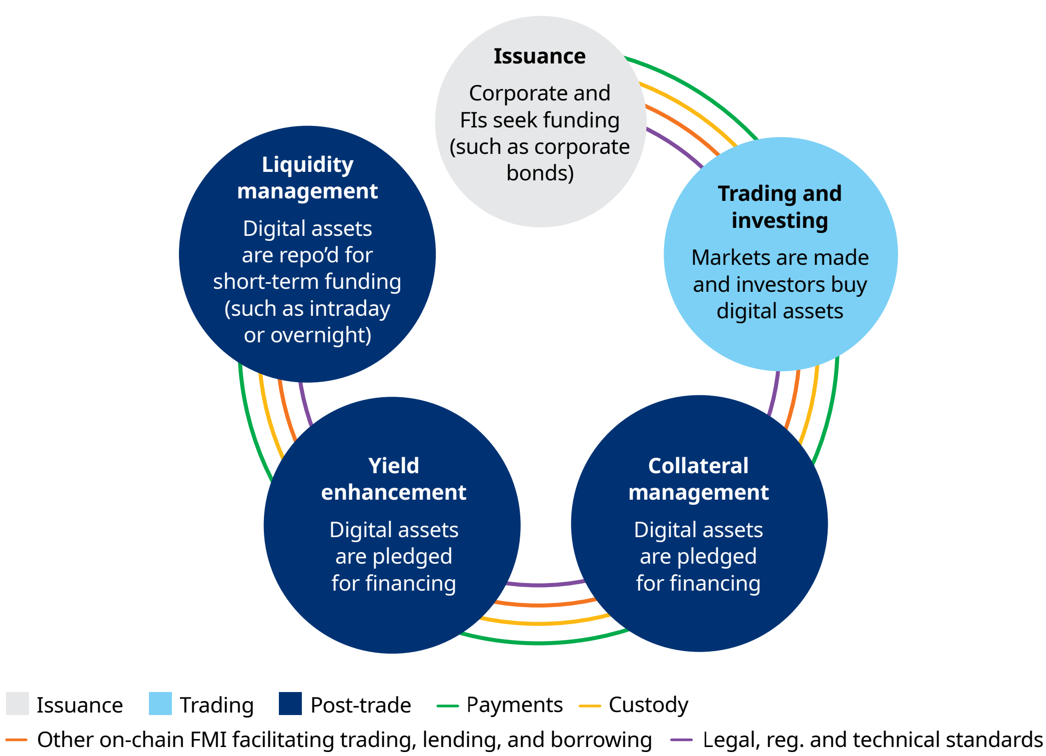
# 3. GROWING MOMENTUM IN TOKENIZATION

SFF2023 participants reported the results of numerous experiments in tokenization. These experiments promise significant cost savings and expanded accessibility, but reaching scale will require more focus on distribution and further regulatory and legal clarity.

**Tokenization can offer a wide variety of benefits to the financial sector.** These benefits are widespread across asset lifecycles (see Exhibit 3). These benefits are not just theoretical, as they are being proven in experiments. For example, recent findings from the Hong Kong Monetary Authority (HKMA) on tokenized bonds highlighted significant cost reductions and liquidity enhancements, as tokenization reduced borrowing costs by 0.78% and underwriting fees by 0.22% of a bond's par value. Additionally, liquidity saw an improvement of 5.3%, potentially increasing to 10.8% with retail investor involvement.[7] This increase in liquidity and fractionalization enables issuers to offer bonds in smaller denominations, which can improve access.

**Exhibit 3: Benefits of use cases across an asset lifecycle**

Asset lifecycle components




7 HKMA. Tokenised Bond: Huge Potential to be Unlocked. Retrieved January 29, 2024.

**Key benefits across market participation (non-exhaustive)**

| | |
|---|---|
| **Issuance** | • New products, markets, and investment opportunities<br>• Increased efficiency through disintermediation reduces fees<br>• Issuance speed means more products reflect real-time market conditions |
| **Trading** | • Efficient trading and risk management via programmability of smart contracts<br>• Faster settlement and clearing times<br>• Composability of assets creates new (structured) products |
| **Collateral management** | • Lower counterparty risk reduces collateral requirements<br>• Possible new collateral types created by composing assets |
| **Yield enhancement** | • Real-time yield generated through traditional lending activities<br>• New on-chain yield generation activities (such as liquidity pools through institutional DeFi protocols, if applicable) |
| **Liquidity management** | • Short-term funding enabled by instant collateral transfers<br>• Unlocked capital otherwise tied up during clearing processes |

