# The Impact of Distributed Ledger Technology in Capital Markets

## Ready for Adoption, Time to Act

gfma afme/ asifma sifma IIF Institute of International Finance ISDA Safe, Efficient Markets Celebrating 40 Years GDF Global Digital Finance GBBC Global Blockchain Business Council FIA bpi Bank Policy Institute Financial Services Forum

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# Foreword

Across each evolution of global capital markets, trust has been the cornerstone upon which efficient and robust capital markets rest. Regulatory frameworks play an essential role in maintaining this trust, setting clear, consistent rules that protect stakeholders and meet the objectives of policymakers worldwide. Effective regulation balances growth and innovation with market integrity, consumer protection, systemic stability, and overall safety.

The emergence and rapid maturation of distributed ledger technology ("**DLT**") and digital assets are driving a transformational shift in capital markets – demanding proactive collaboration from market participants and regulators to ensure these assets and their infrastructure build on the existing protections of traditional financial instruments.

This report provides a comprehensive analysis of the practical applications, opportunities, and challenges posed by DLT and tokenization in global capital markets. It evaluates the implications of digital securities across the entire securities lifecycle, offering insights into at-scale use cases such as collateral management, fixed-income issuance, and fund tokenization. The analysis further addresses critical operational risks, such as cybersecurity, smart contract reliability, and settlement finality, and outlines clear risk mitigation strategies, affirming that institutional-grade risk management frameworks are both robust and adaptable to these innovations.

The use of DLT in capital markets may provide material benefits such as substantial operational efficiencies, reduced settlement times, and increased transparency throughout the trade lifecycle. Precision settlement, automated asset servicing, and enhanced regulatory reporting capabilities are just a few tangible benefits that tokenization can unlock, addressing longstanding inefficiencies in existing securities workflows, making the system safer and more secure for all.

Since the publication of the 2023 report titled *The Impact of Distributed Ledger Technology in Capital Markets*, institutional adoption of DLT has accelerated significantly across the world. Key building blocks—robust technology platforms, evolving regulatory clarity, and sustained institutional engagement—have converged to create the conditions for rapid expansion of tokenized assets. The central question is no longer whether real-world assets will be tokenized at scale, but when and how DLT will become embedded in market operations. Signals from both market activity and policy frameworks indicate that a structural turning point is near.

Major financial institutions have moved beyond experimentation to large-scale implementation, demonstrated by notable milestones such as J.P. Morgan's Kinexys digital asset network, which has processed over $1.5 trillion in tokenized transactions. Similarly, prominent bond issuances on DLT platforms, including those by the European Investment Bank, illustrate the growing acceptance and viability of digital securities. Tokenized money market funds have also witnessed substantial growth, reflecting increasing institutional demand for DLT-based financial instruments that streamline liquidity management and collateral optimization. Likewise, the proliferation of regulated and sound DLT-based Payment Instruments has enabled these use cases to scale. We highlight that these institutions have been able to deploy these use cases and satisfy the controls and standards required of traditional financial institutions – demonstrating that it is possible to ensure risks are appropriately managed, with issuer, market, and investor protections in place.

Our analysis indicates that the selection of DLT network architecture continues to be fundamentally driven by specific use-case considerations. Network architecture and technological choices vary significantly depending on the business requirements and operational needs of each use case. Importantly, our research demonstrates that institutional-grade controls and robust risk management frameworks can be effectively implemented across diverse network types—private-permissioned, public-permissioned, and public-permissionless networks. For public permissionless networks, additional solutions such as Layer 2 technologies and asset-specific smart contracts have demonstrated the capability to provide many of the necessary controls, scalability, and compliance mechanisms required by institutional market participants. These solutions can help manage privacy, operational resilience, and governance concerns within a public blockchain environment.

Hence, we advocate for a technology-neutral regulatory approach. Prudential and regulatory treatments should focus on the underlying financial activities and associated risks rather than on the specific technology being utilized. This approach will enable market participants to responsibly leverage innovative DLT solutions, ensuring robust controls and efficient risk management tailored precisely to the complexity, scope, and scale of each distinct use case.

Institutional adoption of DLT is accelerating, backed by client demand, measurable efficiency savings, and growing use as a key operational tool in high-priority asset classes. The impetus for progress will continue to be defined by how effectively institutions, regulators, and policymakers can work together to solve open challenges around legal certainty, share infrastructure, risk frameworks, and liquidity formation to scale in a safe and sound manner. This report presents six priority areas of focus: legal clarity, interoperability, collaboration to develop high-priority asset classes, operational resilience, enabling stable payment for settlement, and public-private coordination. We re-emphasize the importance of coordination between market participants, be it banks, non-bank financial institutions, or digital natives, prudential authorities, and policymakers – a fragmented approach risks reinforcing the very inefficiencies we hope to overcome. Ultimately, this report aims to support policymakers, regulators, and industry participants in aligning on practical risk management tools and supervisory practices that balance market safety and innovation.

The stage for mass adoption of tokenization in capital markets is set, driven by clearer regulatory pathways, mature technology platforms, and committed institutional participation. Now is the time for coordinated action to harness the benefits of DLT, modernize financial infrastructure, and support sustainable economic growth.

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This report serves as an update to the 2023 publication *The Impact of Distributer Ledger Technology In Capital Market* and seeks to provide an updated assessment of the opportunities and risks posed by distributed ledger technology – including DLT-based Securities (both tokenized securities and DLT-native security tokens) – and associated activities across the end-to-end securities lifecycle. Co-developed with members of a broad set of trade associations (see **Foreword**, hereafter referred to as the "**Joint Trades**"), the report represents the perspectives of industry practitioners who are pioneering research and real-world applications of DLT use cases across the world.

## SCOPE OF THIS REPORT

**Implementation Models:** This report explores two different implementation models of DLT for use across the securities lifecycle by regulated financial institutions: "Books and Records", and "Tokenization". These are defined as follows:

- **"Books and Records":** Existing internal recordkeeping, accounting, reporting, and other back-office functions centrally administered by a financial institution(s), which can be supported by DLT-based infrastructure; and

- **"Tokenization":** Digital representation of securities and payment instruments on a distributed ledger, reflecting an ownership right of the underlying asset, and its transfer between entities using the ledger. The report assumes that DLT is the enabling technology and catalyst for Tokenization. Although some features of Tokenization can be achieved without DLT (e.g., precision settlement and fractionalization), this is out of scope for this report given market adoption of DLT.

**Asset Classes and Types:** The core asset classes in scope are the DLT-based forms of traditional equity and fixed income securities (including asset-backed securities), including securities collateral held in relation to derivative transactions.[2] These assets can exist on a distributed ledger in two formats:

1. **"Tokenized Securities"**, which are issued and custodied traditionally, but also represented on a distributed ledger through a digital twin token that represents the underlying traditional security; and

2. **"Security Tokens"**, which are issued and custodied natively on a distributed ledger only and therefore do not have a traditional security as an underlying basis.

It is important to distinguish between the two because they pose significantly different implications across the securities lifecycle. Where a distinction is not required, they are collectively referred to as **"DLT-based Securities"**.

**Prudential Classification:** These in-scope asset classes and types either meet the classification conditions for **Group 1a** digital assets as set out by the Basel Committee on Banking Supervision ("**BCBS**") under its revised "SCO60: Cryptoasset exposures" standard in the Basel Framework[3], whether recorded on permissioned ledgers or, where robust token-level governance and compliance controls exist, on permissionless networks, or are acknowledged as out of scope for this framework.[4]

**Payment Instruments:** In addition to the core scope of this report, payment instruments that are represented on a distributed ledger through Tokenization or otherwise are also considered as they relate to capital markets activities.[5] These are defined as **tokenized commercial bank monies; tokenized deposits** (where the ownership of commercial bank deposits is reflected natively on a distributed ledger); use of DLT by central banks, financial institutions, and payment institutions to facilitate payments among wholesale market participants; and/or regulated **Stablecoin** instruments.[6]

They will be collectively referred to as "**DLT-based Payment Instruments**". Members underline the importance of DLT-based Payment Instruments to realize the benefits of Delivery-versus-Payment ("**DvP**") settlement for DLT-based Securities transactions, the distribution of coupons, dividends and other proceeds on a distributed ledger.[7]

2. Tokenization also includes the representation of other tangible assets (e.g., commodities) and intangible assets (e.g., copyrights and patents) on a distributed ledger, but this is out of scope for this report. Additional use cases for Tokenization also exist but are out of scope for this report.
3. The Basel Framework is the full set of standards of the BCBS, which is the primary global standard setter for the prudential regulation of banks.
4. BCBS, "Prudential treatment of cryptoasset exposures," November 27, 2024; see SCO60.3 for specific detail on CBDCs etc.
5. The use of money and deposits as an asset class in this report does not include Foreign Exchange. With respect to DLT platforms designed primarily to facilitate payments, this report does not address these systems generally, but instead focuses on considerations that may be applicable to the use of these platforms in connection with capital markets activities.
6. For a detailed description of these DLT-Based Payment instruments, we direct readers to Chapter 1.3.1 – DLT-Based Payment Instruments.
7. ASIFMA, "Tokenized Securities: A Roadmap for Market Participants and Regulators", 2019.

# USE CASES IN FOCUS:

The market has matured from predominantly experimental pilots to live use cases, with scaling institutional adoption. DLT has become meaningful in reshaping collateral management, improving fixed income issuance, and accelerating fund tokenization, delivering operational improvements and setting the stage for broader market transformation.

- **Collateral management has benefited from DLT-enabled intraday repos**, addressing inefficiencies related to delayed settlement, fragmented systems, and limited liquidity reuse. Platforms such as J.P. Morgan's Kinexys and Broadridge's Distributed Ledger Repo (DLR) have demonstrated value. J.P. Morgan's Kinexys, for example, tokenizes cash and collateral to execute intraday repos within minutes, integrating seamlessly into traditional banking systems. Similarly, Broadridge's DLR utilized smart contracts to automate bilateral repo processing. The results are notable:
  - Settlement times reduced from several hours to mere seconds.
  - Dramatically lowered operational risks and funding costs.
  - Increased efficiency in collateral reuse and liquidity management.
  - Improved regulatory transparency and reporting capabilities.

- **DLT also reshaped fixed income markets through digital bond issuance**, transforming a historically manual process characterized by delayed settlements and significant reconciliation burdens. Real-world applications include UBS's CHF 375 million bond issuance on the SIX Digital Exchange (SDX), achieving immediate settlement while preserving interoperability with traditional investor channels. Another milestone was the Asian Infrastructure Investment Bank's (AIIB) $500 million digital bond, issued via Euroclear's D-FMI platform, combining DLT-based settlement with traditional infrastructure integration. This innovation led to tangible benefits:
  - More efficient settlement cycles.
  - Lowered issuance and reconciliation costs.
  - Expanded investor accessibility through dual listing and seamless cross-platform interoperability.

- **Fund management has seen substantial progress via tokenization**, particularly with digital money market funds, addressing settlement delays and inefficient cash management practices. Franklin Templeton's FOBXX, a money market fund operating entirely on a public blockchain, has reached assets under management exceeding $740 million, enabling real-time tracking and instant peer-to-peer transferability. Similarly, BlackRock's tokenized liquidity fund BUIDL, managing more than $2 billion through multi-chain issuance, has demonstrated significant adoption. Spiko's tokenized EU Treasury Bills UCITS fund offers 24/7 access and immediate redemptions through public blockchain platforms, highlighting transformative impacts:
  - Instant settlement and real-time net asset valuation (NAV) calculation.
  - Improved collateral utility and liquidity.
  - Simplified compliance and enhanced investor onboarding efficiency.

These successful implementations indicate DLT's potential to become foundational in capital markets, signaling a hybrid future where digital and traditional infrastructures coexist, mutually reinforcing their strengths and paving the way for continued market modernization. To fully realize this hybrid vision and scale the initial successes into industry-wide transformation, market participants must now address specific foundational requirements.

# CALL TO ACTION: RECOMMENDATIONS TO BUILD MOMENTUM

The findings in this report highlight several critical steps needed to support the next phase of adoption in capital markets. While early implementations have gained traction, particularly across specific asset classes in both primary and secondary markets, broader ecosystem development remains in a transitional stage. At this juncture, it is essential for all market participants, including financial institutions, infrastructure providers, regulators, and technology vendors, to collaborate in shaping the core components of a resilient and scalable DLT ecosystem.

To accelerate ecosystem maturity, the following **calls to action** are directed at mobilizing public and private stakeholders towards meaningful and sustainable progress. Governments establishing a pro-innovation mandate to foster growth and competition, and market integrity, while protecting clients, investors and end users, sends the necessary signal for the private sector to unlock investment to deliver enhancements for the ecosystem. **While public policy and regulatory clarity remain crucial enablers, this roadmap prioritizes actions that can be taken now, unilaterally or in collaboration with peers, to build sustainable momentum and unlock value:**

**1 | Accelerate Market Development in High-Potential Asset Classes:** To accelerate tokenization, the industry is currently prioritizing high-impact asset classes such as private credit, and money market funds. Building scalable infrastructure, enabling broad investor access, and embedding programmability into design will drive market depth. Regulatory enablement and support for innovation, including tokenized instruments in existing frameworks and public-sector issuance can catalyze cross-border adoption and unlock institutional-grade liquidity at scale.

**2 | Clarify Legal Foundations and Align Regulatory Treatment:** To unlock the full potential of tokenized capital markets globally, further timely action is needed to establish clear, consistent legal frameworks. With coordinated regulatory reform and industry coordination, tokenized instruments can achieve legal certainty, enabling cross-border adoption, improving market confidence, and accelerating institutional-scale deployment.

**3 | Establish Interoperability to Prevent Market Fragmentation:** To realize the full benefits of tokenization, interoperability must be prioritized. Industry, in collaboration with regulators, should align on common data models, smart contract standards, and messaging protocols. By embedding interoperability into infrastructure design and regulatory frameworks, we can reduce fragmentation, lower integration costs, and unlock scalable, cross-platform market connectivity. The building blocks for this coordination already exist, now is the time to act.

**4 | Address Technical and Operational Integration Gaps:** To enable institutional adoption, DLT platforms must meet high operational and security standards. Industry should identify minimum requirements for wallet custody, smart contract governance, and system integration in a manner consistent with appropriate regulatory standards. With robust frameworks, auditability, and standardized APIs, institutions can safely scale tokenization while aligning with existing operational and regulatory practices. Coordination and investment now will ensure secure and seamless future deployment.

**5 | Enable Scalable Settlement with Tokenized Money and Stable Payment Instruments:** To unlock the full benefits of tokenized markets, scalable on-chain settlement with DLT-based Payment Instruments is essential. Industry should integrate tokenized deposits and stablecoins into settlement workflows, enabling atomic DvP and programmable payments. Regulatory clarity and interoperability with central bank systems will ensure secure, efficient, and continuous settlement across digital and traditional rails.

**6 | Foster Public-Private Coordination:** To scale tokenized markets, public and private sectors must align on institutional use of DLT infrastructure in such cases of custody, identity, compliance, and settlement. Industry should adopt open, collaborative models and support joint pilots. Policymakers can accelerate progress by harmonizing cross-border legal standards to foster funding of critical infrastructure.

## REPORT OVERVIEW

The full report that follows provides a granular, bottom-up analysis across the topics explored in the Executive Summary. This includes a detailed overview of DLT, including the infrastructure and the digital assets represented on this infrastructure, a phase-by-phase impact assessment across the securities lifecycle, an exploration of live use cases, legal and regulatory considerations and recommendations, and barriers to adoption. To close the report, joint trades and members present critical calls to action from market participants to drive progress towards network effects, working in dialogue across key areas. For regulators, it could help inform efforts around emerging legal and regulatory frameworks, with a view to protecting markets and promoting innovation. For industry, it provides detailed potential areas for further dialogue to accelerate ongoing research and development.

As an overarching guiding principle, legal and regulatory frameworks should be designed in line with the "same activity, same risk, same regulatory outcome" and "technology-neutral" risk-based guiding principles that support, rather than deter, industry innovation and adoption. Joint trades and members underline the importance for all market participants to contribute toward ongoing research and development of DLT, and the representation of securities and payment instruments on this infrastructure. Punitive penalties for the use of a particular technology, without clearly defined risk-based justification, could be detrimental to innovation in the market and have unintended consequences on the evolution of a future DLT-based market structure within the regulatory perimeter.

Significant contributions have been made by a wide selection of joint trade members and non-members across the financial services ecosystem, together with industrial and legal advisers. Engagement has also been held with regulatory bodies across jurisdictions to ensure central areas of concern are addressed. We hope this provides a value-added perspective that drives public-private dialogue and advances progress on the topic.

**For further details, please see the following chapters of this report:**

- **Chapter 1: DLT Technology and Tokenization |** Providing a clear and unambiguous definition of the key terms and concepts required with the goal of providing a consistent cross-industry framework for discussions of DLT, Tokenization, technology, and infrastructure.
- **Chapter 2: Opportunities and Risks:** Impact Across the Securities Lifecycle | Examining the impact across the end-to-end securities lifecycle on roles and responsibilities, workflows and activities, technology and infrastructure, financials, and existing levels of risk.
- **Chapter 3: Towards a Future-DLT-Based Ecosystem |** Outlining what a potential future-state DLT-based ecosystem may look like, barriers to adoptions and the role of regulated institutions in a DLT-based future.
- **Chapter 4: Legal and Regulatory Landscape |** Demonstrating where existing regulation sufficiently addresses DLT-enabled operations and Tokenized Securities and highlighting gaps in legal and regulatory frameworks based on the "same risk, same regulatory outcome" principal
- **Chapter 5: Conclusion and Call to Action |** A set of six, pragmatic next steps for industry participants to work towards a desirable future. Prioritizes focus areas that require cross-industry collaboration and public-private dialogue to unblock and drive progress.
- **Deep Dives: Assessing Select Examples of Scaled Adoption |** Exploring real-world use cases, developed with joint trades and members, to provide insights and best practices on how existing risk-management approaches are being used to drive decisions around technology and governance.

