

From Concept to On-Chain

*An Institutional Playbook for Tokenization Structuring,
Governance, and Lifecycle Management*

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Abstract

This paper examines the tokenization of real-world assets (RWAs) through an institutional lens, arguing that the primary constraints on adoption are structural rather than technological. While distributed ledger technology (DLT) has made it feasible to represent ownership, transfer value, and automate execution on-chain, institutional viability is determined by legal enforceability, governance design, lifecycle management, and integration with existing financial systems.

The analysis is organized as a lifecycle playbook, covering asset selection, legal structuring, governance design, issuance, servicing, and secondary market behavior. Across each stage, the paper identifies recurring failure modes that prevent tokenization initiatives from moving beyond pilot environments, including weak legal anchoring, undefined authority structures, insufficient servicing infrastructure, and misaligned liquidity assumptions.

Drawing on examples from tokenized funds, private credit, and infrastructure, as well as regulatory developments in Singapore, United States, Hong Kong, and Abu Dhabi, the paper shows that institutional adoption is converging toward models that embed tokenization within existing legal and regulatory frameworks rather than replacing them.

The central conclusion is that tokenization should be understood not as a technological innovation, but as an extension of financial market infrastructure. Systems that prioritize governance, enforceability, and lifecycle management are more likely to achieve institutional scale, while those that focus primarily on on-chain execution remain confined to experimental use cases.

Keywords: tokenization; real world assets (RWA); institutional finance; financial market infrastructure; governance; distributed ledger technology (DLT); digital assets; asset management; capital markets; regulatory frameworks

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1. Introduction: Tokenization as an Implementation Problem

Tokenization of real-world assets is frequently framed as a technological milestone. In institutional settings, the binding constraints are structural, not technical. Advances in blockchain systems, smart contracts, and digital custody have made it feasible to represent ownership, transfer value, and automate financial processes across asset classes (BIS, 2024). From tokenized funds to digital bonds, the underlying capability is no longer in question.

Yet institutional adoption remains limited.

This gap is often attributed to transitional frictions—regulatory uncertainty, immature infrastructure, or conservative incumbents. These explanations are not wrong, but they are incomplete. The more fundamental problem is not whether assets can be represented on-chain, but whether they can be designed, structured, and managed to meet institutional requirements (OECD, 2020). Technology is necessary but insufficient. Institutional viability is determined by what happens before and after the blockchain.

In practice, many tokenization efforts fail because they are not built to withstand institutional due diligence. Projects that succeed in pilots often cannot scale because they lack the legal, governance, and operational structures that institutional investors require. The result is a recurring pattern: systems that function technically but remain unusable for institutional capital.

This paper argues that tokenization is not a technology problem but an institutional implementation problem. Successful tokenization requires aligning each stage of the asset lifecycle—from concept and structuring to issuance, servicing, and secondary market activity—with the constraints under which institutional capital operates. These constraints are concrete: legal enforceability, fiduciary accountability, governance clarity, and regulatory integration. Without this alignment, improvements in programmability or execution speed yield little practical advance (BIS, 2024; Sing, 2023a).

The analysis proceeds as a lifecycle playbook. Rather than explaining how tokens are issued, it examines how tokenization must be designed across stages to become institutionally viable. The paper focuses on three representative asset classes—tokenized funds (including money market funds and government bond vehicles), private credit, and infrastructure—to illustrate where tokenization aligns with institutional requirements and where it encounters structural limits. It situates these developments across major financial centers, including Singapore, United States, Hong Kong, and Abu Dhabi, where regulatory practice is converging around institutionally compatible models.

The central claim is straightforward: tokenization will scale not through technological breakthroughs, but through institutional design. The question is no longer whether assets can be put on-chain, but whether they can be structured in a way institutions are able—and willing—to hold in their investment portfolios.

2. From Idea to Asset Selection: What Should (and Should Not) Be Tokenized

Tokenization is often assumed to depend on execution quality—how efficiently assets can be issued, transferred, and settled on-chain. In practice, the decisive step occurs much earlier. Whether a tokenized asset achieves institutional adoption is largely determined at the concept stage, before a single line of smart contract code is written. Most assets are not suitable for institutional tokenization.

Institutional investors operate under constraints that extend well beyond return generation. Assets must support enforceable rights, ongoing oversight, and clear allocation of responsibility. These constraints act as implicit filters on what can be held in institutional portfolios. Assets aligned with standardized legal frameworks, predictable cash flows, and established governance mechanisms are structurally compatible with tokenization. Those dependent on discretion, bespoke contractual arrangements, or fragmented jurisdictional exposure are not (Hart & Moore, 1990; Williamson, 1985).

From an allocation perspective, the relevant question is not whether an asset can be tokenized, but whether it can be governed, valued, and exited within institutional constraints—including adequate liquidity for portfolio management purposes.