Issuance  Trading  Post-trade  — Payments  — Custody
— Other on-chain FMI facilitating trading, lending, and borrowing  — Legal, reg. and technical standards

Source: Oliver Wyman and UK Finance (2023). Unlocking The Power Of Securities Tokenization

**While the current market size is limited, the potential opportunity is significant.** Market projections vary, but there are estimates that the value of tokenization could reach around US$4 to 14 trillion by 2030, according to reports by Citi Global Perspectives and Solutions and HSBC and Northern Trust.[8] This projection reflects a growing recognition of the scope and importance of this technology in the financial sector. Caroline Malcolm, VP of Global Public Policy at Chainalysis, noted, "There's billions of dollars a day already across business lines and product lines that are moving on tokenized rails more efficiently, cheaper, [and] safer." SFF2023 participants made this evident, with experiments spanning applications in payments, financial products, and asset management.

**SFF2023 showcased the value of tokenization across multiple applications.** Experiments included tokenizing an increasing array of assets, including money market funds and trade finance. For example, Steven Hu, Head of Digital Assets, Trade, and Working Capital at Standard Chartered presented on a Project Guardian pilot where it tokenized trade-finance receivables as tokens on Ethereum, while Rajeev Tummala, Head of Digital and Data — Asia and MENA at HSBC Securities Services presented on its native issuance of structured notes. Financial institutions are also exploring how financial services can be delivered differently with on-chain assets. For example, Anna-Naomi Bandi-Lang, Executive Director, Digital Assets

8 Citi GPS, Money, Tokens, and Games; and HSBC and Northern Trust, Beyond Asset Tokenization. Retrieved January 29, 2024.

Structuring at UBS, Jason Beale, Head of Product and Technology Business Development at SBI Digital Asset Holdings, and Keith Desouza, Group Head of Treasury Liquidity Management, Treasury and Markets at DBS Bank presented on their Project Trident experiment, where they successfully executed a cross-border repurchase agreement of natively issued digital bonds. The transaction spanned Japan, Singapore, and Switzerland, and demonstrated the feasibility of the entire lifecycle of the transaction being executed on-chain.

**Tokenization can also have a significant impact on asset management, by facilitating new ways to construct portfolios and democratize access to financial products.** For example, Stephanie Law, Head of Products South-East Asia at UBS Asset Management and CK Ong, Chief Operating Officer at SBI Digital Markets presented on their tokenized investment fund issuance and distribution under Project Guardian. The fund is structured as a smart contract on Ethereum, allowing automation of fund subscriptions and redemptions. Similarly under Project Guardian, Tyrone Lobban, Head of Onyx Digital Assets and Blockchain at Onyx by JP Morgan and Christine Moy, Partner, Head of Digital Assets and AI at Apollo presented their tokenized fund proof of concept, which allows portfolio construction to be automated and more readily personalized. This process would enable alternative assets to be included in a wider range of portfolios, at potentially a 20% cost reduction at the portfolio level. Tan Su Shan, Managing Director and Group Head of Institutional Banking at DBS Bank noted the potential of this type of technology, saying, "Today you have democratized wealth management… bringing financial products to [the] previously unbanked or the elderly."

**Tokenization could also offer new tools and capabilities for policymakers.** For example, blockchain technology offers supervision in real time and thereby provides an opportunity for the public sector to build real-time monitoring and data analysis capabilities for enhanced supervision. Keith Desouza, Group Head of Treasury Liquidity Management, Treasury and Markets at DBS Bank, emphasized this point, stating, "As we head into a new world, it's important that regulators have firsthand experiments… As regulators understand the risks, they are better able to put the appropriate boundaries." This insight underscores the importance of continuous adaptation, learning, and experimentation by regulators within a framework that supports growth and preserves the integrity of the financial system.