***The Joint Trades on behalf of their members recognize the growing relevance of DLT to global capital markets and the extensive research backing its adoption. We believe this report will prove a valuable asset to policymakers, regulators, and governmental authorities, fostering deeper collaboration on DLT's potential to reshape global capital markets.***

# Executive Summary

## THE STAGE FOR MASS ADOPTION IS SET – USE CASES ARE SCALING

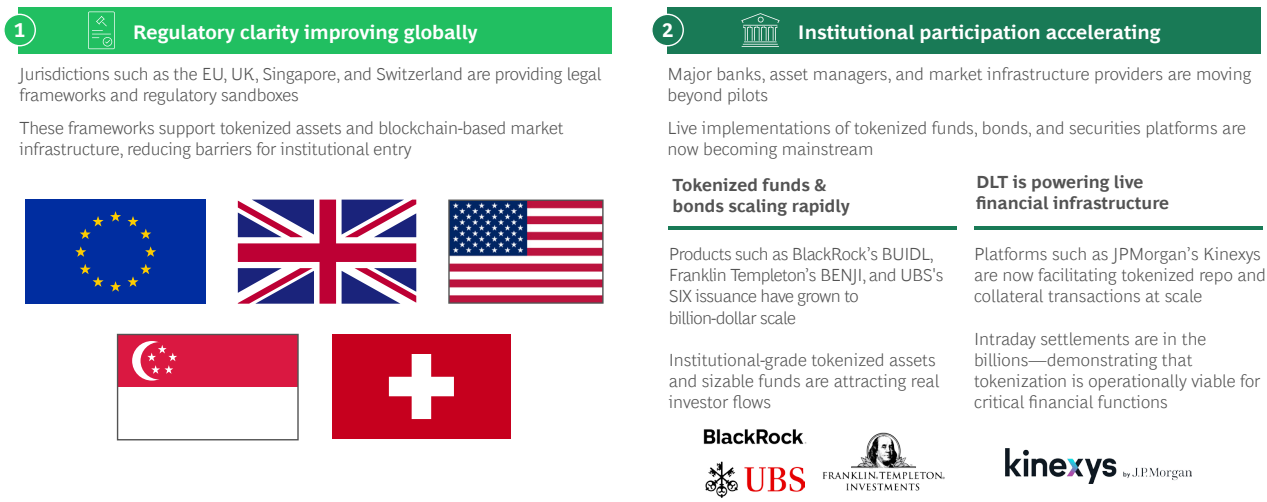
Global capital markets are entering a new phase where **tokenization** – the representation of financial assets on distributed ledgers – is poised for mass adoption. Key building blocks that were nascent a few years ago have matured. **Market infrastructure** is increasingly robust and interconnected: major banks and market utilities have launched live distributed ledger platforms, and settlement networks are achieving significant scale. For example, J.P. Morgan's Kinexys digital assets network has processed over $1.5 **trillion** in transactions (averaging $2 billion daily) for tokenized deposits and collateral transfers, demonstrating that institutional-grade blockchain systems can handle real volumes.[8] Likewise, central bank and regulatory experiments are validating the technology, from cross-border payment pilots to on-chain bond issuances, demonstrating that distributed ledgers may be able to operate within existing market ecosystems.

Crucially, **regulatory clarity** has improved in multiple jurisdictions, lowering a key barrier to institutional adoption. Policymakers are establishing frameworks that recognize tokenized assets and provide guardrails for their use, and wider DLT implementation across financial services.

In the U.S., developments and updated policy guidance from the White House, the Securities and Exchange Commission ("**SEC**"), federal banking regulators, and Congress have accelerated a more supportive regulatory environment. On July 30th, the President's Working Group on Digital Asset Markets released a report outlining the administration's stances on various aspects of digital asset regulation and legislation, while calling for regulatory agencies and Congress to work together and create a pro-innovation regulatory regime for digital assets. The SEC has established a dedicated Crypto Task Force and published guidance to clarify the agency's stance on the registration, issuance, custody and trading of crypto-assets. The Federal Reserve Board ("**FRB**"), Office of the Comptroller of the Currency ("**OCC**") and the Federal Deposit Insurance Corporation ("**FDIC**") have all withdrawn prior restrictions on crypto-asset activities and issued new guidance to better align crypto-asset oversight with comparable traditional products. Congress has recently made significant strides towards establishing a supervisory framework for crypto-assets and digital markets, demonstrating a commitment to fostering innovation in financial markets. The Guiding and Establishing National Innovation in U.S. Stablecoins ("**GENIUS**") Act was signed into law, marking a pivotal moment in establishing a supervisory framework for payment stablecoins. Beyond the GENIUS Act, market structure legislation, including the Digital Asset Market Clarity ("**CLARITY**") Act in the House of Representatives and parallel legislation in the Senate, aim to establish a comprehensive federal framework for digital asset markets offerings and trading activity, further underscoring ongoing efforts to create a legal framework.

**EXHIBIT ES.1**

### Key Developments Driving Institutional Adoption of DLT And Tokenization




8. J.P. Morgan, 2024

In the EU, the landmark **MiCA** regulation was enacted in 2023, creating a comprehensive licensing and oversight regime for crypto-assets, including stablecoins, while the **European DLT Pilot Regime** now allows market infrastructure trials for digital securities within a controlled environment. The UK has launched a **Digital Securities Sandbox (DSS)** in 2024 to facilitate the issuance, trading, and settlement of digital securities on blockchain under close regulatory supervision, reflecting authorities' willingness to accommodate innovation in a safe setting. The UK's Financial Conduct Authority ("**FCA**") is also consulting on stablecoin legislation as well as market structure rules via CP25/14: Stablecoin issuance and cryptoasset custody, and DP25/1: Regulating cryptoasset activities. In parallel, major jurisdictions such as Switzerland have authorized tokenization projects within their securities and payments systems. This convergence of clearer rules and supportive regulators has given institutional players the confidence to move from proofs-of-concept toward full-scale implementations.

In Asia-Pacific, regulators are advancing fast-paced reforms to support digital asset innovation within structured, compliant frameworks. Singapore has emerged as a leader, with the Monetary Authority of Singapore (MAS) spearheading Project Guardian—a collaborative initiative with major banks to test tokenized securities and DeFi applications under regulated conditions. Hong Kong has also made significant strides, with the Hong Kong Monetary Authority (HKMA) playing a central role in enabling the issuance of tokenized green bonds under the Government Green Bond Programme and integrating blockchain into the operations of its Central Moneymarkets Unit (CMU). The HKMA has also set out clear licensing expectations for virtual asset trading platforms, reinforcing its commitment to responsible innovation. Most recently, tthe HKMA's Stablecoins Ordinance has been enacted and will come into effect in August of 2025, establishing a licensing regime for fiat referenced stablecoin issuers in Hong Kong.[9] Japan amended its Payment Services Act and Financial Instruments and Exchange Act to recognize stablecoins and digital securities, while also establishing dedicated frameworks for Security Token Offerings. Australia is consulting on digital asset custody and exchange licensing, and Korea is piloting wholesale CBDC infrastructure for capital market applications. This wave of regulatory clarity and structured experimentation across APAC has created a fertile environment for institutional adoption and positioned the region as a key hub for next-generation financial market infrastructure.

**Institutional participation** is therefore at an all-time high. Many of the world's largest asset managers, banks, and market infrastructure firms have either gone live with tokenized offerings or are on the cusp of doing so.

**Notably, tokenized U.S. Treasuries are now being used in intraday repurchase agreements among banks**, with daily volume in some networks measured in the billions. JPMorgan's Kinexys platform, for example, conducted one of the first such tokenized collateral transfers in 2022 and has since scaled to routinely process large bilateral repos within minutes on-chain. Prudential authorities, like the Bank for International Settlements ("**BIS**") have also weighed in on these benefits highlighting that tokenizing government bonds has the potential to enhance market efficiency and drive financial innovation.[10] These tangible use cases across funds, bonds, and repos underscore that the technological and operational stage for tokenization at scale is effectively set.

**DLT has significantly reshaped fixed income markets by enabling digital bond issuance:** prominent examples of this transformation include UBS's CHF 375 million bond issuance on SDX, which delivered precise settlement while preserving full interoperability with traditional investor access points. Similarly, AIIB issued a $500 million digital bond through Euroclear's D-FMI, combining blockchain-based settlement with legacy infrastructure compatibility. These real-world implementations highlight the practical benefits of DLT in capital markets—namely, reduced friction, operational efficiency, and stronger integration between emerging technologies and established systems.

**Tokenized money market funds are reaching critical mass:** BlackRock's tokenized U.S. Treasury fund (ticker **BUIDL**) has grown to over $2 billion in market value – now accounting for more than 30% of the tokenized Treasury market – while Franklin Templeton's on-chain government money fund (**BENJI**) has amassed well over half a billion in assets.[11] These are no longer experimental pilot programs but sizable funds attracting real investors.

**This report will assess these use cases in detail across standard dimensions such as: *Overview of the Use Case, Settlement Asset and Legal Structure, Interoperability and Network*, and *Conclusion*. Seeking to provide practical examples of benefits espoused here, these deep dives serve as a sample of the transformation underway.**

The past two years have seen significantly increased readiness for digital assets in mainstream finance. The foundational pieces, mature technology platforms, clearer regulations, and committed institutional players, have aligned to create an environment where tokenized assets can expand rapidly. The question is no longer if real-world assets will be tokenized at scale, but when these assets will be represented on DLT and how participants will interact with them. Market momentum, supported by regulatory green lights, suggests the inflection point is imminent. As we stand today, the conditions are in place for tokenization to move from early-stage live projects to a critical component of market infrastructure in the coming years. The stage for mass adoption is set.

9. HKMA, "Robust and Sustainable Development of Stablecoins", June 2025.
10. BIS, "Tokenization of Government Bonds: Assessment and Roadmap, BIS Bulletin No. 107", July 2025.
11. RWA.xyz, May 2025.

# THE CASE FOR VALUE REMAINS CLEAR ACROSS THE TRADE LIFECYCLE

The fundamental value proposition of tokenization – efficiency and automation across the entire trade lifecycle – remains clear demonstrated by live use cases today. Tokenization directly addresses longstanding pain points in securities markets by leveraging smart contracts and distributed ledgers to streamline issuance, trading, settlement, and asset servicing. At the issuance stage, digital tokens can simplify syndication, enabling faster time-to-market and broader investor reach. For example, issuing financial instruments as tokens can cut out numerous intermediaries and manual processes. According to analysis by Ripple and BCG, tokenizing an investment-grade bond can reduce operating costs by 40–60% compared to traditional issuance, largely by automating workflow and reducing paperwork.[12] Settlement of such tokenized bonds can occur nearly instantly (T+0 or T+1), versus several days in the conventional system, improving capital efficiency and reducing counterparty risk.[13] An issuer handling $1 billion in bonds annually could save on the order of $2–3 million in costs by issuing on-chain, thanks to efficiency gains in book-building, compliance processing, and distribution.[14] These savings directly enhance issuance profitability and can lower financing costs for issuers.

**During trading and settlement**, the benefits are equally compelling. Transactions recorded on a distributed ledger settle *delivery-versus-payment* automatically through smart contracts, significantly reducing settlement times and reducing the likelihood of fails or reconciliation breaks. Providing the option for precision (such as on a real-time or near-real-time basis) may allow market participants to benefit from improved liquidity and faster collateral mobility. Participants no longer need to maintain large buffers for operational delays. In the **collateral management and securities financing** context, these efficiencies translate into material financial gains. A recent industry study estimated that a global bank managing around $100 billion in daily repo transactions could realize **$150–300 million in annual cost savings** by using tokenized collateral and instantaneous settlement, due to reduced idle collateral, faster trade cycles, and the ability to settle repo trades on a 24/7 basis.[15] Early deployments in the repo market (such as JPMorgan's collateral tokenization for intraday liquidity) have already demonstrated reduced friction – collateral can be mobilized and re-used multiple times a day when represented as tokens, something not feasible under traditional intraday cutoff constraints.

**EXHIBIT ES.4**

## Market and Efficiency Potential Across Key Use Cases

| INVESTMENT-GRADE BONDS | REAL ESTATE | COLLATERAL & LIQUIDITY MANAGEMENT | TRADE FINANCE & WORKING CAPITAL | TREASURY & CASH MANAGEMENT |
|---|---|---|---|---|
| Savings of **USD 40M–60M** | Savings of **USD 100M–150M** | Savings of **USD 150M–300M** | Savings of **USD 2B–4B** | Savings of **USD 55M–140M** |
| Annually, for USD 100B in issuance, by reducing intermediaries and automating issuance, settlement, and compliance through smart contracts. | Over 5 years, for a real estate fund with USD 5B in AUM, by reducing admin costs through automation. Additional USD 500M–1B in new capital possible via fractional ownership and broader investor access. | Annually, for a global bank with USD 100B in daily repo volume, by reducing idle collateral and accelerating settlement cycles. | Annually, for a firm processing USD 50B in trade volume, by accelerating invoice settlement and programmable payments. Additional reduction of financing costs by USD 20M–50M achievable through tokenized receivables. | Annually, for a multinational company managing USD 1B in idle cash and 10B in payments, by boosting yield, reducing FX and processing costs, and improving liquidity through tokenized money. |

12. BCG, Ripple, "Approaching the Tokenization Tipping Point", April 2025.
13. Ibid.
14. Ibid.
15. BCG, Ripple, "Approaching the Tokenization Tipping Point", April 2025.

## Cost-benefit analysis

Implementing DLT often means overhauling or integrating with core banking systems, which can be expensive and technically challenging. Early adopters have encountered hurdles around scalability, integration, and security.[16] Major banks have also made sizable internal investments: JPMorgan's Kinexys division (its dedicated DLT unit) grew from a small team in 2014 to over 100 full-time staff by 2020 underscoring a multi-year, multi-million-dollar commitment to DLT innovation.[17]

Deploying DLT at an institutional scale is typically a multi-year journey. Some high-profile projects have incurred large costs with mixed results. A cautionary example is the Australian Securities Exchange (ASX), which spent an estimated $165–$170 million USD attempting to replace its clearing and settlement system with a blockchain platform.[18] After several years of development, that project was paused due to technical challenges, illustrating the risk and complexity involved in reinventing core market infrastructure. Lessons from such cases underscore the need for rigorous planning, phased implementation, and stakeholder alignment to achieve success.

Recognizing these costs and complexity, institutions have collaborated to develop DLT solutions. R3, for example, is a banking-led consortium that at one point included over 100 banks, regulators, and trade associations developing a dedicated DLT platform (Corda) for finance.[19] Similarly, the Linux Foundation's Hyperledger project attracted 170+ participating organizations ranging from tech firms to exchanges.[20] SDX trading, which has recently merged with SIX, offers a strong example of how DLT can be effectively applied, integrating seamlessly with existing market infrastructure rather than replacing it, while emphasizing confidentiality, settlement finality, and adherence to regulatory standards in its design.[21] DLT adoption is a strategic commitment that requires long-term investment, cross-functional coordination, and sustained executive support. Given the scale of integration, regulatory complexity, and capital at stake, successful implementation depends on careful planning, phased deployment, and strong risk management from the outset.

Further, costs are falling and are increasingly strategic. Recent research has identified that launching a focused tokenization use case can cost USD $2M or less. However, a full integration (i.e., across custody, trading, compliance and multiple asset types) may require an investment of USD $15M-20M for a mid-size bank and up to USD $100M for a Tier 1 Financial Institution or GSIB.[22] These are not solely "R&D" or experimental budgets, but rather strategic investments in infrastructure that will support new business models and deliver on efficiencies for the financial system and franchise to expand products and services benefiting clients globally.

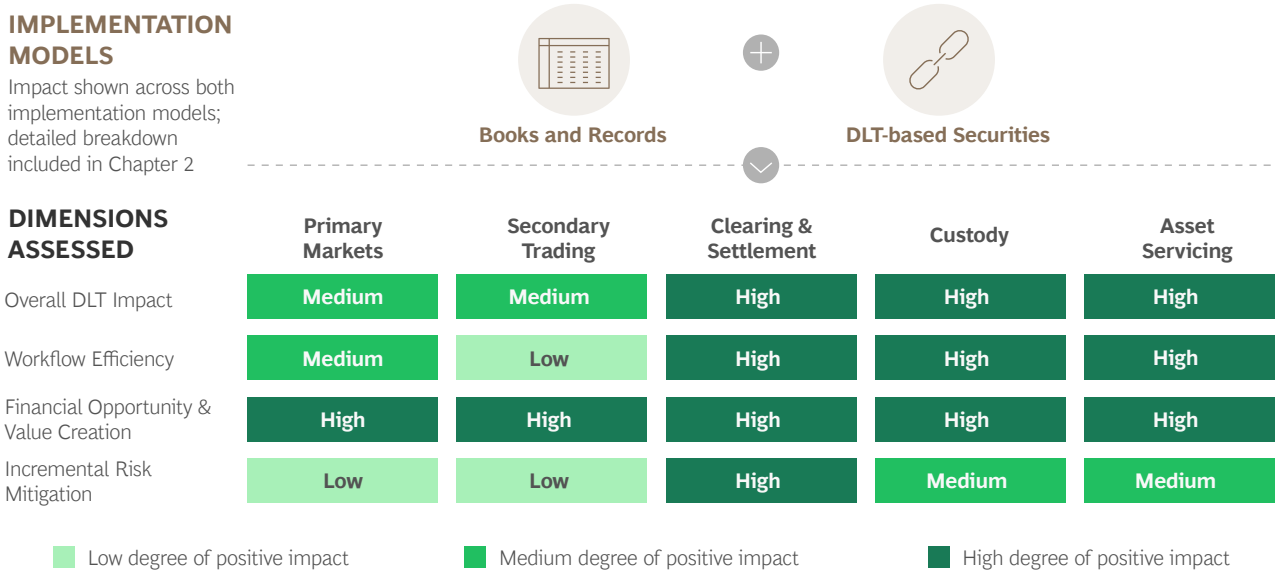
Global banks and market players have poured substantial capital into DLT projects and consortia over the past decade, and these investments are now maturing to the point where they can produce substantial industry-wide benefits. Over time, these economics are likely to reverse as tokenization platforms become the default choice and may one day cost less to run than legacy systems, especially as liquidity forms and scale accelerates.