This distinction is evident in early tokenized markets. Tokenized funds—particularly money market funds, government bond vehicles and similar pooled vehicles—have attracted the most sustained institutional participation. These structures inherit existing legal frameworks, governance arrangements, and fiduciary relationships. Tokenization modifies record-keeping and settlement without altering the underlying allocation of rights and responsibilities. Institutions can therefore evaluate tokenized funds using familiar criteria and integrate them into existing workflows without requiring new legal or regulatory interpretations (Franklin Templeton, 2023; BIS, 2024; Sing, 2024a). Tokenized US Treasury vehicles represent the clearest current illustration of this dynamic: government bonds are the most standardized, most liquid, and most legally unambiguous fixed income instruments available, making them structurally ideal candidates for tokenization within fund wrappers that preserve existing fiduciary and regulatory treatment.

A similar logic applies to private credit. Contractual cash flows, defined creditor hierarchies, and established enforcement mechanisms provide a clear foundation for tokenization. Loan documentation, security interests, and priority waterfall structures translate relatively well into on-chain representations precisely because they are already explicit and enforceable. In these cases, tokenization functions as an incremental operational enhancement rather than a structural disruption to existing rights.

By contrast, attempts to tokenize bespoke infrastructure or early-stage real estate assets have encountered persistent difficulties. These assets rely on complex contractual arrangements, jurisdiction-specific risks, and ongoing discretionary intervention by asset managers, lenders, and regulators. Tokenization does not eliminate these characteristics—it adds a layer of digital

abstraction that can obscure, rather than clarify, the relationship between ownership, control, and accountability (Sing, 2024a). For institutional investors, this abstraction is not a neutral feature; it is an unquantifiable risk.

A recurring failure in tokenization is treating technical feasibility as the primary selection criterion. If an asset can be represented digitally and transferred on-chain, it is assumed to be a viable candidate. This framing ignores the institutional filters that ultimately determine adoption. Assets lacking legal clarity, governance continuity, or fiduciary alignment may function technically while remaining unsuitable for institutional capital.

Tokenization should not begin with how to tokenize an asset, but with whether the asset should be tokenized at all. Structural compatibility—meaning the degree to which an asset's legal, governance, and cash flow characteristics align with institutional requirements—is the primary determinant of viability. Tokenization succeeds where it operates within institutional frameworks and fails where it attempts to substitute for them.

3. Structuring the Asset: Legal Anchoring and Institutional Compatibility

Once an asset is identified as a viable candidate for tokenization, structuring becomes the next critical task. This stage is routinely underestimated. Practitioners focus on technical questions—which blockchain to use, how to manage wallets, how to structure smart contracts—when the more consequential decisions are legal and organizational. Structuring determines whether tokenized claims are enforceable, interpretable, and compatible with the systems through which institutional capital operates.

In institutional contexts, structuring is a legal problem before it is a technical one.

At the foundation of this process is legal anchoring (Sing, 2023a). A token, in isolation, is a digital representation with no inherent economic meaning. Its meaning derives entirely from what it legally represents: an ownership interest, a contractual claim, a beneficial interest held through a trust structure, or a reference to an off-chain agreement. These distinctions determine priority in insolvency, rights to cash flows, voting or governance entitlements, and the mechanisms through which disputes are resolved (De Filippi & Wright, 2018). Without explicit legal anchoring, these questions remain open—and for institutional investors, an open question is an unquantifiable risk.

The practical implications differ across asset types. For tokenized funds, legal anchoring is relatively straightforward: existing fund structures—registered investment companies, unit trusts, limited partnerships—provide recognized frameworks with established rights and obligations. The token represents a share or unit interest in a structure courts already recognize. For tokenized private credit, the critical legal anchors are the loan agreement, security interest, and priority waterfall—all of which must be defined off-chain before any on-chain representation has meaning. For infrastructure and real assets, anchoring is hardest: ownership is often layered

across concession agreements, planning permissions, and operational contracts that are inherently jurisdiction-specific and difficult to standardize.

Institutional investors require that ownership claims be grounded in recognized legal structures—funds, special purpose vehicles, or trusts—that courts and regulators can interpret and enforce. Tokenization may alter how these claims are recorded or transferred, but it does not replace the underlying legal framework. The role of the blockchain is secondary to the legal structure that precedes it. Smart contracts can enforce the rules defined by that structure; they cannot supply the structure itself (OECD, 2020).

This is not merely theoretical. In the most developed institutional tokenization use cases, the legal structure carries the weight. Tokenized bond issuances in Hong Kong, for example, are designed so that token holders retain enforceable claims under local law, with the Central Moneymarkets Unit providing statutory settlement finality (HKMA, 2023). The DLT layer improves operational efficiency; the legal and regulatory framework provides enforceability. Neither substitutes for the other.