**These tokenization projects have also revealed common challenges, such as building liquidity and driving adoption.** Discussions at SFF2023 emphasized the need for robust distribution networks to support building liquidity. By broadening and enhancing the channels through which tokenized assets are offered and traded, the ecosystem can build up the necessary on-chain value to enable growth and stability. Experts highlighted that engagement with the buy-side market is crucial. While the sell-side can structure innovative products, the actual market impact depends on buy-side demand. To achieve widespread adoption, both sides of the market must see the value in exploring tokenization.

**Regulatory and legal clarity also remains a central challenge.** The operational risks unique to these technologies demand well-defined legal parameters to establish liability. An effective legal framework should address the specific nuances of tokenization, including ownership rights and compliance obligations, to ensure digital assets function within a secure and well-understood legal landscape. Janet Young, Managing Director and Group Head, Channels and Digitalization, Communications and Brand at UOB, highlights the complexities involved, stating, “The complexity of rules and regulations adds a certain degree of friction to adoption.” Policymakers may need a gradual approach, given advances in innovation are likely to continue challenging legislation.

**Among regulatory challenges, decentralized finance (DeFi) stands out.** DeFi protocols add value to digital assets because they can automate financial services while reducing the burden of manual involvement and reconciliation. However, many DeFi protocols are governed without centralized control and can evolve at a very rapid pace, thus not fitting with traditional financial regulation. Valerie Szczepanik, Director at the US SEC’s Strategic Hub for Innovation and Financial Technology (FinHub), captured this need for regulation to evolve, saying, “DeFi is a really exciting area, it’s taking technology and applying it in new ways… we have to lay down a flexible but solid framework for people to either build or apply.” Participants highlighted the need for an agreed-upon taxonomy for DeFi, further advances in regulatory frameworks that balance innovation and risk, and a globally consistent approach to avoid regulatory arbitrage.

**We are at this very unique inflection point for tokenized assets… We are modernizing infrastructure for the financial system and this is enabling access to markets, greater access to markets at less cost, more efficiency, [and] more resiliency.**


**Hon Caroline D. Pham**
Commissioner, US Commodity Futures Trading Commission

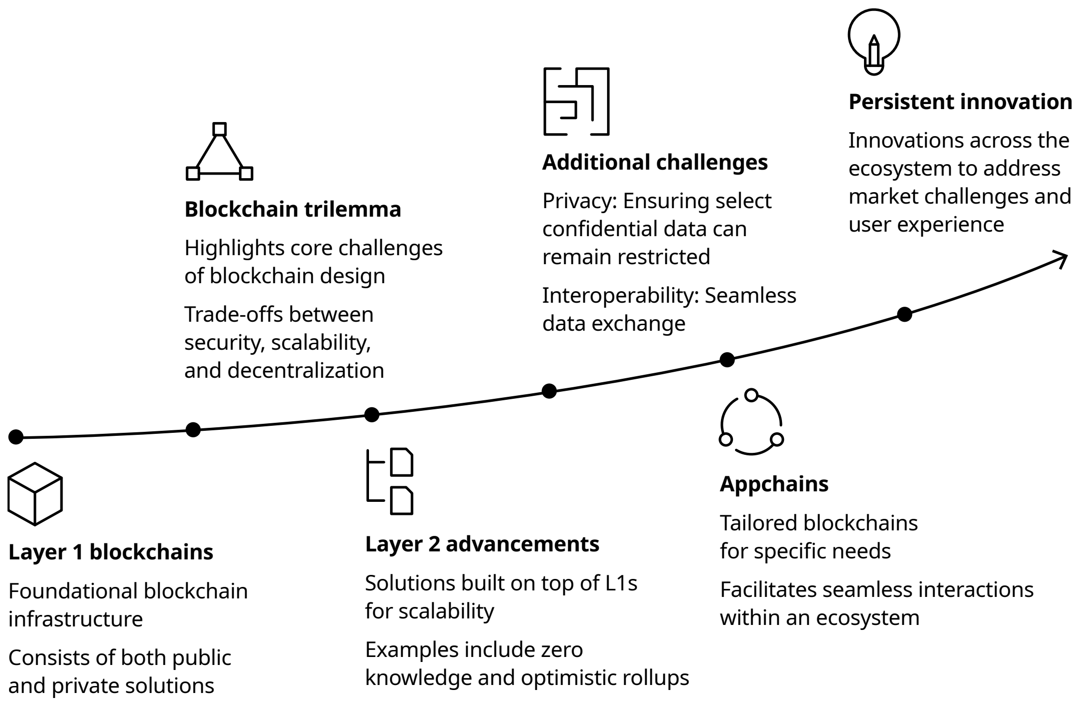
# 4. TOWARDS CONNECTIVITY ACROSS NETWORKS