Perhaps the most underestimated gains are in **asset servicing and lifecycle management**. Processes such as coupon payments, corporate actions (e.g., dividends, splits), and investor communications can be automated via smart contracts embedded in the tokenized asset. This analysis finds that **DLT-based asset servicing** offers **high impact** potential. For instance, smart contracts can automatically credit entitlements to holders or handle tax withholding and reporting, drastically reducing manual workloads and errors in back-office operations. In a tokenized environment, an equity token could automatically execute a shareholder vote or distribute a dividend to token holders without the complex chain of custody and custodians that exists today. These improvements not only cut costs but also enhance transparency and accuracy across the lifecycle of a security.

16. Secfin Solutions, "Blockchain and Distributed Ledger Technology in the Repo Market: A Comprehensive Analysis", 2025.
17. CNBC, "JPMorgan creates new unit for blockchain projects, says the technology is close to making money", 2020.
18. Reuters, "Australian stock exchange's blockchain failure burns market trust", 2022
19. World Bank Group, "Distributed Ledger Technology (DLT) and Blockchain", 2017.
20. Ibid.
21. SDX, "SDX announces the consolidation of trading for digital assets into SIX Swiss Exchange", May 2025.
22. BCG, Ripple, "Approaching the Tokenization Tipping Point", April 2025.

**EXHIBIT ES.5**

# Impact of DLT-based Securities on Workflow Efficiency, Financials and Value Creation, and Risk Mitigation Across the Securities Lifecycle




**Source:** BCG analysis.

The **operational resilience** benefits are notable as well – with an authoritative ledger, all parties share a single source of truth, simplifying reconciliations and audits. Our comprehensive lifecycle assessment confirms that tokenization can drive value at each stage: from **faster issuance and settlement to more efficient servicing and reporting**. In aggregate, these efficiencies can free up significant capital and reduce the frictional costs that have historically burdened capital markets. One study estimates that by 2030, widespread tokenization could unlock **tens of billions of dollars** in savings industry-wide through reduced operational overhead and improved liquidity management.[23]

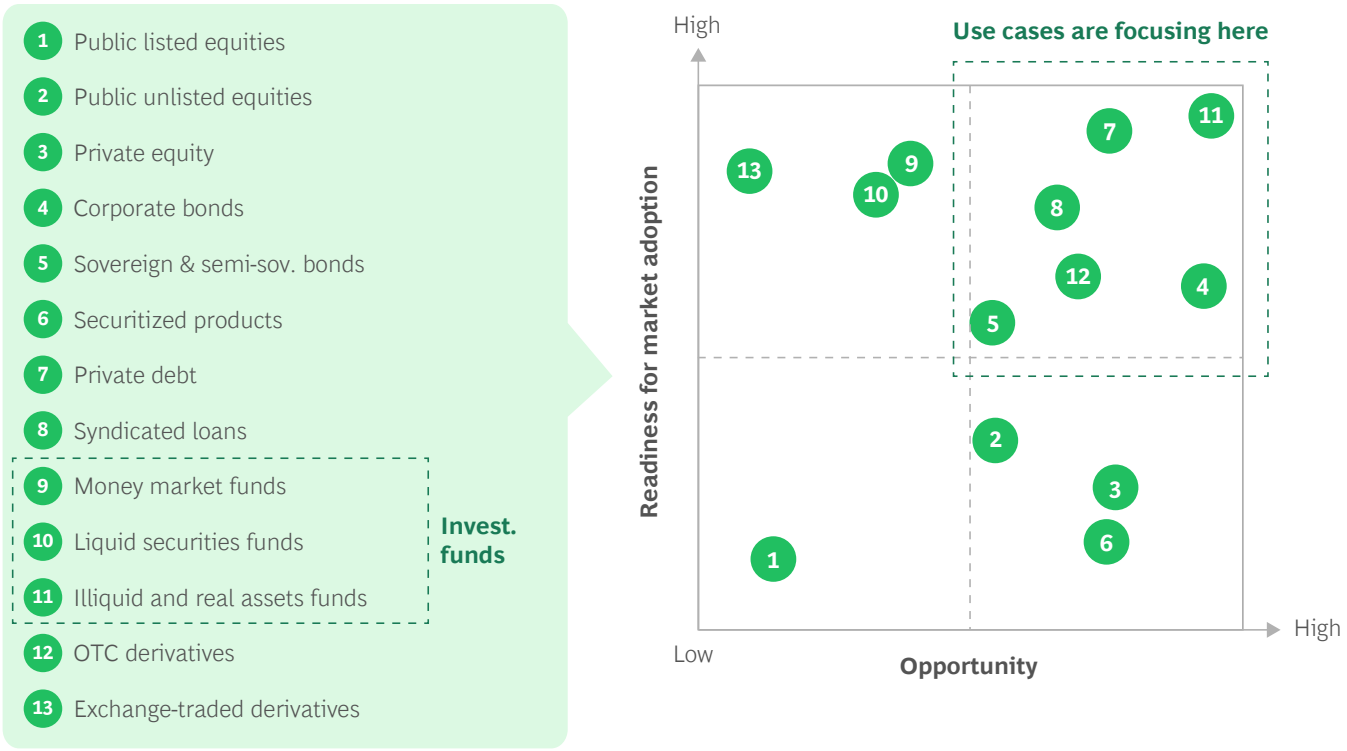
The case for these economic benefits has only grown stronger as pilot projects have quantified the time and cost reductions in practice. For many participants the economic rationale for tokenization is compelling as it begins to deliver tangible improvements in speed, cost, and risk mitigation across the entire trade lifecycle. Prudential authorities such as the Bank of England have highlighted that tokenization provides a route to innovation that supports financial stability while preserving public trust and confidence in the monetary system.[24] Market participants and observers now widely recognize that tokenization is not just a technological experiment, but a means to enhance market infrastructure and operational processes.

Adoption of DLT-based Securities will not progress equally across asset classes. As demonstrated by the use cases profiled later in this report (see **Deep Dive | Use Cases)** adoption is informed by two common drivers: (1) a clear financial opportunity from efficiency gains or innovation; and (2) market readiness for innovation and adoption around specific market structure attributes. The BIS offers a similar perspective in the *Tokenization Continuum* citing that "Tokenization could bring benefits" to assets and the way transactions and transfers occur, but adoption will occur on a "continuum and highlight a trade-off: where Tokenization is easiest, per-unit gains are likely to be modest" and conversely "where Tokenization is difficult the potential benefits are the largest".[25] As a result, the authors suggest Tokenization efforts to "focus on identifying assets that are suitable for Tokenization" and have enough volume for a sizeable impact.[26]

23. BCG, Ripple, "Approaching the Tokenization Tipping Point", April 2025.
24. Sasha Mills, Bank of England, "Keynote Address at City Week 2025", July 2025.
25. Aldasoro, Doerr, Gambacorta, Garratt, Wilkens, BIS Bulletin No 72 "The Tokenization continuum", April 2023.
26. Aldasoro, Doerr, Gambacorta, Garratt, Wilkens, BIS Bulletin No 72 "The Tokenization continuum", April 2023.

**EXHIBIT ES.6**

# Asset-Classes Show Varying Suitability for Adoption onto DLT




**Sources:** BCG analysis; Adapted from JP Morgan and BCG, 'The Future of Distributed Ledger Technology in Capital Markets', November 2022.

# THE FUTURE STATE WILL BE A COMBINATION OF DIGITAL NATIVES, NON-BANK FINANCIAL INSTITUTIONS, AND BANKS

The emerging tokenization ecosystem is characterized by a **hybrid market structure** in which diverse types of institutions – from digital natives to non-bank financial institutions ("NBFIs") to banks – all play complementary roles and co-exist within the regulatory perimeter. **Collaboration between traditional and new players** may define the future state.

**Digital-native firms** (including DLT-native FinTechs, tokenization platforms, stablecoin issuers and exchanges) have provided much of the early innovation, developing technology and business models for tokenized assets. They bring technical expertise and a willingness to experiment with decentralized finance protocols. **NBFIs**, such as asset managers, broker-dealers, and market makers, have also been quick to embrace tokenization where it enhances their services – for example, asset managers launching tokenized funds or nonbank lenders arranging tokenized private credit. These NBFIs serve as a bridge, applying institutional standards to new digital asset products while not being subject to bank-specific constraints. **Banks**, for their part, have moved more deliberately but are now entering the space in force, especially where tokenized assets intersect with their core businesses (such as payments, custody, and lending). Large global banks are focusing on tokenized versions of traditional assets (bonds, deposits, money market funds) that can be brought under existing regulatory and risk frameworks.

While there were early concerns that stablecoins may not fully meet the core monetary system criteria of singleness[27], elasticity, and integrity,[28] as regulatory frameworks continue to evolve for stablecoins, they show meaningful potential in supporting tokenization, and the aforementioned risks should be weighed thoughtfully against the potential benefits that stablecoins can offer. Stablecoins, alongside other forms of DLT-based Payment Instruments like Tokenized Deposits, can play a valuable role, particularly in enabling 24/7, programmable settlement and supporting innovation in tokenized markets. With appropriate regulation, transparency, and interoperability, many of the risks around singleness, elasticity, and integrity may be able to be managed.

A next-generation financial system built on DLT-based Payment Instruments and DLT-based Securities offers the potential to significantly enhance efficiency, programmability, and cross-border functionality. At the core of this system is the integration of central bank reserves, commercial bank money, and government securities into unified, programmable platforms. In this ecosystem, central banks provide the foundation of trust and monetary stability, while commercial banks play a critical role in distribution, customer access, and credit intermediation. As private innovations such as stablecoins continue to evolve, the active involvement of both central and commercial banks is essential to ensuring that future financial infrastructure operates safely. Regulated institutions, working in partnership with regulators are uniquely positioned to provide the compliance, risk management, and technological integration capabilities needed to support the safe scaling of digital asset ecosystem.[29]

Notably, industry stakeholders are actively urging regulators to refine their rules to better integrate public blockchain innovation into the mainstream. Overly restrictive bank capital rules, such as blanket penalties on assets issued on public, permissionless blockchains, could push digital asset activity outside the regulated financial services sector, leading to market fragmentation and new systemic risks. The industry has called for re-integrating permissioned and permissionless public networks into the ambit of allowable infrastructure for banks, provided appropriate risk mitigants (such as smart contract controls, vetted code, and on-chain analytics) are in place, and for a case-by-case, risk-based treatment of tokenized assets. Regulated institutions bring their expertise in risk management and may help prevent system of significant scale from growing completely outside prudential oversight. The future market structure will therefore be a blend of various participants: we will see regulated banks, digital native innovators, FinTechs, and non-bank intermediaries coexisting and interacting within tokenized markets. Each type of player will occupy the roles best suited to their strengths, together working to support a healthy financial system.

27. Single-minded? Rethinking our approach to the 'singleness of money' could help to reap the benefits of stablecoins: **https://www.kcl.ac.uk/news/stablecoin-regulation-and-the-singleness-of-money**.
28. Bank for International Settlements, "Blueprint for the Future Monetary System: Improving the Old, Enabling the New. Annual Economic Report 2025, Chapter III", June 2025.
29. Ibid.

Over time a pluralistic market structure is a likely end state. Achieving this will require continued dialogue between the private and public sectors. Regulators are already beginning to acknowledge that an inclusive approach, one that welcomes banks, NBFIs and digital natives into the digital asset space under appropriate safeguards, is preferable to forcing all activity into unregulated corners. In summary, the tokenization ecosystem of the future will not belong to any single class of institutions; instead, it will be an integrated network of banks, non-banks, and FinTech firms, each playing critical roles to ensure both innovation and stability. Innovation must evolve within the traditional financial system, requiring regulatory frameworks that enable both legacy and emerging technologies to coexist and interoperate within a unified market infrastructure.[30] This hybrid model will help embed tokenization into the fabric of finance in an orderly, resilient way, combining the best attributes of traditional finance (reliability, compliance, scale) with the efficiencies and inclusiveness of decentralized technologies.

Looking ahead, the evolution of this ecosystem is likely to be a phased development, supported by advancements in technical capabilities, clarity around legal and regulatory frameworks and taking learnings from lessons of live use cases. As risk mitigants continue to mature towards the standard needed for institutional activity, progress could significantly accelerate.

**The path toward widespread adoption of tokenization is expected to unfold in three key phases:**

**Phase 1 | Institutional Readiness:** This is the current stage, where institutions are moving beyond isolated pilot programs and beginning to develop the operational capabilities and regulatory frameworks needed to support real product launches. Activity is likely to remain concentrated in asset classes with more established regulatory clarity—such as money market funds, collateral, especially fixed income instruments. The focus at this stage is less about scale and more about building foundational experience, infrastructure, and risk frameworks.

**Phase 2 | Commercial Expansion:** As market liquidity deepens and early use cases demonstrate consistent value, adoption is expected to broaden across asset classes and investor segments. This phase is defined by more widespread issuance and trading of DLT-based Securities, especially in secondary markets. Institutions may begin to standardize issuance and settlement practices, and interoperability between platforms could become more critical. The emergence of shared infrastructure and common protocols will help accelerate adoption.

**Phase 3 | Market Transformation:** The final phase marks the shift to a fully integrated digital market infrastructure. At this point, tokenization spans the entire securities lifecycle, from primary issuance through post-trade servicing. End-to-end automation and programmability become embedded features of the system, delivering structural efficiencies and enabling new financial products. Regulatory frameworks will have been tested and finalized, investor trust established, and institutional workflows reconfigured to support the operational and legal standards of a tokenized environment.

30. Sasha Mills, Bank of England, “Keynote Address at City Week 2025”, July 2025.

**EXHIBIT ES.7**

# Phased Adoption of Tokenized Capital Markets

| | TODAY<br>PHASE 1: INSTITUTIONAL READINESS<br>1–3 years | MEDIUM TERM<br>PHASE 2: COMMECIAL EXPANSION<br>3–5 years | LONG TERM<br>PHASE 3: MARKET TRANSFORMATION<br>5–10+ years |
|---|---|---|---|
| | **Partnered experimentation** to validate technical capabilities & pilots move to production (e.g., repos, bond issuance). Public-private partnerships on legal ambiguities, regulation and best practice risk mitigants. | **Commercial viability** driven by rising issuer and investor demand in selected asset classes, as liquidity establishes. Legal and regulatory frameworks crystallize as benefits proven across jurisdictions. | **Large-scale growth** in issuer and investor demand across primary and secondary markets in selected asset classes. Robust and globally harmonized legal and regulatory frameworks established as DLT-ecosystem matures. |
| **Key Enablers** | **Limited demand for DLT-based securities; experimental issuances**<br>• Mix of tokenized security and native security token issuance<br>• Majority of process (e.g., structuring, syndication, book build) performed traditionally, no cost savings<br>• Limited innovation around fractionalization and bespoke products | **Demand emerges in selected asset classes**<br>• Native security token issuances outstrips tokenized securities<br>• Native security issuance process party enabled on DLT, driving speed to market and lower issuance costs<br>• Fractionalized issuance on select DLT platforms; issuers test new products | **Demand overtakes traditional issuance in selected asset classes**<br>• Native security tokens is default format over tokenized securities<br>• Native security issuance process fully enabled on DLT, driving further market responsiveness & savings<br>• Scaled (retail) investor adoption of fractional issues and products tailored to investor needs |
| **Secondary Trading** | **Few secondary markets for DLT-based securities; liquidity is low**<br>• Majority of trading venues (exchanges, OTC networks, MDPs) do not offer DLT-based securities<br>• Where trading is possible, participants leverage non-FMI, purpose-built DLT-trading platforms | **Growth in DLT-based secondary market liquidity**<br>• Trading of DLT-based securities emerges in selected trading venues for selected asset classes (e.g., illiquids)<br>• DLT Platforms are integrated with traditional, non-DLT, FMI (e.g., FedNow for payment settlement) | **Majority of liquidity and trading in selected asset classes is via DLT**<br>• Interoperable DLT market allows aggregation of liquidity across OTC markets and greater velocity<br>• DLT-specific FMI matures (e.g., post-trade)<br>• Fractionalization allows precise hedging and risk management |
| **Clearing & Settlement (C&S)** | **Testing of DLT-based C&S operational processes**<br>• PoCs demonstrate instant DvP with traditional payment rails (e.g., RTGS)<br>• Instant DvP in live production across repos, enabling intra-day use cases<br>• DvP driven by tokenized commercial bank money, deposits and/or other forms of DLT-based Payment instruments | **DLT-based C&S emerges as alternative DvP channel in selected asset classes**<br>• Instant DvP in live production across selected asset classes<br>• Traditional settlement continue to dominate markets<br>• DvP driven primarily by tokenized commercial bank money, deposits | **Automated, continuous DLT-based C&S is the default in selected asset classes**<br>• Settlement choices driven by needs of market participants<br>• DLT-based C&S enables Opex & capital efficiencies, and mitigates risk<br>• DvP driven by either tokenized commercial bank money or deposits depending on use case |
| **Custody** | **Digital custody solutions are limited, propositions focused on cryptoassets**<br>• Custodians focused on custody of cryptoassets to meet near-term market demand<br>• Limited adoption of DLT-based books and records and post-trade operations<br>• Emergence of DLT-based collateral mobility platforms in repos and OTC derivatives | **Growth in digital custody solutions, with move away from cryptoassets**<br>• Custodians build or buy solutions for DLT-based security custody (recordkeeping and automation in post-trade operations)<br>• DLT-based collateral mobility platforms become default option<br>• Clarity on role of national CSDs across major markets | **Digital custody solutions offer DLT-based and traditional custody**<br>• Custodians provide seamless interoperability between DLT-based and traditional securities<br>• DLT simplifies post-trade operations reducing Opex and mitigating risk<br>• Harmonization on roles of CSD across markets |
| **Asset Servicing** | **Limited ecosystem around smart contracts (standards, regulation etc.)**<br>• Proof-of-concept testing for smart contracts supporting DLT-based income payments (e.g., coupons, dividends)<br>• Partnerships to build capabilities but open questions remain (e.g., legal, regulatory, risk and governance, standards) | **Growth in piloting of DLT-based asset servicing**<br>• Standardization of smart contracts drives traction in DLT-based income payments (e.g., coupons, dividends)<br>• Functionality to support tax and regulatory reporting processes piloted<br>• Clarity across legal, regulatory, risk and governance frameworks | **DLT-based asset servicing becomes default in selected asset classes**<br>• Corporate actions embedded in smart contracts tied to securities at issuance<br>• Dividends, coupons, and tax withholding processes automated and settled with DLT-based payments<br>• Targeted 'embedded supervision' introduced for real-time regulatory visibility and monitoring |
| **Key Enablers** | Cross-industry, public-private partnerships<br>Regulated, accepted, DLT-based money<br>Industry-aligned taxonomy and educative materials<br>Updated fund and investment mandates<br>Global legal and regulatory framework<br>Interoperable networks and markets<br>DLT-specific FMI | | |