The choice of jurisdiction is therefore a structuring decision, not an operational afterthought. Different financial centers offer meaningfully different levels of regulatory clarity, legal enforceability, and institutional infrastructure. Singapore, Hong Kong, and Abu Dhabi have become focal points for institutional tokenization not because they are technologically advanced, but because they provide environments where tokenized assets can be structured within recognized legal and supervisory frameworks (MAS, 2024; ADGM, 2023). This specificity matters: an institution cannot rely on a jurisdiction’s regulatory framework unless that framework has been deliberately incorporated into the asset's design.

By contrast, tokenization projects that prioritize technical deployment over legal clarity encounter predictable limits. Tokens may be issued and transferred on-chain while the underlying rights remain ambiguous or unenforceable across jurisdictions. In these cases, institutions cannot reliably assess risk—particularly in adverse scenarios—and therefore cannot hold the asset. Technical functionality diverges from institutional viability.

Structuring is not a preliminary step before tokenization begins. It is the foundation on which all subsequent stages depend on. Decisions about legal form, jurisdictional anchoring, and rights allocation made at this stage determine whether a tokenized asset can move beyond experimentation and into institutional portfolios—and whether it can survive the stress events that institutional due diligence is designed to anticipate.

4. Governance Design: Where Most Tokenization Efforts Fail

If structuring determines whether tokenized assets are legally viable, governance determines whether they are institutionally investable. The two are not the same. An asset can be legally sound and still fail to attract institutional capital if its governance structure cannot answer the

questions that fiduciary duty requires: Who has authority to act? Under what conditions can decisions be made? And who is accountable for the outcomes?

Institutional investors operate within systems that deliberately allocate authority and responsibility across multiple actors. Boards, trustees, investment committees, custodians, and regulators each hold defined roles in overseeing assets, managing risk, and ensuring accountability. These roles are not incidental features of the institutional landscape—they are the mechanisms through which fiduciary obligations are exercised and enforced (CPMI-IOSCO, 2012). Any tokenized structure that cannot map onto this system, or that leaves these questions unanswered, will fail at the investment committee stage regardless of its technical merits.

Many tokenization initiatives fail to provide clear answers to basic governance questions.

A common assumption among tokenization practitioners is that automation reduces or eliminates the need for governance. By encoding rules into smart contracts, systems are expected to operate deterministically, minimizing human intervention. This assumption holds for routine, well-defined processes. It fails for the class of events that define institutional risk management: regulatory changes, covenant breaches, counterparty defaults, operational disruptions, and market dislocations (Hart & Moore, 1990; Williamson, 1985). These events require judgment, not just execution. Smart contracts have no capacity for the former.

Automation does not eliminate discretion. It relocates it to less visible, less accountable parts of the system.

In institutional settings, uncertainty is managed through explicitly designed governance structures. Authority is allocated to actors with the institutional mandate and information to interpret conditions, exercise judgment, and intervene. Tokenization does not remove this requirement—it changes how authority and discretion must be exercised under uncertainty. Systems that fail to define governance structures explicitly do not eliminate the need for discretion; they obscure where it resides, making it impossible to audit or assign accountability (Sing, 2023b).

This opacity is acutely problematic during stress events. When a tokenized asset encounters a default, a covenant breach, or a regulatory intervention, institutions must be able to identify, with certainty, who has the authority to respond. Can token transfers be paused to prevent disorderly liquidation? Can the terms of the underlying agreement be modified? Can the asset be restructured without triggering on-chain mechanisms that operate independently of those decisions? Without clear answers, uncertainty about authority amplifies rather than contains risk. For institutions operating under fiduciary duty, the absence of defined authority is itself a material governance failure (BIS, 2024).

If authority cannot be clearly identified, responsibility cannot be assigned — and fiduciary accountability breaks down.

The most robust tokenization frameworks treat governance as a first-order design constraint, not a secondary consideration. Rather than eliminating intermediaries, they define and formalize their roles within a structure that accommodates both automation and human judgment. Custodians, administrators, and oversight bodies remain integral to the architecture. Smart contracts standardize routine processes—settlement, reconciliation, distribution—but operate within governance frameworks that specify clearly when intervention can occur, who may authorize it, and how decisions are documented and communicated.

Automation and governance serve distinct functions that cannot be collapsed into a single layer of code. Automation reduces friction in predictable, well-specified processes. Governance manages uncertainty in situations that cannot be fully anticipated. Attempts to replace governance with automation do not make institutions more efficient—they create systems that perform well in normal conditions and fail structurally under stress. For tokenization to scale, these functions must be clearly separated and deliberately integrated.