The promise of digital assets and tokenization depends on connecting the various networks that have emerged. This will require new technical solutions, and potentially new global efforts.

**Digital assets today are being issued across multiple network models, each with distinct advantages and challenges.** On one end of the spectrum, there are public permissionless networks, such as Ethereum, where anyone can join freely. On the other end are private permissioned networks which require approved access. The more open approaches facilitate innovation and liquidity, but openness can also be a source of risk. Public permissionless networks have also struggled with scalability and security, but have seen a wide range of advancements (see Exhibit 4). Meanwhile, a plethora of permissioned networks have emerged, but have had challenges with building liquidity.

**Fragmentation of activity across multiple networks can limit the value of digital assets, unless solutions can be found to ensure connectivity across markets.** It is natural to expect multiple networks to emerge, as Caroline Butler, Global Head of Digital Assets at BNY Mellon, notes, "There will be ledgers for different use cases, [and] different purposes." As the promise of digital assets depends on the ability to automate business processes and reduce unnecessary intermediation, new risks and frictions emerge when there is fragmentation of activity across multiple networks. It is a critical challenge for the industry to ensure connectivity across these solutions. Dr Christoph Puhr, Lead CoE Digital Assets at UBS Group AG, underscores this vision, stating, "What we need is a sort of common infrastructure layer, which is open [and on] which you can innovate."

**Exhibit 4: Evolution of network and challenges**




Source: Oliver Wyman and Matter Labs analysis

**Policymakers have put forward visions for global connectivity.** At SFF2023, MAS announced its proposal for a Global Layer One infrastructure, with the aim to create an open digital platform for cross-border transactions and global liquidity pools, paralleling the openness and accessibility of the public internet.[9] This builds on other similar calls by multilateral institutions. For example, BIS' unified ledger integrates CBDCs and tokenized assets into a new financial market infrastructure, emphasizing fast transactions and atomic settlements within a transparent and privacy-aware environment.[10] The IMF's cross-border payment and contract platform (XC platform), modeled on CBDC infrastructure, offers a single ledger for digital representations of central bank reserves, enabling the private sector exchange of assets and tokenized money that settle in central bank currency.[11]

**Meanwhile, technologists in the blockchain space are making advances on technical interoperability.** These tools collectively facilitate the transfer of assets and data across various blockchain platforms. Historically, crypto markets have connected different networks through bridges, which are protocols that "lock" value in a wallet in one network and convert it into a token on the other network. As these protocols lock up significant value, hackers have significant incentives to discover vulnerabilities in the protocol code.

9 MAS. MAS Partners Financial Industry to Expand Asset Tokenisation Initiatives. Retrieved January 29, 2024.

10 BIS. Blueprint for the future monetary system: improving the old, enabling the new. Retrieved Janaury 29, 2024.

11 IMF. Exploring Cross-Border and Domestic Payment and Contracting Platforms, Speech by Tobias Adrian. Retrieved January 29, 2024.

Smart contract bridge exploits cost more than US$2 billion in 2022, as stated in an article in CoinDesk's Consensus Magazine.[12] Financial institutions and financial technology companies (fintechs) are increasingly exploring alternative solutions. According to an Onyx by JP Morgan and Apollo paper prepared under Project Guardian, Axelar facilitated interoperability between Provenance blockchain and Onyx, LayerZero connected Avalanche with Onyx, and Biconomy's account abstraction on Avalanche eliminated the need for asset managers to use crypto for gas fees.[13] At SFF2023, MAS also published a whitepaper written in collaboration with the private sector proposing a common framework for cross-network exchanges.[14]

**Financial institutions are also exploring connectivity to legacy systems.** As Christine Moy, Partner and Head of Digital Assets and AI at Apollo, explains, "Not only would we connect different blockchains, but [we] would [also] elaborate on connecting to legacy systems." This means a dual challenge of achieving interoperability between different blockchain networks, and effectively bridging blockchain networks with established legacy systems. This harmonization requires going beyond mere technological compatibility. It calls for a shift in both operational and business models, such as adapting processes for real-time data flow and revising business strategies to capitalize on the benefits of blockchain technology.