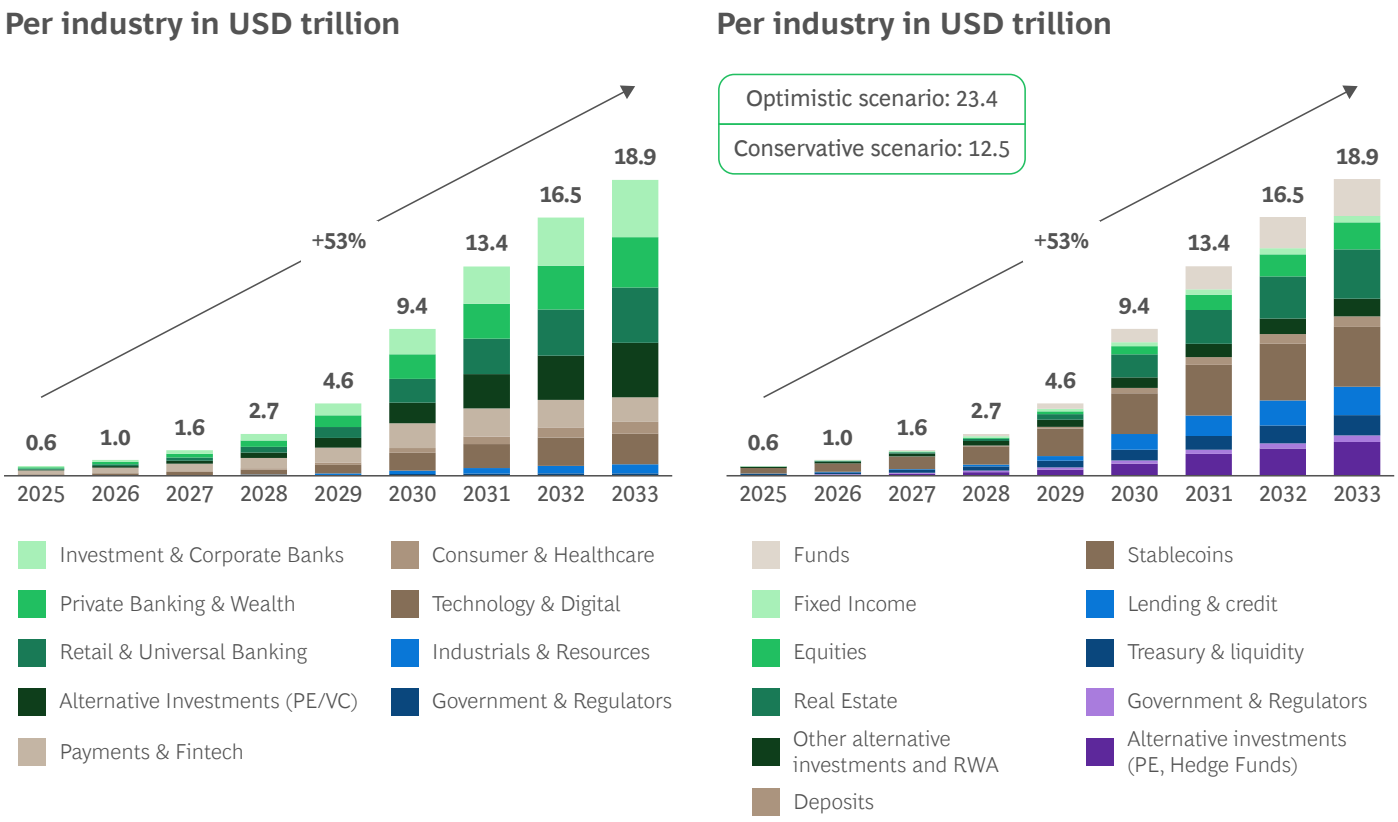
**Sources:** BCG analysis, GFMA Member Interviews.

As adoption expands, liquidity improves, and investor demand materializes, the growth of tokenization will likely be a **self-reinforcing flywheel** as organic growth naturally accelerates. Tokenization supports long-term product trends such as accessibility and fractionalization that institutions are already beginning to offer via non-DLT-based solutions. The tokenization of capital markets is expected to scale materially through 2033. Market analysis projects tokenized real-world assets will grow from approximately $0.6 trillion in 2025 to $18.9 trillion by 2033, a compound annual growth rate of over 50%.[31] This transition reflects both a technological shift and a strategic reorientation within institutions.

**As this market matures – the differentiating factors between market participants will not be technological, but like today, their ability to meet client demand, deliver innovative services, offer safe, sound, and compliant access to global capital markets.**

**EXHIBIT ES.8**

## Estimated Growth in Tokenization Through 2033[32]




**Source:** Ripple and BCG.

31. BCG, Ripple, "Approaching the Tokenization Tipping Point", April 2025.
32. BCG, Ripple, "Approaching the Tokenization Tipping Point", April 2025.

# RISK MITIGATION MEASURES HAVE EVOLVED TO MEET INSTITUTIONAL STANDARDS

As tokenization moves from the periphery to the mainstream of capital markets, **risk management and governance frameworks** have likewise evolved to meet the high standards of institutional finance.

This report serves as a comprehensive update to the existing "Risk and Mitigants" chapter articulated in the 2023 GFMA Report *The Impact of DLT in Capital Markets*, integrating the latest insights from seminal industry publications, including the GFMA-GDF Smart Contract Primer (October 2024), the Guardian Fixed Income Framework (November 2024), and the ISDA Digital Asset Derivatives Definitions (January 2023) and ISDA Tokenized Collateral Model Provisions (May 2024). It further supplements this analysis with current guidance and frameworks from leading international standard-setting bodies and national regulators such as the Bank for International Settlements ("BIS"), the Financial Stability Board ("FSB"), the International Organization of Securities Commissions ("IOSCO"), the Basel Committee for Banking Supervision ("BCBS"), the MAS, SEC, the FCA, and the European Securities and Markets Authority ("ESMA"). The primary objective is to provide a consolidated view of how DLT-specific risks are being systematically addressed and managed. For a full view of the identified risks and mitigants, please refer to **Chapter 1.4 | Risk Mitigants Across Network Types**.

***The focus remains steadfast on the robust mitigation of identified risks. The operational procedures and control enhancements detailed herein convey a strong sense of confidence that current and evolving risk management frameworks are increasingly sufficient and appropriate for institutional controls, thereby fostering responsible innovation and ensuring the continued integrity and stability of capital markets.***

## Holistic Understanding of DLT-Specific Risk

Joint Trades and members consistently advocate for DLT implementation that aligns with the stringent standards of regulated capital markets, thereby safeguarding market participants and the broader financial system. This approach is built upon established principles from organizations such as the IOSCO[33,34] BCBS[35], and FSB[36], with the explicit goal of identifying and mitigating DLT-specific risks to ensure safe and secure development.

A guiding principle for regulatory approaches emphasizes technology-neutrality. This means that regulatory requirements should be determined by the specific use cases or activity taking place, rather than by the technology's characteristics alone. This perspective is crucial for avoiding broad, undifferentiated regulatory mandates that could inadvertently hinder responsible innovation. The current DLT ecosystem is still in its formative stages, with primary and secondary markets yet to achieve widespread adoption. This foundational phase necessitates ongoing dialogue and collaboration between the public and private sectors to address technical challenges and work towards global harmonization in regulatory and operational frameworks.

The understanding of DLT's impact has matured from viewing it as a revolutionary technology introducing entirely new risks to recognizing it as an enhancement or alternative infrastructure. Discussions now frequently refer to "new considerations" or "novel applications of existing risks," rather than solely "new risks." This evolution in perspective suggests that regulatory bodies are increasingly integrating DLT into their established oversight mechanisms, which helps reduce regulatory uncertainty and encourages the scaling of DLT within existing prudential boundaries.

Updated principles for DLT risk assessment and mitigation underscore the need for adaptability. Risk assessments which must be undertaken for each DLT platform in light of the platform's specific characteristics, must evolve based on three critical factors: **the implementation model** (e.g., 'Books and Records' versus 'DLT-based Securities'), the **lifecycle activity** (e.g., Primary Markets, Secondary Markets, or post-trade operations), and the **specific DLT network archetype** employed (Private-Permissioned, Public-Permissioned, or Public-Permissionless). Regulated financial institutions possess a well-established history of responsible innovation, leveraging their high standards in institutional-grade technology, operational risk management, operational resilience, cybersecurity, data protection, client suitability frameworks, and robust Know Your Customer ("KYC"), Anti-Money Laundering ("AML"), and Combating the Financing of Terrorism ("CFT") procedures. These existing frameworks form the bedrock for managing risks associated with DLT adoption.

33. BIS-IOSCO, "Principles for Financial Market Infrastructure", 2012.
34. IOSCO, "Principles on Outsourcing" October 2021, and "Operational resilience of trading venues and market intermediaries during the COVID-19 pandemic", January 2022.
35. BCBS, "Principles for Operational Resilience", March 2021, and "Principles for Sound Management of Operational Risk", March 2021.
36. FSB, "Recommendations to Achieve Greater Convergence in Cyber Incident Reporting", and Format for Incident Reporting Exchange (FIRE), April 2023; and the FSB's Guidance on "Operational Continuity while in Resolution", August 2016.

## DLT-based Books and Records

DLT-based Books and Records systems, primarily used for internal recordkeeping, accounting, and reporting on private-permissioned networks, are managed with risk management practices that are analogous to traditional systems. The BCBS has indicated that such systems, where the legal nature of the service remains unchanged, fall outside the scope of additional prudential treatment.

For internal DLT-based systems, regulatory oversight remains focused on ensuring that the system fulfills the financial institution's existing obligations to maintain efficient and effective systems and controls in a safe and sound manner. Key criteria for maintaining analogous risk management include: operating within a private-permissioned and internal control environment; ensuring security is properly ringfenced within the regulated institution's technology and security controls; limiting direct read/write access exclusively to the institution; recording debits, credits, and other asset transfers consistent with existing approved traditional book entries; requiring the approval and vetting of instructions by the regulated financial institution for any third-party changes; providing permissioned reporting to customers without direct third-party access; and establishing mechanisms for reconciliation and unilateral correction of mistakes in line with internal governance protocols.

The explicit policy stance that the mere introduction of DLT protocols for Books and Records, akin to traditional banking activities, should not in itself lead to additional regulation or capital charges, is a significant development. This position indicates that internal, permissioned DLT applications are largely perceived as operational enhancements within existing regulatory boundaries, rather than new regulated activities. This clarity reduces regulatory uncertainty and the potential for punitive capital treatment, thereby incentivizing financial institutions to invest in DLT for internal efficiencies and accelerating its adoption in back-office functions.

### Perspective on Public-Permissioned and Public-Permissionless Networks as a Form of Books and Records Use Cases

DLT enables a reimagining of traditional books and records systems through digital infrastructure that allows greater transparency, programmability, and resilience. While private-permissioned networks have long been viewed as best suited for internal recordkeeping due to their control and security, emerging perspectives suggest that public-permissioned, public-permissionless, and hybrid networks can serve comparable books and records functions under appropriate conditions.

In essence, the core functionality required for books and records—control over who can read and write data, validation of transactions, and auditability—can be achieved on public networks when deployed with permissioning mechanisms. In such configurations, control over the token and protocol remains with the issuing institution. Access to the wallet may be distributed, but only authenticated actors can initiate or view transactions. The institution retains ultimate authority to read and write data relevant to ownership records and obligations.

This architectural model redefines the concept of a wallet. Rather than serving as a direct custodian of bearer assets (as is default for many public network architectures), the wallet becomes a method of issuing or coordinating the issuance of instructions. Access credentials (such as private keys or digital certificates) act as gatekeepers to instruct a transaction, but not to alter the official record unilaterally. The actual recording—what the institution owes to the client and what the client owns—is governed centrally, even if the infrastructure to record said record is distributed.

Critically, such a model should not alter the legal nature of the asset or the risk profile of the activity. A token representing a deposit or security should remain subject to the same regulatory outcome as its traditional counterpart if it is merely a new format for existing records. This aligns with the principle of "same activity, same risk, same regulatory outcome." Institutions should maintain their obligations under existing regulatory frameworks—including KYC, AML, and transaction monitoring—even when deploying on public infrastructure.

A recent example of this approach is J.P. Morgan launch of a blockchain-based deposit token (JPMD) that represents insured U.S. dollar deposits held at the bank, offering a regulated and interest-bearing alternative to stablecoins.[37] Built on Coinbase's Base Layer-2 network, the token enables instant, low-cost transfers and 24/7 settlement between institutional clients. The initiative supports cross-border payments, tokenized asset transactions, and interoperability between public blockchains and J.P. Morgan's internal infrastructure.

37. Ledger Insights, "JP Morgan's blockchain bank account used to settle Ondo public chain transactions", May 2025.

As institutions evaluate implementation models, the decision is less about whether the infrastructure is public or private, and more about how control, access, and validation are architected. When built with institutional-grade security and oversight, public-permissioned, public-permissionless, and hybrid networks that utilize Layer 2 scaling solutions can support books and records use cases in a manner consistent with regulatory and operational standards.

## Refreshing a Principles-Based Approach to Assessing Risk Implications of Each DLT Network Type

As the ecosystem evolves, it is vital that regulatory frameworks remain technology-neutral, proportionate to actual risk related to the asset class and use case. Regulatory expectations should focus on outcomes, such as financial stability, financial integrity, investor protection and competition, rather than prescribing specific architectural choices. While permissioned networks and institutional controls offer clear benefits in certain contexts, decentralized networks can also offer robust alternatives through emerging tools like programmable compliance, decentralized identity, and zero-knowledge proofs. Maintaining a diverse and open infrastructure landscape is essential to preserving competition and enabling innovation for all market participants to serve clients. Both permissioned and permissionless systems can coexist within a responsible and well-supervised ecosystem, provided the right safeguards are applied—and crucially at the appropriate layer of the stack.