**Connectivity across networks depends on alignment of regulatory standards and market practices.** As highlighted at SFF2023, the creation of unified regulatory frameworks that accommodate the unique characteristics of blockchain technology, while ensuring compliance on a global scale, is crucial. Dong He, Deputy Director of the Monetary and Capital Markets Department at the IMF, emphasizes the critical role of policymakers in this endeavor, saying, "It's up to us to shape the global finance system so we don't end up with siloed networks. So we need to have public policy in place, we need to have international collaboration to ensure that these different networks are interoperable by design." Initiatives like MAS' Project Guardian serve as important milestones towards this goal, demonstrating the potential for shared regulations and international cooperation.

**The world is an interactive place. And by definition, no one institution can serve everyone and, frankly, should not serve everyone… We need those platforms to talk to each other in a manner that's safe, secure, and performant.**

**Umar Farooq**
Global Head of Financial Institution Payments and
Chief Executive Officer, Onyx by JP Morgan, JP Morgan

12 CoinDesk. Bridge Exploits Cost $2B in 2022, Here's How They Could Have Been Averted. Retrieved January 29, 2024.

13 JP Morgan. The Future of Wealth Management. Retrieved January 29, 2024.

14 MAS. Interlinking Networks. Retrieved January 29, 2024.

# 5. INNOVATION FOR ALL

Building a better financial system should mean a more inclusive one. Here, digital assets also show promise, but more remains to be done to ensure appropriate education and protection.

**Digital assets have the potential to enhance accessibility and inclusion.** They are appealing given their low-cost nature and ability to efficiently handle microtransactions. Many countries leading in crypto adoption also have a significant unbanked population (see Exhibit 5). According to Juniper Research, 60% of the global population is projected to use digital wallets by 2026.[15] Digital wallets create an opportunity to expand inclusion through lower cost financial products, creating a significant opportunity to integrate traditionally excluded groups into the formal economy. Staci Warden, Chief Executive Officer of Algorand Foundation, underscores this potential, saying, “We are talking about the millions of people without bank accounts. Payment is a fundamental human right and can only be protected as such if it’s on… blockchain.”

**Digital assets have proven especially valuable where traditional financial systems have been challenged or disrupted.** Digital asset solutions are empowering individuals in emerging markets by providing them with tools for financial management and access to global financial systems. Rich Teo, Co-founder and Chief Executive Officer Asia at Paxos, noted, “We learned about people who, refusing to use their own unstable currency, used stablecoins for payments. They put it in DeFi to earn yield on it. And they save, manage, transact, and then build their own ecosystems.” Digital assets have also proven helpful in scenarios of infrastructure breakdowns and conflict zones, where traditional financial systems often falter. For example, in Ukraine, digital assets have not only emerged as vital tools for facilitating aid and maintaining financial flows, but they have also provided a means to deliver support quickly and securely to those in need.

15 Juniper Research. Over 60% of Global Population to Use Digital Wallets in 2026. January 29, 2024.

**Exhibit 5: Leading countries in cryptocurrency adoption**

| Rank in 2023 | Country | Unbanked Population |
|---|---|---|
| 1 | India | 20% |
| 2 | Nigeria | 60% |
| 3 | Vietnam | 69% |
| 4 | United Sates | 6% |
| 5 | Philippines | 66% |
| 6 | Indonesia | 51% |
| 7 | Pakistan | 45% |
| 8 | Brazil | 30% |
| 9 | Thailand | 18% |
| 10 | China | 20% |

Source: Chainalysis, Global Finance, Express Tribune

**Continuing to build inclusivity means catering to diverse needs.** Stuart Alderoty, Chief Legal Officer at Ripple, reflects on this evolution and its implications for future applications, saying, "As the technology evolves, and as people get more comfortable with the technology, they will think of additional use cases and applications. And I think that's where we are." As familiarity with digital assets increases, so does the potential to tailor the technology to local circumstances, a critical component of user-centric design.