**EXHIBIT ES.9**

# Comparison of Defining Characteristics Across Distributed Ledger Network Archetypes

| | | Private-permissioned | Public-permissioned | Public-permissionless |
|---|---|---|---|---|
| Defining characteristics | Governance | Centralized | Centralized (for the relevant application) | Decentralized* |
| | Accessibility to users | Role-Based Access | Role-Based Access | Role-Based Access |
| | Control over privileges | Can be defined as required | Users authenticated for specific roles | Defaults to open, but fully configurable (RBAC) |
| | Identification Requirements | All users known | All users known (for the relevant application) | Defaults to open, but fully configurable |
| | User base | Limited (by design) | Limited (for the relevant application) | Broad |
| | Interoperability | Can be developed as req'd but lower ease of implementation. In practice – limited. | Can be designed as required (for the relevant application). In practice – limited. | Higher interoperability given existing DLT-based ecosystem. "composability" as standard |
| Technology and infrastructure | Default data confidentiality | Can be defined as required | Can be defined as required (for the relevant application) | All users can view all transactions (without bespoke approaches) |
| | Overall operational resilience | Lower common fault tolerance but highest cyberattack resilience | Provides lower common fault tolerance and cyberattack resilience vs permissionless | Higher common fault tolerance; most exposed to cyberattacks but proven resilience in leading networks |
| | Scalability | Higher scale and performance in core network given fewer nodes | Higher scale and performance in core network given fewer nodes | Lower scale and performance in core network (layer 1) given many nodes; higher scale and performance at layer[2] |
| | Interoperability | Can be developed as required but lower ease of implementation. In practice – limited. | Can be designed as required (for the relevant application). In practice – limited. | Higher interoperability given existing DLT-based ecosystem. "composability" as standard |
| Regulatory and Compliance Factors | 1 \| Cyberattacks (application layer) | Strongest mitigation as network closed and centrally controlled<br>Vulnerable to human errors/misconfigurations and phishing | Permissioning reduces risks of cyberattacks and hacks but still vulnerable to human errors/misconfigurations and phishing | Unique risks of cyberattacks and hacks (e.g., bridges) |
| | 2 \| KYC/AML compliance | All participants are verified by default | Authentication enables KYC/AML, but some participants (e.g., node validators) unverified although verified validators can be an option | Participants are unverified, so bespoke solutions are required (e.g., application whitelisting) |
| | 3 \| Group 1b & Group 2a/b asset exposure[1] | No Group 1b/2 assets are used | Can be designed to ensure no Group 1b/2 assets are used | Workarounds required to avoid Group 1b/2 assets |
| | 4 \| Settlement finality | Can demonstrate precise moment of settlement finality in network-wide rules (subject to rules/regs) | Can be designed to define moment of settlement finality similar to private-permissioned networks | Probabilistic settlement due to validation by consensus; some networks defined "finality" step where reorg probability is very low |
| | Examples | HYPERLEDGER FABRIC, r3 corda | POLYMESH, corda | bitcoin, ethereum |

**Sources:** GFMA member input; BCG analysis.
[1]As defined in the Basel Framework, set out by BCBS in the "Prudential treatment of cryptoasset exposures", 2022.
*technical, legal, economic, logical and governance measures of decentralization.

For a more detailed discussion, including the advantages and resilience of public networks, we refer readers to **Chapter 1.2 | DLT Architectural Attributes and Networks.**

## Layer 2 solutions for Public-Permissionless blockchains allow Institutional Control

Regulated financial institutions are exploring public **Layer 1** blockchains (such as Ethereum) to leverage their decentralization, transparency, and broad liquidity. However, some public **permissionless** networks pose challenges around governance, privacy, and compliance. **Layer 2** technologies – including rollups, state channels, and app-specific chains – are emerging as a potential solution to address these challenges and may enabling institutional **operational controls** (such as permissioning, KYC/AML compliance, access control, and privacy) on top of public L1 infrastructure.

Layer 2 (L2) solutions inherit technological architecture from a Layer 1 chain but operate with custom rules, allowing banks and other firms to enforce controls. They can be permissioned at the L2 level – meaning only authorized participants (with verified identities) can transact or validate, even though the L1 architecture may be more open in nature. This may help address the trade-off institutions face: permissionless chains offer wide transparency and liquidity, but raise compliance and security risks, whereas fully permissioned blockchains offer control but isolate assets from broader market. For example, **rollups** (either optimistic or zero-knowledge) batch many transactions off-chain and post proofs to L1, enabling high throughput and custom logic. Banks can run an L2 with a known set of validators, enforce whitelisting of addresses, and incorporate **KYC** checks at onboarding. One real-world example is Deutsche Bank's planned Ethereum L2 using zk-rollup tech: it is described as a "public and permissioned" network where anyone can observe the ledger but only authorized parties can participate. The goal is to **know all counterparties** (satisfying KYC/AML rules that are hard to meet on a fully open network) and to improve speed and privacy, all while settling on Ethereum's robust base layer. Indeed, the bank's prototype will let them choose permitted validators and even give regulators special "super auditor" access to monitor fund flows on the L2.

Other pilots show how L2 or analogous structures meet institutional needs. In Singapore's **Project Guardian** (2022), major banks (JPMorgan, DBS, SBI) traded tokenized forex and government bonds on a modified DeFi platform. They used a permissioned liquidity pool on a public chain (Polygon) with "**trust anchors**" issuing verifiable credentials to users – essentially embedding KYC verification into the DeFi process. All wallet addresses in the pool were verified, allowing trading to occur only among known, vetted participants in that **permissioned market**. This ensured compliance (no anonymous or blacklisted actors) while still using automated smart contracts for settlement. **State channels** offer another tool: two parties (or a consortium) can lock funds in a smart contract and transact off-chain with each other rapidly; only final state is settled on L1, giving privacy and speed for, say, interbank payment flows while relying on L1 for final **settlement assurance**. In all cases, the L1 blockchain serves as an immutable anchor for finality and dispute resolution, while the L2 or off-chain layer provides the *operational envelope* where institutional rules (permissions, limits, checks) are enforced.

Despite their advantages, L2 solutions bring unique challenges. Operational complexity increases due to managing off-chain transactions and their settlement on-chain, potentially complicating governance and oversight. Ensuring robust security in L2 mechanisms, especially around cryptographic proofs and validator accountability, may introduce new vulnerabilities to be managed. Additionally, interoperability between different L2 solutions, essential for seamless asset movement and market integration, remains an evolving technical and regulatory challenge. While not a panacea, L2 solutions represent promising emerging technologies that can broaden institutional participation, enabling greater market reach and regulatory compliance.

## Risks and Governance

This executive summary reflects a synthesis of the broader analyses conducted across the DLT ecosystem to identify practical and forward-looking risk mitigants. It consolidates industry-wide perspectives on risk exposures associated with various DLT architectures—ranging from private-permissioned to public-permissionless networks—and highlights consensus-driven strategies for managing these risks effectively. The insights presented here are the result of extensive industry collaboration, aiming to support both market participants and regulators in navigating DLT adoption with greater confidence and resilience.

**Operational risks are a key focus area**, including cybersecurity threats and smart contract vulnerabilities, and settlement finality concerns. Cybersecurity risks vary significantly across DLT architectures. Permissioned networks typically utilize strict access controls, centralized monitoring, and traditional cybersecurity measures, while permissionless networks rely on decentralization, cryptographic safeguards, and open-source scrutiny. Smart contract risks, arising from code vulnerabilities or malicious designs, are mitigated by rigorous audits, formal verification, and built-in emergency intervention capabilities, differing considerably between centralized private networks and decentralized public ones.

**Settlement finality remains a critical concern**, particularly in public-permissionless environments, where finality can be probabilistic rather than deterministic. Effective mitigation combines technical solutions, such as economic penalties and sufficient confirmation depths, with emerging legal frameworks providing clarity and assurance.

**Interoperability among diverse DLT networks** introduces additional complexity and vulnerabilities, especially at cross-network bridges. Mitigations emphasize standardizing interoperability protocols, using secure gateway nodes, and employing multi-party validation schemes to minimize systemic risks. Industry efforts, such as DTCC's ComposerX platform, showcase growing interoperability maturity, integrating DLT seamlessly with traditional financial systems.

**Common mode failures**, due to shared vulnerabilities across nodes or infrastructure dependencies, represent significant operational risks. Strategies such as deploying nodes across multiple clouds or regions, diverse validator implementations, and continuous disaster recovery exercises significantly bolster network resilience.

**Scalability remains critical** as institutions require high transaction throughput and predictable costs. Layer-2 solutions, sharding, and optimized consensus mechanisms are recommended for scaling effectively across network types. Mitigations increasingly focus on integrating off-chain processes and innovative fee stabilization strategies to maintain performance during peak usage.

**Quantum computing** poses long-term existential threats, with potential capabilities to compromise existing cryptographic algorithms. Mitigation involves transitioning proactively to quantum-resistant cryptography through layered encryption, crypto-agility, and community consensus for algorithm upgrades. Regulatory bodies advocate preparatory adoption of post-quantum cryptography to safeguard future network integrity.

**Finally, compliance risks,** particularly KYC/AML/CFT obligations, data privacy, and regulatory uncertainties, demand embedded compliance controls and active engagement with regulators. Public-permissioned networks often implement embedded controls like token-level permissioning, while public-permissionless networks increasingly utilize advanced analytics and decentralized identity solutions to manage illicit finance risks. Cross-network compliance solutions are maturing through automated smart contract checks and holistic analytics.

For a full review of identified risks, mitigants, categorized by network type, please refer to **Chapter 1.4 | Risk Mitigants.**

The integration of DLT and smart contracts into global capital markets represents a significant evolution, offering substantial opportunities for enhanced efficiency, transparency, and liquidity. This report demonstrates that while DLT introduces new considerations for risk management, the financial industry and global regulators are proactively developing and implementing robust mitigation strategies. The prevailing approach emphasizes the application and adaptation of existing, well-established regulatory frameworks for operational resilience, cybersecurity, and financial crime compliance, rather than the creation of entirely new regimes. This technology-agnostic stance fosters responsible innovation by providing a clearer pathway for regulated entities to adopt DLT.

A key theme emerging from this analysis is the critical role of interoperability and standardization in scaling DLT adoption. Efforts to bridge traditional and DLT-based systems, alongside the development and implementation of common technical and legal standards for smart contracts and data, such as the FINOS Common Domain Model ("CDM"), are essential to prevent market fragmentation and unlock the full benefits of tokenization. Furthermore, the detailed examination of smart contract risks highlights the industry's commitment to rigorous pre-deployment testing, independent auditing, and the integration of human oversight mechanisms ("human-in-the-loop" governance), ensuring that the self-executing nature of smart contracts is balanced with necessary controls and recourse.

The ongoing dialogue and collaboration between public and private sectors, as evidenced by initiatives such as Project Guardian, are vital for harmonizing approaches and ensuring that DLT development in global capital markets continues to meet the high standards of safety and soundness required for financial stability. The continuous evolution of regulatory guidance and industry best practices provides a strong foundation for managing the risks associated with DLT, instilling confidence that these technologies can be safely and effectively integrated into the future of global capital markets.

## LEGAL AND REGULATORY CHANGE: GO FURTHER AND FASTER

**Chapter 4: Legal and Regulatory Landscape** demonstrates where existing regulation sufficiently addresses DLT-enabled operations and Tokenized Securities and highlighting gaps in legal and regulatory frameworks based on the "same risk, same regulation, same regulatory outcome" principle.

Joint Trades urge regulators and legislators (amongst other things) to:

i. increase their focus and resourcing to ensure legal and regulatory certainty; and

ii. continue engaging in ongoing dialogue with the private sector to work towards solutions to those issues.

Legal and regulatory clarity is an essential element of a well-functioning and thriving financial services sector. The established rights and obligations in traditional finance (TradFi) have developed over many decades. The same concepts do not, or cannot, always provide a good fit when applied to DLT-based financial instruments and markets. In some cases, pending legislative and rule-making developments, participants have taken an incremental and pragmatic/risk-based view (for example, the issue of whether cryptoassets are classified as securities or not under US law).

As we noted in 2023, both regulators and legislators have been aware of this situation, and since then there has been ongoing work around the world. It is important to recognize that these developments involve engaging with difficult policy choices, require significant public sector resource, and necessitate balancing consumer protections.

We should emphasize that having a transparent 'roadmap' of legal and regulatory modifications/clarifications is as important to the growth and facilitation of market activity in DLT as the implementing measures themselves. Therefore, to take an example, we have seen the EU Digital Finance package performing a vital role in attracting business innovation to the EU market.

Uncertain and/or overly restrictive DLT-related laws and regulation pose numerous challenges, including:

- limitation on scaling in markets and practices outside the scope of existing regulated financial services regimes; and
- substantial delay in the evolution of transparent, disciplined, and effective development of markets and infrastructure.

In this Executive Summary, we summarize the extent of legislative and regulatory progress in major financial centers. We then provide our updated recommendations.

## EU Update

The European Commission adopted on 24 September 2020 a digital finance package, including a digital finance strategy and legislative proposals on cryptoassets, for a competitive EU financial sector that gives consumers access to innovative financial products, while ensuring consumer protection and financial stability.

This led to two major regulations on cryptoassets and the use of DLT in financial market operations: Regulation (EU) No. 2023/1114 of 31 May 2023 ("**MiCA**") and Regulation (EU) 2022/858 of 30 May 2022 ("**EU Pilot Regime**").

Furthermore, on 28 June 2023, the European Commission published its proposals for a digital euro as part of a 'Single Currency Package' comprising proposals for a Regulation establishing the legal framework for a possible digital euro, a Regulation on the provision of digital euro services by payment services providers incorporated in EU Member States whose currency is not the euro and a Regulation on the legal tender of euro coins and banknotes ("**Digital Euro Proposal**").

**MiCA:** MiCA fully entered into application on 30 December 2024 and establishes a comprehensive and harmonized regulatory framework for cryptoassets and related services across the EU.

MiCA applies to persons involved in the issuance, offer to the public and admission to trading of cryptoassets or that provide services related to cryptoassets in the European Union, imposing a series of obligations on them. It specifically excludes from its scope cryptoassets that are already regulated by existing EU financial services legislation, such as cryptoassets qualifying as financial instruments under Directive 2014/65/EU of 15 May 2014 ("**MiFID II**"), deposits, funds (with the exception of e-money tokens), securitization positions, pension products, and central bank digital currencies.

MiCA classifies cryptoassets into three main categories: 'e-money tokens', which are stablecoins referencing the value of a single official currency; 'asset-referenced tokens', which are stablecoins other than e-money tokens and referencing another value or right or a combination thereof, including one or more official currencies; and 'other cryptoassets', which include utility tokens and other forms of cryptoassets not covered by the previous categories.

**EU Pilot Regime:** The EU Pilot Regime fully entered into application on 23 March 2023 and provides a legal framework for trading and settlement of financial instruments (as defined under MiFID II) issued, recorded, transferred and stored using DLT. The EU Pilot Regime addresses regulatory barriers that hinder the use of DLT in financial market infrastructures by allowing certain DLT market infrastructures to apply for temporary exemptions from certain requirements of existing EU financial services legislation, namely Regulation (EU) No. 909/2014 of 23 July 2014 ("**CSDR**"), MIFID II, Regulation (EU) No. 600/2014 of 15 May 2014 ("**MiFIR**") and Directive 98/26/EC of 19 May 1998 ("**Finality Directive**").

The EU Pilot Regime applies to DLT multilateral trading facilities (DLT MTFs), DLT settlement systems (DLT SS), and DLT Trading and Settlement Systems (DLT TSS). The DLT TSS is an innovation that allows a single player to provide both the services of a multilateral trading facility and those of a settlement system.

Only shares issued by issuers with a market capitalization of less than EUR 500 million, bonds or securitized debt with an issue size of less than EUR 1 billion, and certain units in collective investment undertakings, the market value of the assets under management of which is less than EUR 500 million are eligible for inclusion in the EU Pilot Regime. Additional value thresholds are imposed: in particular, the aggregate market value of DLT financial instruments admitted to a DLT market infrastructure must not exceed EUR 6 billion.

In principle, the EU Pilot Regime will run for a period of 3 years, renewable or extendable to 6 years total. However, in a letter to ESMA dated May 2024, the European Commission publicly stated that the regime would not have an expiry date[38].

In a joint paper published on 9 April 2025, the French *Autorité des marchés financiers* and the Italian *Commissione Nazionale per le Società e la Borsa* highlight the low number of players authorized under the EU Pilot Regime and suggest amendments to enhance the competitiveness of this regime[39].

In a report "on the functioning and review of the DLT Pilot Regime" published on 25 June 2025, the ESMA presents strategic recommendations to the European Commission about (i) how to make the E.U. Pilot Regime more attractive to the market, and (ii) suggested amendments to the E.U. Pilot Regime to make it permanent and allow for more flexibility in the regulatory thresholds or eligible assets depending on the risks of each business model.[40]

38. **https://www.esma.europa.eu/sites/default/files/2024-05/3056562_030524_Reply_Verena_Ross_on_DLT_Pilot_Regime_Implementation.pdf.**
39. AMF, "Towards a More Competitive European Pilot Regime: A Proposal for Fostering Experimentation by Blockchain-Based Market Infrastructures", Accessed 2025.
40. **https://www.esma.europa.eu/sites/default/files/2025-06/ESMA75-117376770-460_Report_on_the_functioning_and_review_of_the_DLTR_-_Art.14.pdf.**

**Digital Euro Proposal:** The Digital Euro Proposal would give a digital euro legal tender status in euro area EU Member States, entailing its mandatory acceptance by payees, subject to certain exemptions. The digital euro would be a direct liability of the European Central Bank or of the national central banks of the EU Member States whose currency is the euro towards digital euro users.

Based on the Digital Euro Proposal, the digital euro would support a variety of use cases of retail payments, excluding its use for wholesale payments.

## Hong Kong Update

Since the Hong Kong Government's first "Policy Statement on Development of Virtual Assets in Hong Kong" in 2022, there have been significant developments in Hong Kong's exploration and adoption of DLT in the financial sector.[41] This includes financial institutions exploring DLT applications in traditional financial market operations, changes in Hong Kong law and regulation both responding to market developments and which are intended to facilitate change,[42] and interventions by regulators[43]. The latter included the Hong Kong Monetary Authority (HKMA)'s Supervisory Incubator for Distributed Ledger Technology launched in January 2025, intended to enable banks to explore the adoption of DLT, and with a particular focus on addressing risks that may arise as banks move to develop services (e.g. deposits and loans) that cut across DLT-based and legacy banking infrastructures.[44]

The Hong Kong Government issued a second policy statement on digital assets on 26 June 2025 ("Policy Statement 2.0 on the Development of Digital Assets in Hong Kong"), reiterating the Government's commitment to establishing Hong Kong as premier global hub for digital assets.[45] This second policy statement builds on the 2022 policy statement and sets out a series of strategic policy directions to be implemented through a number of corresponding initiatives. These efforts are designed to be technology agnostic, to ensure adaptability to future digital assets innovations while embedding them into the real economy and financial systems for sustainable growth. The initiatives are structured under the "*LEAP*" framework, an acronym for: "Legal and regulatory streamlining; "Expanding the suite of tokenised products' "Advancing use cases and crosssectoral collaboration; and "People and partnership development.