**Moreover, inclusivity in digital finance extends to reaching people regardless of their financial literacy or geographical location.** Mairead McGuinness, Commissioner for Financial Services, Financial Stability and Capital Markets Union at the European Commission, emphasized the importance of public engagement, stating, "The more tuned in our public [is] on these developments, the better." Educating individuals and businesses about the functionalities, benefits, and risks of digital assets is crucial, and requires a collaborative effort from both the public and private sectors to integrate the technology into daily life seamlessly. This work should complement steps taken to ensure consumer protection and market stability.

**The solutions are ideally so simple to users that their technological underpinnings are invisible.** SFF2023 experts called for simplifying blockchain technology into a more user-friendly form, similar to how complex internet protocols like the Hypertext Transfer Protocol (HTTP) evolved into the seamless web experiences we have today. Ideally, technical details become seamlessly integrated and largely unnoticed by end users. Echoing this sentiment, Sigal Mandelker, General Partner at Ribbit Capital, envisions a future where digital assets become a part of our daily lives, saying, "I think five to 10 years from now, nobody's going to use the word crypto or tokenization or DLT; it's just going to be a part of our modern-day life."

**Digital assets can gain a boost by connecting to forms of digital identity.** Forms of digital identity are relevant to both individuals and firms. A prominent initiative underway to meet this need is the Universal Trusted Credential (UTC), developed through a partnership between MAS and the United Nations Development Programme (UNDP). It is a data-driven approach to assess the “intent to pay” of a small and medium-sized enterprise (SME), which will allow for informed decisions on credit provision. With pilots underway in Cambodia and Ghana, this credentialing approach is already fostering a more inclusive financial sector and holds promise for further expansion.

**Experts at SFF2023 also acknowledged the collective role of key industry stakeholders in shaping a comprehensive and inclusive digital finance landscape.** As digital financial services expand, the role of partnerships becomes increasingly important in fostering innovation and ensuring the comprehensive integration and bridging of traditional finance and DeFi solutions to provide useful services to end users. Matthew Driver, Executive Vice President and Head of Services at Mastercard Asia Pacific, stresses this collaborative approach, stating, “If we’re going to make a difference for our customers, we’re not going to get there by ourselves… embrace the best in class… get the intelligence at the edge of our systems by working with these partners.” This mindset reflects a broader industry consensus that financial institutions and technology providers alike bring unique capabilities that complement rather than compete with one another.

**[When] Ukrainian refugees were displaced, the UN turned to public blockchain infrastructure in the Stellar blockchain and to USDC as a trusted digital dollar to provide for real-time cash assistance at the speed [necessary].**

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

Deep Dive

# Achieving Seamless Financial Transactions

Ravi Menon, former Managing Director of MAS, highlighted the transformative role of digital assets in financial ecosystems, outlining instant payments, seamless transactions, and a trusted sustainability ecosystem as foundational pillars for a reimagined financial future. This vision rests on leveraging the strengths of digital assets, digital money, and digital infrastructure, aiming to create a network of interoperable systems for instantaneous and seamless financial processes.

## Digital assets

Menon emphasized the transformative role of digital assets in the financial ecosystem, particularly through MAS' Project Guardian. This initiative is pioneering the tokenization of various asset classes. Key projects include tokenizing asset management instruments and FX to create 24/7 global liquidity pools, which aim to consolidate fragmented liquidity and reduce operational costs in over-the-counter markets. Additionally, tokenizing bonds is set to enhance cross-border distribution and settlement, increasing liquidity for traditionally less-traded assets. Furthermore, tokenizing funds, through initiatives such as Variable Capital Company (VCC) structures, aims to improve the efficiency of fund issuance and trading.