Key developments in recent years have included the amendment of the Anti-Money Laundering and Counter-Terrorist Financing Ordinance ("**AMLO**") to introduce a licensing regime, with effect from 1 June 2023, for Virtual Assets Trading Platforms and Virtual Asset Service Providers engaging in different specific virtual asset operations. The amendments to the AMLO also introduced a definition of "*virtual assets*" which is now being referenced across subsequent legislation and in regulatory guidance, with the effect that the Hong Kong regulatory landscape is increasingly joined up in the context of the regulatory characterization of asset classes which had previously fallen between the existing patchwork of regulations and remits of regulatory authorities. Coordinated with Policy Statement 2.0, consultations were launched on 27 June 2025 jointly by Hong Kong's Financial Services and Treasury Bureau and SFC to expand Hong Kong's regulatory regime for virtual assets to include (i) dealing in virtual assets and (ii) virtual assets custodian services.

In the context of the traditional securities markets the **HKMA** has engaged in a number of pilot projects, including through the issuance of two rounds of digital bonds as part of the HKMA's Project Evergreen (in February 2023, and in February 2024), which were in part intended to act as proof-of-concept for bond tokenization[46]. The second of these issuances saw the **Hong Kong Government** issue a multi-currency "digitally native" green bond, denominated in HK dollars (HKD2 billion tranche), Renminbi (RMB-1.5 billion tranche), US dollars (USD-200 million tranche) and euro (EUR80 million tranche) under the Government Green Bond Programme. This used a private blockchain network (HSBC's Orion platform as part of the HKMA's Central Money Markets Unit ("**CMU**")), and the bonds were constituted on-chain without first being issued in a traditional central securities depositary, and with direct participants in the platform holding legal (rather than beneficial) title and with their on-chain records again **legally recognized as the definitive record of ownership**. The bonds were also listed on the Hong Kong Stock Exchange. This was followed in November 2024, with the launch by the HKMA of the Digital Bond Grant Scheme, aiming to promote the development of the digital securities market and to encourage broader adoption of tokenization technology in capital market transactions[47]. Subject to the satisfaction of relevant eligibility requirements under the scheme, a maximum grant of HKD2.5 million is available to each eligible digital bond issuance in Hong Kong[48].

41. Financial Services and Treasury Bureau. 2024. Policy Statement on Development of Virtual Assets in Hong Kong", Accessed 2025.
42. HKMA, "Distributed Ledger Technology in the Financial Sector: A Study on the Opportunities and Challenges", March 2025.
43. Ibid.
44. HKMA press release, "launches Supervisory Incubator to foster responsible adoption of distributed ledger technology", January 2025.
45. Financial Services and Treasury Bureau. 2025. "Policy Statement 2.0 on the Development of Digital Assets in Hong Kong".
46. HKMA inSight Article," Project Evergreen: From concept to application", November 2024.
47. HKMA press release, "HKMA launches Digital Bond Grant Scheme", November 2024.
48. Ibid.

Most recently a new Stablecoins Ordinance has been enacted and will come into effect on 1 August 2025, establishing a licensing regime for fiat referenced stablecoin issuers in Hong Kong. This follows on from the HKMA's Stablecoin Issuer Sandbox (launched in March 2024) for the purposes of testing proposed business models[49]. The development of the stablecoins regime has taken place in parallel with the Hong Kong Government's exploration of a central bank digital currency (CBDC). This includes Project Ensemble, which was launched in March 2024 to explore innovative financial market infrastructure that facilitates interbank settlement of tokenized money through wholesale CBDC and involves a sandbox to test tokenization use cases that include, among other various use cases, settlement of tokenized real world assets.[50] This also includes exploring utilizing CBDC for wholesale cross-border payments. As part of Project mBridge, in which the HKMA has been working with the Bank for International Settlements Innovation Hub Hong Kong Centre, the Bank of Thailand, the Digital Currency Institute of the People's Bank of China, the Central Bank of the United Arab Emirates and the Saudi Central Bank, to develop a multi-central bank digital currency platform shared among participating central banks and commercial banks, built on DLT to enable instant cross-border payments and settlement. The first issuance announced under this scheme was in December 2024 by Zhuhai Huafa Group, an issuer incorporated in Greater China, which issued a 3-year 1.4 billion RMB-denominated digital bond.

In its March 2025 research paper on DLT in the financial sector, the HKMA communicated its intention to work closely with industry stakeholders and to provide clear supervisory guidance with the purpose of positioning Hong Kong "to lead the responsible integration of DLT within global capital markets"[51].

## Japan Update

A regulatory framework for transactions in respect of DLT-based Securities has been implemented in Japan.

For securities tokens, the Financial Instrument and Exchange Act of Japan ("**FIEA**") was amended in 2019 to regulate transactions of tokens representing securities in an attempt to facilitate capital formation in this manner while protecting investors. The amendment came into force in May 2020. Under the amendment to the FIEA, tokens representing (i) a conventional class of financial assets listed as “Type I Securities” under the FIEA (such as shares and bonds) or (ii) an interest in a collective investment scheme, would be deemed to be "securities".

For stablecoins, an amendment to the Japanese Payment Services Act, which aims to regulate digital money to be used for fund transfers and payments, including stablecoins, was made in June 2022 ("**2022 Amendment**"). The 2022 Amendment enables the use of legislatively permitted stablecoins in Japan. Permission to issue stablecoins in Japan is only granted to licensed banks, fund transfer agents, and trust companies. Immediately after the 2022 Amendment, only the issuance of stablecoins was regulated, and secondary market activities such as trading and exchanging issued stablecoins were not regulated. However, with the further amendment to the Japanese Payment Services Act, which was made in 2023 ("**2023 Amendment**"), the sale and purchase, exchange, intermediation of sale and purchase or exchange, and custody of stablecoins have also become subject to regulation under the Japanese Payment Services Act. In other words, with the 2023 Amendment, not only the issuance of stablecoins but also the secondary market activities of stablecoins has become regulated.

Furthermore, the revision of the Japanese Payment Services Act made in June 2025 ("**2025 Amendment**") has made three major changes regarding crypto-assets and stablecoins. These are: (i) giving the regulator the authority to order stablecoin operators and crypto-asset operators (collectively, "**Operators**") to hold assets in Japan in the event of their bankruptcy, (ii) relaxing of the administration and management of the underlying assets of trust-type stablecoins, and (iii) creation of intermediary services for cryptoasset and stablecoin transactions.

In relation to (i) above, it has become possible to prevent the outflow of assets overseas in order to ensure the return of assets to domestic users of the service of the Operators in the event of their bankruptcy. It was previously impossible to issue an order that required retention of assets in Japan in the event of the bankruptcy of the Operators, and this was criticized as a shortcoming of the law in protecting the interests of Japanese investors. It is now possible to issue such an order to the Operators at the time of their bankruptcy.

The 2025 Amendment is scheduled to take effect within one year from its enactment in June 2025.

49. HKMA inSight Article, "Stablecoin Issuer Sandbox", July 2024.
50. HKMA press release "HKMA unveils Project Ensemble to support the development of the Hong Kong tokenization market", March 2024.
51. Ms Carmen Chu, Executive Director (Banking Supervision) of the HKMA, quoted on page 5 of "Distributed Ledger Technology in the Financial Sector: A Study on the Opportunities and Challenges", March 2025.

## Singapore Update

Singapore continues to spearhead as a leading jurisdiction for the adoption and regulation of DLT in capital markets. The Monetary Authority of Singapore ("MAS") has taken a proactive approach, fostering innovation while maintaining robust regulatory standards to ensure market integrity and investor protection. Key initiatives include Project Guardian and Project Orchid, which explore asset tokenization and DeFi applications within a regulated framework, and possible use cases of a digital Singapore Dollar, respectively.

On digital money, MAS's position is "Yes to digital asset innovation, No to cryptocurrency speculation". MAS takes the view that "stablecoins – if well regulated – can potentially play a useful role as digital money alongside Central Bank Digital Currencies and tokenized bank liabilities." In August 2023, MAS announced key features of its new regulatory framework[52] for Singapore stablecoin issuance.[53] MAS's stablecoin regime will apply to single currency stablecoins ("**SCS**") pegged to the Singapore dollar (or any G10 currency) that are issued in Singapore. Whilst detailed regulations for its stablecoin regime have not taken effect, MAS encourages SCS issuers who would like their stablecoins recognized as "MAS regulated stablecoins" to make early preparations for compliance. During the Singapore FinTech Festival 2023, MAS announced in-principle approval under Singapore's Payment Services Act ("**PSA**") to three entities that already demonstrate compliance with MAS's upcoming detailed regulations.

MAS has also implemented AML/CFT requirements[54] and customer protection measures aimed specifically at digital payment token service providers, such as customer assets segregation and custody[55], prohibition over lending and staking retail customers' assets, business conduct measures, consumer eligibility controls and risk management of technology and cyber security issues.[56]

Following Project Orchid, MAS published the Orchid Blueprint[57] which sets out 4 key infrastructure components for introducing digital money infrastructure in Singapore: (i) settlement systems to facilitate transfer of value and ensure settlement finality; (ii) tokenization bridges to connect existing market infrastructure with token-based systems; (iii) programmability protocols to specify the conditions for the use of digital money and; (iv) a name service to translate complex wallet addresses to name identifiers that are easier for the average user to verify.

The publication of the Orchid Blueprint also came with the announcement that the Project Orchid digital money trials would be expanded, and that MAS would commence the development of CBDC for wholesale settlement, although updates on the latter have not been forthcoming.[58] MAS' position remains that it does not currently see a compelling case for retail CBDCs in Singapore.

MAS's Project Guardian explores the potential applications of asset tokenization and decentralized finance (DeFi)[59], focusing on how tokenization could be integrated into existing, conventional financial systems. The main benefits of DeFi identified in the project report include enhancing efficiency and transparency in the financial system as well as reducing operational complexity and costs. Project Guardian identified a three-stage evolution of tokenization, beginning with the tokenization of conventional funds, then of underlying assets in bespoke portfolios, finally culminating in tokenization of value flows using smart contracts for self-executing financial products. In January 2025 MAS launched the Global-Asia Digital Bond Grant Scheme to promote digital bonds issued using DLT by companies and non-bank financial institutions with an Asian nexus[60]. The bonds must be issued on a designated digital asset platform in Singapore and denominated in an Asian local or G3 currency, and the scheme will run until the end of 2029.

Singapore takes a technology agnostic approach to regulate DLT within the existing legislation framework. Most notably, the PSA regulates digital payment tokens used as forms of payment, the Securities and Futures Act ("**FSA**") regulates tokens that share the same features as securities or other capital markets products, and the Financial Services and Markets Act regulates virtual asset service providers established in Singapore that provide virtual asset services outside of Singapore to address regulatory gaps that are not otherwise regulated under the SFA or the PSA.

52. MAS Finalises Stablecoin Regulatory Framework.
53. Response to Public Consultation on Proposed Regulatory Approach for Stablecoin-related Activities, 15 August 2023.
54. Prevention of Money Laundering and Countering the Financing Of Terrorism – Holders Of Payment Services Licence (Digital Payment Token Service), 2 April 2024: **https://www.mas.gov.sg/-/media/mas-media-library/regulation/notices/amld/psn02-aml-cft-notice---digital-payment-token-service/notice-psn02-dated-2-april-2024.pdf**.
55. Response to Public Consultation on Proposed Regulatory Measures for Digital Payment Token Services (Part 1), 3 July 2023: **https://www.mas.gov.sg/-/media/mas/news-and-publications/consultation-papers/2023-consultation-paper-on-proposed-measures-on-market-integrity-in-dpt-services/consultation-paper-on-proposed-measures-on-market-integrity-in-dpt-services.pdf**.
56. Response to Public Consultation on Proposed Regulatory Measures for Digital Payment Token Services (Part 2), 23 November 2023: **https://www.mas.gov.sg/-/media/mas/news-and-publications/consultation-papers/2022-proposed-regulatory-measures-for-dpt-services/response-to-public-consultation-on-proposed-regulatory-measures-for-dpt-services-part-2-v2.pdf**.
57. Orchid Blueprint, November 2023: **https://www.mas.gov.sg/-/media/mas-media-library/development/fintech/project-orchid/orchid-blueprint-final.pdf**.
58. MAS Press Release, "MAS Lays Foundation for Safe and Innovative Use of Digital Money in Singapore", 16 November 2023: MAS Lays Foundation for Safe and Innovative Use of Digital Money in Singapore.
59. Project Guardian Funds Framework, November 2024, **https://www.mas.gov.sg/-/media/mas-media-library/development/fintech/guardian/guardian-funds-framework.pdf**.
60. Global-Asia Digital Bond Grant Scheme (G-ADBGS), 15 January 2025, **https://www.mas.gov.sg/schemes-and-initiatives/global-asia-digital-bond-grant-scheme**.

Singapore's regulatory landscape for the implementation of DLT in capital markets is characterized by a progressive, risk-based approach that balances innovation with robust investor protection and anti-money laundering safeguards, positioning the jurisdiction as a leading global hub for digital asset development and adoption

## UK Update

The UK Government has recognized the potential of digital assets and cryptoassets to contribute to economic growth, innovation and the UK's position as a global financial center. It has set the financial services sector, including DLT, at the heart of its plan for economic growth. The UK Government wants to see the UK become a global center for digital assets. There are many UK initiatives in train. As part of the UK Government's recent Mansion House 2025 announcements, it has reiterated and updated a number of the initiatives as well as adding new ones. For example, the package included announcing a Wholesale Financial Markets Digital Strategy[61].

**UK regulatory approach:** there has been a regulatory reset for UK financial services regulators. The UK Government's view is that post-financial crisis financial regulation went too far by seeking to eliminate risk-taking. The balance is now being reset, with a regulatory focus on growth, innovation and proportionate regulation. In addition, UK regulators have been given a secondary objective to facilitate international competitiveness and economic growth where they recognize the importance to creating an environment where innovation can flourish safely and where households, business and markets can reap the benefits[62].

**Digital Securities Sandbox (DSS):** the DSS is a live regulated environment created to explore how developing technologies can be used by firms in the financial sector. For example, the DSS will facilitate the issuance, trading and settlement of digital securities in the UK on distributed, programmable ledgers. There are proportionate guardrails and DSS activities will need to comply with UK regulation by the Financial Conduct Authority and the Bank of England. The DSS aims to facilitate innovation, protect financial stability and protect market integrity. The DSS is generally acknowledged as a progressive move by UK authorities. It has been designed so that participants can scale their businesses as they demonstrate regulatory compliance, and there will be the opportunity to transition to a new permanent regime if the technology is successful.

**Digitally native UK sovereign gilt (DIGIT):** the UK Government intends to launch a pilot digitally native sovereign gilt using Distributed Ledger Technology. Issuing a digitally native UK sovereign gilt is intended to complement existing DLT initiatives and support private sector innovation in digital asset platforms and securities. DIGIT will be issued on a platform within the DSS. It will be a real short-dated transferable security instrument, albeit experimental and separate from the UK's standard debt issuance processes. The Government wants DIGIT to encompass key-DLT features, for example on-chain settlement (including the cash leg) and interoperability. The Government is expected to select suppliers in relation to the DIGIT project in late summer 2025.

**Central Bank Digital Currency (CBDC):** CBDCs are digital currency backed by the full faith and credit of a central bank. In other words, a digital form of a country's fiat currency. The UK Government and the Bank of England are continuing their work exploring the possibility of a digital British Pound.

**Regulation:** the UK Government and UK regulators have published detailed proposals for creating a UK regulatory regime for cryptoassets and are in the process of implementing this plan. For example, cryptoassets are now within the UK's financial promotion regime. A detailed discussion and consultation process is underway, including cryptoasset admission and disclosure; market abuse rules; trading platform rules; and intermediation, lending and staking rules. In addition, a consultation and discussion process concerning a UK stablecoin regime is underway, encompassing rules in relation to backing assets, record-keeping, redemption, custody, segregation of assets and prudential rules. There will also be new UK regulated activities in relation to cryptoassets, including conduct rules, a complaints regime and the application of the consumer duty. The final rules are expected to be published, and the full framework to go live, in 2026. In addition to the ongoing FCA consultation on stablecoins, the Bank of England is expected to release a consultation on systemic stablecoins in the coming months. The Bank of England has provided an update on its plans for synchronised settlement and programme of experiments in wholesale payments[63]. The Bank of England has also recently clearly signaled its support for digitalization, saying that "[i]t is time to move away from talking about potential and one-off demonstrations of the technology, and for all of us to start working together to deliver a new generation of the financial system that is befitting of London's place as the heart of the global financial system[64]".

61. **Wholesale Financial Markets Digital Strategy - GOV.UK**.
62. **Innovation and regulation—striking the balance**, David Bailey (June 2025).
63. **https://www.bankofengland.co.uk/speech/2025/july/victoria-cleland-keynote-address-at-city-week-2025**.
64. **https://www.bankofengland.co.uk/speech/2025/july/sasha-mills-keynote-address-at-city-week-2025**.

There are shortcomings with the proposed regimes, for example the "qualifying cryptoasset" definition is not technology neutral, creates uncertainty and regulatory duplication. Finally, the Prudential Regulation Authority ("PRA") is expected to consult on the implementation of the BCBS's SCO60 in 2026.