## Digital money

Discussing the evolution of digital money, Menon highlighted the transition from simulated to live experiments with wholesale CBDCs. This marks a significant shift towards the real-world application and integration of CBDCs in domestic payments, enhancing efficiency in the financial landscape. He touched upon the role of well-regulated stablecoins, pointing to their potential to complement CBDCs and tokenized bank liabilities. Menon also shed light on the concept of Purpose Bound Money (PBM) and Project Orchid, which explore innovative use cases for stablecoins in transactions, demonstrating MAS' proactive approach in nurturing a stable and secure digital money ecosystem.

## Digital infrastructure

Menon's comments on digital infrastructure centered around the Global Layer One (GL1) initiative, envisioned as foundational infrastructure across multiple DLT networks. GL1 is aimed at facilitating seamless cross-border transactions and enabling tokenized assets to be traded across global liquidity pools. This initiative underscores the need for open and interoperable networks that are compliant with regulatory requirements. By promoting a compliance-by-design approach, GL1 seeks to harmonize regulatory compliance with technological advancements, paving the way for a more integrated and efficient global financial system.

**Conclusion**

Menon's vision for shaping the financial ecosystem of the future is anchored in the capacity of financial technology (fintech) to solve real-world problems and improve lives. The journey towards this future involves embracing the convergence of technology, regulation, and sustainability, underpinned by a collective drive to create a more inclusive and sustainable world. This vision, as laid out at SFF2023, sets a course for the global financial community to collaborate and innovate for a better, more interconnected financial future.

**Everything we do in fintech must have a larger purpose. Yes, there is money to be made, costs to be cut, opportunities to be seized. But fintech is more importantly about:**

- **Solving real-world problems**
- **Improving people's lives**
- **Promoting a more inclusive society**
- **Securing a sustainable planet for the future**

**This sense of higher purpose has permeated the FinTech Festival since 2016. It is why people come back year after year to the FinTech Festival: to build a better world.**

**Ravi Menon**
former Managing Director, MAS

# 6. FORGING A PATH FORWARD

Building a shared future will depend on cross-sector and cross-regional collaboration.

**As we look towards the future of digital assets, public and private sector collaboration is critical for advancing the ecosystem.** As noted by Lars Sjögren, a Board Director and Senior Advisor, “If you really want to achieve the real results, it’s about public and private actually working together.” The public sector, including policymakers and regulatory bodies, will play a crucial role in continuously developing and refining regulatory frameworks. Concurrently, the private sector drives innovation and commercialization, leading technological advancements and their inevitable societal impacts. Collaboration is needed to ensure new solutions, standards, and connectivity support a scalable, secure, and equitable ecosystem.

**The most innovative firms are investing in digital assets and blockchain technology not just for efficiency and cost-effectiveness, but also to drive financial inclusion.** Experts at SFF2023 noted that increasing accessibility and market democratization can provide substantial returns by reaching new and underserved markets. In this endeavor, regulatory frameworks are vital for balancing innovation with safety, ensuring that the pursuit is not only profitable but also secure and sustainable. The frameworks play a key role in mitigating potential risks and fostering responsible expansion.

**The regulation of digital assets is evolving and will not come to fruition overnight.** Regulation encompasses a comprehensive spectrum that includes facets such as market integrity, consumer protection, and the overall stability of the financial system. Globally, there is variability in the maturity of regulatory frameworks, with some countries already possessing comprehensive structures while others still in the early stages of development. This diversity underscores the necessity for the ongoing evolution and harmonization of regulatory practices across different jurisdictions. At SFF2023, experts stressed the importance of dynamic and clear regulatory standards that protect users and guide creators, ensuring a conducive environment for the growth and integration of tokenization into the financial ecosystem.

**Achieving a robust yet flexible regulatory framework requires that policymakers also experiment and develop new capabilities in parallel to the private sector.** The governance, interoperability, and privacy of blockchain technology pose major questions, and regulatory frameworks will have to grapple with these questions in a technologically fluent way if policymakers wish to capture the upside of this innovation. By engaging actively in understanding the implications of emerging technologies, regulations can be informed directly by practical experience. Many policymakers are already engaging proactively, as Winston Quek, Chief Executive Officer at SBI Digital Markets, noted, “Much has happened in the last two or three years with regulators getting involved… regulators are coming on board providing support, allowing the private sector to lead but in the background providing the support.”

**Ensuring international collaboration is a key component in realizing the synergy between the public and private sectors in the digital assets space.** Effective partnerships, both domestically and internationally, among policymakers, established players, and startups are essential to foster innovation, stability, regulatory compliance, and public trust. Masakazu Osawa, Managing Executive Officer and Chief Executive for Asia Pacific at MUFG Bank, highlighted the importance of such collaboration, stating, “It will be critical for the private sector institutions like us hopefully together with the central banks or the regulators in the world to come together.” Conferences such as SFF2023, which unite various industry stakeholders for discussion, learning, and collaboration, play a vital role in facilitating these joint efforts.

**Due to the lack of alignment between different jurisdictions… I end up with a 50-page contract to do a single trade. So that is something we’re working on with regulators and all the stakeholders.**

**Fernando Luis Vázquez Cao**
Chief Executive Officer, SBI Digital Asset Holdings

# CONCLUSION

SFF2023 highlighted that digital assets are already integrating into the global financial landscape and will continue to gain traction in the years ahead.

This integration is being propelled by global experiments that underscore the practical applications and potential of blockchain technology. As multiple forms of money, tokenized assets, and networks continue to evolve and gain scale, convergence in standards, policy, and connectivity will become increasingly important. If achieved, the result will be an ecosystem that is inclusive, accessible, and democratized, offering a wide range of financial services and opportunities that benefit a global audience. Realizing this vision will require strategic collaboration and dialogue between the public and private sectors in forums such as SFF2023.

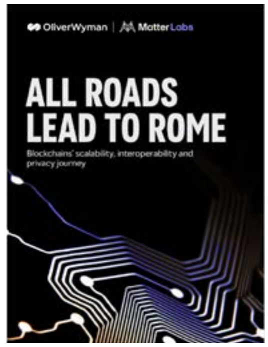
**We have not yet reached land, there is so much more space for innovation and so much uncertainty... we have left port and are now in high seas. This calls for courage and determination.**

**Kristalina Georgieva**
Managing Director, IMF

# RELATED READING *(select publications)*


**Inside The Competition For Big Money**

This paper explores how digital money and tokenization could transform the business of high-value flows by spurring competition between big banks and digitally native firms, potentially driving a major reordering of the financial system. It presents four visions for the way in which these technological and policy developments may play out, along with the potential to realize each vision.




**The Blockchain Evolution — All Roads Lead to Rome**

In collaboration with Matter Labs, this report provides deep insights into the feasibility of public and private blockchain infrastructure, the sector's challenges in terms of scalability, privacy, and interoperability, and the innovative solutions developed over time for making blockchain integration into financial services impactful.


**Unlocking the Power of Securities Tokenization**

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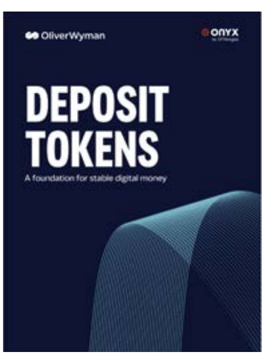
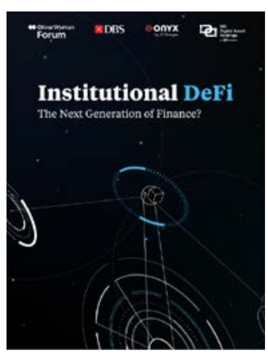



**Deposit Tokens — A Foundation for Stable Digital Money**

In collaboration with Onyx by JP Morgan, this report assesses how deposit tokens can be a strong foundation for digital money, and support the payment and settlement of tokenized asset transactions, as the demands on digital money grow in scale and complexity.




**Institutional DeFi — The Next Generation of Finance?**

In collaboration with DBS, Onyx by JP Morgan, and SBI Digital Asset Holdings, this report explains the potential benefits of adapting decentralized finance (DeFi) protocols in the financial industry using tokenized real-world assets. The paper argues for a version of DeFi called "Institutional DeFi," which combines the innovations of DeFi protocols with the safeguards of today's financial industry.

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This joint report would not have been possible without ideas and contributions from numerous members across Oliver Wyman and Elevandi. The co-authors would like to express deep gratitude to the following individuals:

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