**Reforming the law:** the Law Commission of England & Wales continues its work in relation to digital assets. For example, it recommended and drafted the Property (Digital Assets etc.) Bill, which is currently in the legislative process. If enacted the Bill would permit an additional third category of personal property rights. This would be in line with current English judicial thinking and overrule 19th Century case law which restricted English law to two categories. Recognizing the challenges that DLT poses for private international law (for example which jurisdiction's laws apply, and in which courts to litigate), the Law Commission is currently consulting on private international law reform in the context of digital assets and electronic trade documents. The UK Government has committed to providing legal clarity where it is needed, while acknowledging that English and Welsh law should broadly be able to accommodate DLT already.

**UK Jurisdiction Taskforce of LawtechUK (UKJT):** the UKJT aims to provide market confidence and legal certainty in the digital space by issuing Legal Statements (although they are not legally binding). A Second Legal Statement in 2023, amongst other things, concluded that blockchain or DLT could facilitate the issue and transfer of digital bonds in a variety of forms (bearer, registered and indirect). LawtechUK has also established the International Jurisdiction Taskforce (IJT). The IJT is an independent panel bringing together legal experts from the most widely used private law systems worldwide (including the UK, USA, France, Singapore, the EU, Australia, and Japan). Its objective is to present proposals to reduce the international legal barriers to the use and development of novel digital asset technology, including blockchain and smart contracts.

## US Update

During 2025, the U.S. has made significant progress towards fostering a regulatory environment that supports banks, broker-dealers, investment advisers and other financial institutions seeking to engage with crypto-assets and DLT. The combined effect of agency guidance, rule rescissions, targeted proposals, executive orders,[65] and congressional bills suggests the beginning of a more navigable environment for institutions seeking to engage in crypto-asset related activities and increased clarity around key activities, from custody and trading to tokenization of securities and payment stablecoins.

Most recently, on July 30, the President's Working Group on Digital Assets released a report entitled "Strengthening American Leadership in Digital Financial Technology."[66] The report provides an overview of, and makes policy recommendations concerning, a myriad of topics including, but not limited to: (i) digital asset market structure, (ii) banking and digital assets, (iii) stablecoins and payments, (iv) countering illicit finance, and (v) taxation.

In early 2025, the three federal banking regulators each took steps to clarify their position on permissible crypto-asset activities. In January, the FDIC stated that insured institutions do not need to seek prior FDIC approval to engage in crypto-related services, but as with other activities, must be able to demonstrate sound risk management across market, liquidity, operational, and compliance dimensions.[67] In March, the Office of the Comptroller of the Currency ("OCC") issued guidance reaffirming that national banks and federal savings associations may custody and transfer digital assets under existing statutes without new prohibitions.[68,69] The Federal Reserve followed suit, issuing guidance signaling that supervision will now occur through its routine processes as opposed to a specialized supervisory regime.[70]

Regulatory accounting treatment, previously a major deterrent to banks' engagement in cryptoasset activities, has also undergone a momentous change. SAB 121, which had forced banks and broker-dealers to record client crypto-assets as a liability on their balance sheets at fair value with an offsetting asset in the same amount, was rescinded by the SEC and replaced with SAB 122 in January 2025.[71] This change removed a substantial capital-management obstacle for banks subject to BCBS capital requirements and aligned crypto-asset accounting more closely with practices for traditional custody assets. Meanwhile the SEC withdrew its 2023 proposal to expand the custody rule for investment advisers, stating that the Commission may revisit the issue via a new proposal at a later date.[72]

65. See **https://www.whitehouse.gov/presidential-actions/2025/01/strengthening-american-leadership-in-digital-financial-technology/**.
66. See **https://www.whitehouse.gov/wp-content/uploads/2025/07/Digital-Assets-Report-EO14178.pdf**.
67. This replaced prior restrictive guidance issued by the FDIC. See **https://www.fdic.gov/news/financial-institution-letters/2025/fdic-clarifies-process-banks-engage-crypto-related**.
68. This guidance replaced earlier OCC bulletins as well as two interagency statements on crypto risks published jointly by the OCC, FDIC and FRB. *See* **https://www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2025/int1183.pdf**.
69. This guidance has spurred activity in this space, with several market participants, including Ripple and Circle, applying for OCC trust charters. See **https://www.reuters.com/business/finance/ripple-applies-us-national-bank-charter-crypto-eyes-next-frontier-2025-07-02/**, and **https://www.reuters.com/sustainability/boards-policy-regulation/circle-applies-us-trust-bank-license-after-bumper-ipo-2025-06-30/**.
70. The FRB also withdrew previous guidance to the contrary. See **https://www.federalreserve.gov/newsevents/pressreleases/bcreg20250424a.htm**.
71. See **https://www.sec.gov/rules-regulations/staff-guidance/staff-accounting-bulletins/staff-accounting-bulletin-122**.
72. See, Commissioner Mark T. Uyeda, Remarks at the Crypto Task Force Roundtable on Custody (Apr. 25, 2025), *available at* **https://www.sec.gov/newsroom/speeches-statements/uyeda-remarks-crypto-task-force-roundtable-custody-042525**.

The SEC has been active on multiple other fronts. In April 2025, the SEC's Division of Corporation Finance issued a statement on disclosure requirements for crypto-asset offerings and registrations, emphasizing that all filings must be tailored, clear, and consistent with public materials, addressing business stage, risk factors, and token characteristics.[73] The SEC's Division of Trading and Markets released a May 2025 FAQ making explicit that registered transfer agents may use a permissioned distributed ledger as their official master securityholder file, without duplicate off-chain records, so long as they meet all Exchange Act recordkeeping and operational standards and providing additional guidance on the treatment of digital assets for broker-dealer net capital and customer protection rule purposes.[74] We discuss relevant updates to SEC guidance, in more detail below.

Relatedly, the SEC established a Crypto Task Force, which, among other actions, has requested input on changes to the current regulatory framework and proposed a new exemptive "sandbox" order under Section 36 of the Exchange Act. Commissioners have indicated the SEC is considering rulemaking to create a bespoke trading-venue category for tokenized securities, while the conditional exemptive order would grant limited relief from broker-dealer, exchange, and clearing-agency registration in order to pilot DLT market infrastructure in real-world settings.[75]

There has been substantial activity on Capitol Hill with respect to major digital asset regulation. The GENIUS Act[76] has been signed into law, establishing federal licensing and prudential requirements, capital, liquidity, governance, and reserve standards, for payment stablecoins, with slight differences on treatment of foreign issuers, transition timelines, and bank capital backstops. Legislative attention has shifted to digital asset market structure following the passage of the GENIUS Act, with two draft bills currently under consideration. On July 17, 2025, the CLARITY Act[77] was passed in the House by a vote of 294-134. The CLARITY Act would establish a regulatory framework for digital asset market structures and delineate between the Commodity Futures Trading Commission ("**CFTC**") and the SEC as it relates to regulatory authority over digital assets. On July 22, 2025, Senate Banking Chairman Tim Scott and Senators Cynthia Lummis, Bill Hagerty and Bernie Moreno released a discussion draft of digital asset market structure legislation, building upon the concepts established in the CLARITY Act along with a request for information.

While significant progress is being made to support DLT more generally, that support does not extend to retail CBDCs. The proposed CBDC Anti-Surveillance State Act of 2024,[78] which recently in the U.S. House during the previous legislative session, would prohibit the Federal Reserve from issuing a retail digital dollar absent congressional authority or using a retail CBDC to implement monetary policy.[79,80]

Securitization and bond tokenization have also moved into production. DTCC and Digital Assets have launched a pilot of tokenized U.S. Treasury collateral,[81] while private-sector players, including INX, have completed SEC-registered offerings of security tokens.[82] Meanwhile, Franklin Templeton's OnChain U.S. Government Money Fund (FOBXX) and UBS's uMINT money-market fund on Ethereum and Polygon represent advancements in money market and mutual funds offerings.

Together, these developments constitute a sea-change in the U.S. regulatory approach: from categorical prohibitions and punitive accounting rules to nuanced, risk-based frameworks that encourage banks and intermediaries to innovate responsibly. While some further legislative action remains pending, agencies have demonstrated a clear willingness to update longstanding rules, provide targeted relief, and explore interim approaches, all laying the groundwork for broader adoption of tokenization, crypto custody, and DLT-enabled financial services within the existing legal perimeter.

73. See, SEC Division of Corporate Finance, Offerings and Registrations of Securities in the Crypto Asset Markets (April 10, 2025), *available at* **https://www.sec.gov/newsroom/speeches-statements/cf-crypto-securities-041025**.
74. See, SEC, Division of Trading and Markets: Frequently Asked Questions Relating to Crypto Asset Activities and Distributed Ledger Technology, *available at* **https://www.sec.gov/rules-regulations/staff-guidance/trading-markets-frequently-asked-questions/frequently-asked-questions-relating-crypto-asset-activities-distributed-ledger-technology**.
75. More recently, on June 12, 2025, included as part of a larger withdrawal of fourteen proposals, the SEC withdrew several rule proposals related to crypto-assets and DLT issued by the prior administration, confirming that any future rulemaking on these topics will begin with a new rule proposal and a fresh opportunity for public comment. See, SEC Commissioner Hester M. Peirce, A Creative and Cooperative Balancing Act (May 8, 2025), *available at* https://**www.sec.gov/newsroom/speeches-statements/peirce-iismgd-050825**; see also SEC Chairman Paul S. Atkins, Remarks at the Crypto Task Force Roundtable on Decentralized Finance (Jun. 9, 2025), *available at* **https://www.sec.gov/newsroom/speeches-statements/atkins-remarks-defi-roundtable-060925**.
76. See **https://www.congress.gov/bill/119th-congress/senate-bill/1582**.
77. See **https://www.congress.gov/bill/119th-congress/house-bill/3633**.
78. See **https://financialservices.house.gov/news/documentsingle.aspx?DocumentID=409278&**.
79. The Executive Order issued by the Trump Administration also discusses the potential risks posed by CBDCs. Supra note 65.
80. The report published by the Presidential Working Group on Digital Assets also recommends that no CBDC be established, issued or promoted in the United States or abroad. Supra note 66 at page 151.
81. See **https://www.prnewswire.com/news-releases/dtcc-and-digital-asset-complete-successful-pilot-to-test-collateral-and-margin-optimization-through-tokenization-302255589.html**.
82. See Inx Limited, Prospectus Supplement, *available at* **https://www.sec.gov/Archives/edgar/data/1725882/000121390020023202/ea125858-424b1_inxlimited.htm**.

## Legal and Regulatory Recommendations: Progress, But More to be Done Soon

Development of DLT-based finance continues apace. Reform of legislation and regulation needs to catch up, and keep the pace, with these market developments.

(**1**) **Legislative and Regulatory Constraints:** The law and regulation of TradFi has developed over hundreds of years and may operate in a way which is incompatible with DLT technology. Legislation and regulation should be technology agnostic based on "same activity, same risk, same regulatory outcome".

For example:

a. A clear advantage of a DLT blockchain is its ability to keep immutable and dematerialized records. Under EU law (the Central Securities Depositories Regulation (**CSDR**)) it is a requirement that for a security to be traded on a trading venue (an exchange or a multilateral system) it must be recorded in book-entry form in a centralized securities depository (**CSD**)[83]. Whilst these obligations do not actually *prohibit* the issuance of DLT-based financial instruments they are a fetter on DLT's development and the ability to harness its many advantages including the development of a secondary market.

b. The BCBS's rule SCO60 -(cryptoasset exposures) is fundamentally inconsistent with the principle of technology neutrality. Amongst other things, there is a disproportionate prudential charge for certain cryptoasset exposures and it does not take into account the growing adoption, customer demand or the true underlying risk associated with many digital assets.

c. The UK has set up its own digital securities regulatory 'sandbox' to encourage DLT development. The UK Government is using the UK's digital securities sandbox for its much-anticipated sovereign digital gilt (known as 'DIGIT').

d. The EU Pilot Regime addresses regulatory barriers that hinder the use of DLT in financial market infrastructures by allowing certain DLT market infrastructures to apply for temporary exemptions from certain requirements of existing EU financial services legislation.

e. Regulators in Hong Kong have established various sandboxes to encourage the adoption of DLT, including in September 2016, the Hong Kong Monetary Authority's "FinTech Supervisory Sandbox", and in January 2025, its “Supervisory Incubator for Distributed Ledger Technology”, with the purpose of helping banks responsibly unlock the transformative potential of DLT.[84]

f. The Hong Kong Government has specifically committed to adopting the “same activity, same risk, same regulatory outcome” principle in the context of virtual assets with the intention that virtual asset innovations can thrive in Hong Kong.[85]

g. In the context of its path-finding digital bond issuance, the Hong Kong Monetary Authority has acknowledged that digitalizing paper processes currently used in bond issuances can enhance efficiency gains, but it also acknowledges that it may take time for the industry to replace existing market practices and conventions which have been in place for decades, and that the legal and regulatory framework may also need to be fine-tuned to fully digitalize these processes.[86]

**Act Now:** There should be a technology-neutral level playing field for financial services based on "same activity, same risk, same regulatory outcome". Where this is not the case and/or there are unintended consequences of existing TradFi legislation, this should be addressed as a matter of priority. We welcome the initiatives taken by governments to promote DLT development and lead by example.

(**2**) **Legal Uncertainty:** DLT-based financial services manifest novel concepts which in many cases do not have a developed legal interpretation.

83. For further information, see AFME's June 2025 submission to the European Commission's Consultation document: Targeted consultation on integration of EU capital markets.
84. **https://www.hkma.gov.hk/eng/news-and-media/press-releases/2025/01/20250108-3/**.
85. See paragraph 4 of **https://gia.info.gov.hk/general/202210/31/P2022103000454_404805_1_1667173469522.pdf**.
86. See paragraph 68 of **https://www.hkma.gov.hk/media/eng/doc/key-information/press-release/2023/20230824e3a1.pdf**.

For example:

a. Ownership rights are the most basic, and yet most fundamental, attribute of a financial asset. Until very recently there was legal uncertainty in some jurisdictions about whether assets manifested on blockchain could constitute personal property. It now seems to be beyond doubt that most of the major common law jurisdictions recognize blockchain assets as personal property rights[87].

b. As a related point, in England the Property (Digital Assets etc) Bill is currently in the legislative process. If enacted it will permit a 'third category' of personal property rights, confirming current judicial thinking on cryptoasset ownership and overruling 19th Century English case law, which has historically recognized two categories.

c. Parts of EU legislation (for example the EU's Settlement Finality Directive, Financial Collateral Directive and CSDR) do not contemplate DLT-based concepts and/ or fetter the use of DLT. These points are explained in more detail in AFME's June 2025 submission and ISDA's June 2025 submission[88] to the European Commission's Consultation document: Targeted consultation on integration of EU capital markets.[89]

d. The Hong Kong Government has similarly acknowledged that virtual assets "h*ave unique characteristics different from traditional assets, and their features may not fit squarely into the current private property law categories or definitions in Hong Kong*". In response, the Government has indicated an openness to a future review on property rights for tokenized assets and the legality of smart contracts, in order to provide a legal foundation for their development.[90]

**Cross-functional Collaboration:** We invite legislators and regulators to engage in a dialogue with each other and market participants to find appropriate and workable fixes for these legislative and regulatory issues so that the full social and economic benefits of DLT can be realized.

(**3**) **Remove Legal Frictions & Reduce Regulatory Arbitrage:** DLT is by its nature "everywhere and nowhere" and in many respects knows no borders. For this reason some participants may seek to minimize their compliance obligations using regulatory arbitrage and/ or by establishing in jurisdictions with less (or no) regulation. We believe that an international level playing field for DLT has many advantages. Ideally there would be coordinated and broadly equivalent international legislation and regulation.

For example, as currently drafted, we do not believe that the BCBS's SCO60 (prudential treatment of cryptoasset exposures) achieves a level playing field because it discourages the use of permissioned public and permissionless public blockchains by large traditional financial institutions. This will also have the effect of hampering the crucial development of DLT interoperability. In contrast, for example, the EU's MiCA is DLT technology agnostic. And the UK's Financial Conduct Authority recent consultation paper (**CP25/14**) is also DLT technology agnostic provided that the DLT risks are adequately addressed.

**Growing Risk of Market Fragmentation:** we Joint Trades emphasize that a level playing for DLT legislation and regulation will reduce legal frictions and regulatory arbitrage. We encourage the G20 and G7, global standard setters and regional legislators and regulators to ensure coordinated and broadly equivalent international legislation and regulation to support financial stability, resilience in the global ecosystem, as well as growth and competition to serve end users globally.

We strongly advocate:

i. that finance ministers, legislators and regulators globally to go **further and faster** to harness the social and economic benefits of DLT; and

ii. for international cooperation and consensus to ensure as much as possible a level playing field and to reduce regulatory arbitrage which could force participants offshore and/or encourage unregulated participants.

87. See for example England, Singapore, Hong Kong and Australia.
88. ISDA Response to European Commission Consultation on Integration of EU Capital Markets – International Swaps and Derivatives Association.
89. ISDA Response to European Commission Consultation on Integration of EU Capital Markets – International Swaps and Derivatives Association.
90. See paragraph 8 of **https://gia.info.gov.hk/general/202210/31/P2022103000454_404805_1_1667173469522.pdf**.

# TOKENIZATION IS READY TO SCALE – THE TIME TO ACT IS NOW

The value proposition of tokenization in global capital markets – efficiency, transparency, and new market opportunities across the trade lifecycle – has been validated through concrete use cases and quantifiable benefits, dispelling doubts about whether the gains are real. A vision of the future market structure is coming into focus, one that marries the strengths of traditional finance (banks and regulated entities) with the innovation of digital natives and FinTechs, creating a richer and more resilient ecosystem than either could achieve alone. And critically, the risk question – often cited as the chief barrier – is being answered: through advanced technology safeguards and thoughtful regulation, tokenized markets are meeting the high bar of safety, soundness, and compliance required for broad institutional trust.

To accelerate ecosystem maturity, the following **calls to action** are directed at mobilizing public and private stakeholders towards meaningful and sustainable progress. Governments establishing a pro-innovation mandate to foster growth and competition, and market integrity, while protecting clients, investors and end users, sends the necessary signal for the private sector to unlock investment to deliver enhancements for the ecosystem. **While public policy and regulatory clarity remain crucial enablers, this roadmap prioritizes actions that can be taken now, unilaterally or in collaboration with peers, to build sustainable momentum and unlock value:**

**1 | Accelerate Market Development in High-Potential Asset Classes:** To accelerate tokenization, the industry is currently prioritizing high-impact asset classes such as private credit, and money market funds. Building scalable infrastructure, enabling broad investor access, and embedding programmability into design will drive market depth. Regulatory enablement and support for innovation, including tokenized instruments in existing frameworks and public-sector issuance can catalyze cross-border adoption and unlock institutional-grade liquidity at scale.

**2 | Clarify Legal Foundations and Align Regulatory Treatment:** To unlock the full potential of tokenized capital markets globally, further timely action is needed to establish clear, consistent legal frameworks. With coordinated regulatory reform and industry coordination, tokenized instruments can achieve legal certainty, enabling cross-border adoption, improving market confidence, and accelerating institutional-scale deployment.

**3 | Establish Interoperability to Prevent Market Fragmentation:** To realize the full benefits of tokenization, interoperability must be prioritized. Industry, in collaboration with regulators, should align on common data models, smart contract standards, and messaging protocols. By embedding interoperability into infrastructure design and regulatory frameworks, we can reduce fragmentation, lower integration costs, and unlock scalable, cross-platform market connectivity. The building blocks for this coordination already exist, now is the time to act.

**4 | Address Technical and Operational Integration Gaps:** To enable institutional adoption, DLT platforms must meet high operational and security standards. Industry should identify minimum requirements for wallet custody, smart contract governance, and system integration in a manner consistent with appropriate regulatory standards. With robust frameworks, auditability, and standardized APIs, institutions can safely scale tokenization while aligning with existing operational and regulatory practices. Investment now will ensure secure and seamless future deployment.

**5 | Enable Scalable Settlement with Tokenized Money and Stable Payment Instruments:** To unlock the full benefits of tokenized markets, scalable on-chain settlement with DLT-based Payment Instruments is essential. Industry should integrate tokenized deposits and stablecoins into settlement workflows, enabling atomic DvP and programmable payments. Regulatory clarity and interoperability with central bank systems will ensure secure, efficient, and continuous settlement across digital and traditional rails.

**6 | Foster Public-Private Coordination:** To scale tokenized markets, public and private sectors must align on institutional use of DLT infrastructure in such cases of custody, identity, compliance, and settlement. Industry should adopt open, collaborative models and support joint pilots. Policymakers can accelerate progress by harmonizing cross-border legal standards to foster funding of critical infrastructure.

It is now incumbent upon leaders in both the public and private sectors to **act**, to update the rules, modernize the operations, and embrace the opportunities of tokenization, thereby ushering in a new era of finance that is fit for the digital age.

**Report Overview:** The full report that follows provides a granular, bottom-up analysis across the topics explored in the Executive Summary. This includes a detailed overview of DLT, including the infrastructure and the digital assets represented on this infrastructure, a phase-by-phase impact assessment across the securities lifecycle, an exploration of live use cases, legal and regulatory considerations and recommendations, and barriers to adoption. To close the report, joint trades and members present critical calls to action from market participants to drive progress towards network effects, working in dialogue across key areas. For regulators, it could help inform efforts around emerging legal and regulatory frameworks, with a view to protecting markets and promoting innovation. For industry, it provides detailed potential areas for further dialogue to accelerate ongoing research and development.

As an overarching guiding principle, legal and regulatory frameworks should be designed in line with the "same activity, same risk, same regulatory outcome" and "technology-neutral" risk-based guiding principles that support, rather than deter, industry innovation and adoption. Joint trades and members underline the importance for all market participants to contribute toward ongoing research and development of DLT, and the representation of regulated financial instruments and payment instruments on this infrastructure. Punitive penalties for the use of a particular technology, without clearly defined risk-based justification, could be detrimental to innovation in the market and have unintended consequences on the evolution of a future DLT-based market structure within the regulatory perimeter.

As shown through this report, there are critical enabling steps required to drive the next stage of development toward a DLT ecosystem in capital markets. The current DLT-based ecosystem is primed for future growth. Primary and secondary markets are beginning to reach critical mass in select asset classes and product types. **At this transitional stage, all market stakeholders should come together and proactively shape the ecosystem across the core components as identified in this report.**

The recommendations are designed to mobilize the full spectrum of market participants toward the successful scaling of a DLT ecosystem in capital markets. While public policy and regulatory clarity remain crucial enablers, this roadmap prioritizes clear industry commitments—actions that can be taken now, unilaterally or in collaboration with peers, to build momentum and unlock value.

In **Chapter 5**, each recommendation outlines:

- **Industry Actions:** Specific steps that market participants can commit to, including suggested timelines, partnerships, and shared infrastructure initiatives.
- **Policy Enablers:** Legislative, regulatory, or supervisory adjustments that could accelerate or amplify the effectiveness of planned industry actions but are not prerequisites for industry progress.

This structure ensures that each recommendation begins with the industry's path forward, and identifies where public sector alignment can reduce friction, improve coordination, or enhance scalability.

***The Joint Trades and their members stand ready to work closely with policymakers globally.***

# Reccommendations And Calls To Action

***These recommendations have been developed with the common goal of establishing network effects, governed by clear legal, regulatory, and risk management frameworks that ensure safe and secure innovation. They are each accompanied by specific calls to action, intended as practical next steps to deliver on the benefits of innovation.***

The current DLT-based ecosystem is primed for future growth. Primary and secondary markets are beginning to reach critical mass in select asset classes and product types. **At this transitional stage, all market stakeholders should come together and proactively shape the ecosystem across the core components as identified in this report.**

The following recommendations are designed to mobilize the full spectrum of market participants toward the successful scaling of a DLT ecosystem in capital markets. While public policy and regulatory clarity remain crucial enablers, this roadmap prioritizes clear industry commitments, actions that can be taken now, unilaterally or in collaboration with peers, to build momentum and unlock value.

Each recommendation begins with the industry's path forward, and identifies where public sector alignment can reduce friction, improve coordination, or enhance scalability. A foundational policy enabler for financial services activities serving clients globally will be timely determinations under local cross-border regimes, including principles-based comparability assessments of supervisory and regulatory regimes to support cross-border liquidity and growth.

## RECOMMENDATION 1: ACCELERATE MARKET DEVELOPMENT IN HIGH-POTENTIAL ASSET CLASSES

Tokenization is most impactful where traditional frictions—cost, latency, or access barriers—are highest. These include private credit, structured bonds, real estate, and money market funds. Early market activity supports this: tokenized MMF AUM grew from ~$600M USD to over $5B in AUM in ~18 months. Yet secondary market activity remains shallow, and issuance often depends on bilateral placements. To scale, liquidity must be pooled, and infrastructure must be institutional-grade.

**Call to Action | Prioritize tokenization efforts on asset classes such as those with high operational inefficiencies and market readiness and build scalable issuance and trading infrastructure.**

**Key Near-Term Industry Recommendations:**

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| Form consortia to support common issuance, trading, and servicing platforms for tokenized assets—especially in real estate, structured credit, and short-duration bonds. |
| Embed fractionalization and programmability into token design where appropriate to broaden access and enable composability across platforms and portfolios. |
| Prioritize infrastructure development, particularly through the adoption of standardized models, to support the scaling of tokenization in use cases such as collateral and repo. |
| Collaborate with market makers and index providers to define benchmarks, pricing feeds, and risk parameters for tokenized versions of traditional assets. |

**Policy Enablers:**

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| Enable tokenized funds, bonds, and credit products to operate under existing investment rules, including eligibility for regulatory portfolios, bank liquidity coverage, and solvency frameworks. |
| Expand the scope of public-sector digital issuances, including sovereign bonds and development finance instruments, to catalyze adoption and market infrastructure. |
| Facilitate the use of tokenized instruments as collateral in repo, margin, and central bank operations, subject to risk-based criteria. |

## RECOMMENDATION 2: CLARIFY LEGAL FOUNDATIONS AND ALIGN REGULATORY TREATMENT

Legal uncertainty is one of the most cited barriers to scaling tokenized capital markets. Many jurisdictions still lack statutory recognition of tokenized securities, enforceability of smart contracts, or clear legal frameworks for DLT-based settlement finality. This undermines market confidence and prevents global interoperability. For instance, even where tokenized bonds have been successfully issued, limitations on legal transfer or settlement finality have confined them to private placements or pilot regimes. Legal uncertainty also arises from the divergence between operational control (i.e. possession of private keys or rights to invoke smart contracts) and legal ownership. Without a common legal understanding, cross-border issuance and custody remain legally risky and operationally complex. Divergences in how permissioned and permissionless blockchains are treated, especially in prudential frameworks, further exacerbate regulatory fragmentation and arbitrage risk.

**Call to Action | Establish clear and consistent legal and regulatory frameworks for tokenized financial instruments, focusing on asset classification, settlement finality, contract enforceability, consumer protection, and cross-border recognition.**

**Key Near-Term Industry Recommendations:**

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| Conduct legal mapping exercises to benchmark how tokenized instruments are treated across major jurisdictions, identifying inconsistencies in settlement law, bankruptcy treatment, and enforceability. |
| Develop and promote adoption of standard legal documentation for tokenized bonds, funds, and structured instruments, covering smart contract terms, ownership, and disclosure. |
| Partner with legal institutions and industry groups to define baseline legal principles (e.g., digital bearer vs. registered form) that support industry-wide confidence in DLT-based issuance |
| Introduce market practices consistent with the baseline legal principles supporting DLT-based issuance to demonstrate their practical applications in real world use cases. |
| Develop financial literacy initiatives to equip market participants with the knowledge required to navigate tokenized financial markets responsibly. |

**Policy Enablers:**

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| Publish guidance and interpretations, and grant targeted exemptions, to support the introduction of principles-based market practices supporting DLT-based issuance when permitted by the applicable regulatory framework in each jurisdiction |
| Amend national securities laws to explicitly recognize digital tokens as valid representations of financial instruments and to establish rules governing their issuance, transfer, and custody. |
| Clarify the application of settlement finality frameworks to DLT-based systems, including permissionless networks where risk controls and validator governance are robust. |
| Specifically for collateral use cases, ensure there is regulatory certainty regarding the use of tokenized and digital assets for uncleared margin and CCP margin, reducing any global disharmonization issues. |

## RECOMMENDATION 3: ESTABLISH INTEROPERABILITY TO PREVENT MARKET FRAGMENTATION

DLT platforms are proliferating, but most operate in isolation. Interoperability is not just a technical challenge—it is a strategic imperative. DLT networks must be enabled to seamlessly communicate between each other but also with legacy financial market infrastructures and regulatory systems. Without common standards for identity, smart contracts, and messaging, market liquidity remains fragmented, and infrastructure integration is prohibitively expensive. For example, tokenized settlement frequently requires reconciliation with multiple ledgers and custodians. Without shared protocols and compliance layers, the network benefits of tokenization will not materialize. The Common Domain Model is a shared canonical representation of trade data and event logic. Cross-chain solutions that do not share trade lifecycle semantics may entrench fragmentation at a deeper level than infrastructure alone.

**Call to Action | Design and promote adoption of interoperability standards that enable DLT networks, traditional systems, and regulatory infrastructure to communicate securely and efficiently.**

**Key Near-Term Industry Recommendations:**

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| Standardize smart contract (using the Common Domain Model as a standardized data model) interfaces and templates to support cross-platform execution and reduce custom development costs for each asset class. |
| Implement shared and non-proprietary data and messaging protocols (e.g., ISO 20022, ERC-3643, ERC-1400) for token creation, asset servicing, and event reporting. Further develop and adopt the Common Domain Model industry-wide to align contractual logic, data lineage, and state transitions across chains. |
| Build secure cross-chain bridges with governance and audit controls that enable token transfers and asset recognition across DLT ecosystems |

**Policy Enablers:**

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| Mandate or endorse minimum interoperability standards, including the Common Domain Model, for tokenized financial instruments as part of regulatory licensing for market infrastructure providers |
| Coordinate with international standard-setters to align on cross-border data models, smart contract audit standards, and identity frameworks. |
| Incorporate interoperability testing as a standard feature to validate that new DLT systems can integrate with legacy FMIs and public infrastructures. |

## RECOMMENDATION 4: ADDRESS TECHNICAL AND OPERATIONAL INTEGRATION GAPS

DLT platforms often lack the controls and integrations needed to meet the operational standards of regulated institutions. Key concerns include wallet management, smart contract governance, auditability, and data reconciliation. Moreover, legacy systems struggle to interface with DLT-based infrastructure without costly middleware or duplicated processes.

**Call to Action | Establish secure, modular frameworks for wallet custody, contract execution, and systems integration that meet regulatory and institutional-grade standards.**

**Key Near-Term Industry Recommendations:**

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| Define minimum standards for key management and custody, including support for multi-party computation (MPC), multi-signature protocols, and private key recovery. |
| Adopt formal verification and third-party audit frameworks for smart contract deployment, including fallback mechanisms and kill switches. |
| Develop modular APIs and reconciliation tools to synchronize tokenized asset records with enterprise systems (e.g., general ledger, risk engine, reporting tools). |
| Build systems and operational models leveraging the Common Domain Model. |

**Policy Enablers:**

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| Publish Good Practices for DLT operational resilience, including wallet security, system integrity, and oversight of smart contract execution. |
| Address how DLT-specific risks can be addressed by existing cyber risk, outsourcing, and operational risk guidelines. |
| Support pilots that allow financial institutions to validate DLT integrations before production deployment. |

## RECOMMENDATION 5: ENABLE SCALABLE SETTLEMENT WITH TOKENIZED MONEY AND STABLE PAYMENT INSTRUMENTS

DLT-based Securities cannot achieve full efficiency without DLT-native Payment Instruments. Today, most tokenized transactions are settled via off-chain systems, reintroducing manual processes and counterparty risk. Regulated tokenized deposits and stablecoins offer programmable, precision settlement, enabling potential for instant Delivery versus Payment (DvP). Despite this momentum, tokenized deposit and stablecoin use remains constrained by cross-border legal ambiguity driving infrastructure fragmentation.

**Call to Action | Support adoption of tokenized Payment Instruments for wholesale settlement and ensure their integration with securities platforms and traditional payment infrastructure.**

**Key Near-Term Industry Recommendations:**

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| Integrate tokenized cash instruments such as tokenized deposits and stablecoins into settlement workflows for repo, corporate bonds, and MMFs to enable atomic DvP. |
| Design programmable settlement logic (e.g., conditional release, escrow, T+0) using smart contracts tied to regulated stablecoins or tokenized deposits, leveraging the Common Domain Model work already underway to develop a unified model for representing tokenized securities and cash instruments for both the legal foundation and functionality of the smart contract and the asset attributes. |
| Collaborate on interoperable frameworks linking DLT-based settlement systems with traditional RTGS platforms and cross-border networks. |

**Policy Enablers:**

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| Provide legal certainty and licensing frameworks for fiat-backed tokenized deposits and fiat-backed stablecoins, including requirements for redemption, reserves, and supervision. |
| Facilitate interoperability with central bank settlement systems, including through omnibus accounts or wholesale central bank money. Encourage central bank settlement systems to use the Common Domain Model. |
| Incorporate tokenized Payment Instruments into financial stability frameworks, recognizing them as legitimate payment rails subject to appropriate controls. |

# RECOMMENDATION 6: FOSTER PUBLIC-PRIVATE COORDINATION

Siloed development of tokenization platforms is repeating legacy fragmentation. Without coordinated approaches to infrastructure – across custody, identity, and compliance – scalability and trust will be limited. Public-private coordination has already proven effective: tokenized green bonds, central bank pilots, and stablecoin networks have benefited from early policy engagement. But broader alignment is needed to avoid duplicative systems, ensure regulatory compliance, and accelerate network effects. The next phase must prioritize shared development and joint progress.

**Call to Action | Coordinate across public and private sectors to design interoperable frameworks, define technical and legal standards, and build a foundation for globally interoperable tokenized markets.**

**Key Near-Term Industry Recommendations:**

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| Contribute to shared infrastructure, where necessary, layers for compliance, identity, custody, and settlement that are vendor-neutral and open to promote the development of interoperable markets. |
| Adopt governance models that balance competition and collaboration, such as consortium-led issuance hubs, regulated networks, and shared utilities. |
| Support early public-private pilots, with transparent objectives, performance metrics, and scalability plans. |

**Policy Enablers:**

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| Lead cross-jurisdictional efforts to facilitate timely determinations under recognition regimes, including for settlement finality, custody, and asset classification. |
| Fund or facilitate critical infrastructure components needed to meet regulatory objectives, such as transaction reporting and compliance registries. |
| Create public-private advisory forums – beyond pilot regimes—to facilitate dialogue and further support the development of tokenized market infrastructure, drawing lessons from global regulatory colleges and FMI oversight forums. |

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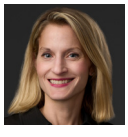

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