The failure of many tokenization efforts is organizational, not technological. Systems that execute flawlessly in pilots yet lack credible governance cannot retain institutional mandates. The concern is not whether the system performs as designed—it is whether the system can be trusted, governed, and held accountable when it does not. That confidence cannot be encoded in a smart contract. Trust cannot be assumed; it must be built into the institutional architecture surrounding the system.

5. Issuance and On-Chain Representation: Translating Structure into Code

With legal structuring and governance design in place, tokenization moves to issuance—the point at which asset representations are created and recorded on-chain. Issuance is not the core of tokenization; it is a translation layer. Its function is to render, in code, the legal rights and governance arrangements that have already been defined off-chain. The quality of that translation determines whether the on-chain record and the off-chain reality remain consistent over time.

Smart contracts are the primary instrument of issuance. They define how tokens are created, transferred, and in some cases how lifecycle events are triggered and executed. At minimum, they specify rules governing ownership records, settlement processes, and transaction validation. In more advanced implementations, they incorporate transfer restrictions, investor eligibility checks, and conditional distributions linked to off-chain events.

The scope of what smart contracts can reliably represent is bounded by a fundamental characteristic: they encode predefined rules that execute consistently under specified conditions. They execute consistently when conditions are well-specified and observable. They cannot handle ambiguity, exercise discretion, or respond to events that were not anticipated at the time of programming. This is not a limitation of current technology—it reflects the nature of the environment in which real-world assets operate (De Filippi & Wright, 2018). Real assets involve

incomplete contracts, evolving regulatory conditions, and counterparty behavior that no code can fully specify in advance.

The institutional implication is critical. The purpose of issuance is not to create new forms of authority, but to operationalize existing ones. Tokens derive their economic meaning from the legal structures and governance arrangements established before them. Smart contracts can enforce rules that have been defined elsewhere; they cannot define the underlying rights or obligations associated with the asset. Those remain grounded in off-chain agreements, legal documentation, and institutional frameworks (OECD, 2020).

The leading institutional tokenization implementations make this separation explicit. The Franklin OnChain U.S. Government Money Fund uses blockchain for share registration and transfer while preserving conventional fund administration, custody arrangements, and regulatory oversight in their existing form (Franklin Templeton, 2023). The blockchain functions as an operational efficiency layer. The legal and governance structure of a registered investment fund—its fiduciary obligations, investor protections, and regulatory treatment—is entirely unchanged. This separation between on-chain execution and off-chain governance is not a compromise; it is the design principle.

Over-engineering the on-chain layer cannot compensate for weak off-chain design.

Problems arise when this relationship is inverted—when tokenization is treated as a mechanism for establishing or redefining ownership, rather than for representing ownership that has already been legally defined. In these cases, smart contracts specify how tokens behave but not what they represent in enforceable terms. The on-chain record effectively becomes authoritative by default, because the off-chain structure is insufficient to govern it. The result is that rights, responsibilities, and recourse mechanisms become ambiguous at precisely the moments—defaults, disputes, restructurings—when they matter most. For institutions, this ambiguity is not a theoretical concern. It is a direct barrier to investment.

Issuance should therefore be understood as a process of alignment, not innovation. The objective is to ensure consistency between on-chain behavior and off-chain reality: aligning token logic with legal documentation, ensuring transfer restrictions reflect applicable regulatory requirements, and maintaining auditable mappings between token holders and recognized ownership records.

In institutional contexts, the success of issuance is measured by alignment, not technical sophistication. A well-designed tokenized asset behaves in ways that are predictable, enforceable, and consistent with the legal and governance systems that surround it. When this alignment is achieved, issuance reduces operational friction without introducing structural uncertainty. When it is not, the result is a system that functions in isolation but cannot integrate into institutional markets. Alignment at issuance is a necessary condition for viability—but it is not sufficient. Whether the system holds over time depends on what comes next: servicing.

6. Servicing and Lifecycle Management: The Missing Layer in Tokenization

If issuance marks the point at which tokenized assets come into existence, servicing determines whether they remain viable over time. This stage is the most underdeveloped dimension of institutional tokenization—and the most consequential. Issuance tests whether an asset can be built. Servicing tests whether everything built upstream actually holds: whether the governance structures function under real conditions, whether the legal framework is enforceable in practice, and whether the on-chain representation stays aligned with off-chain reality across the full life of the asset.

Most tokenization efforts are designed to launch assets. Almost none are designed to manage them.

In institutional finance, assets are not static. They require continuous servicing across their lifecycle: cash flow collection and distribution, investor reporting, portfolio reconciliation, regulatory compliance monitoring, and periodic valuation. These functions are performed by a network of specialized intermediaries—fund administrators, loan agents, paying agents, custodians, auditors, and asset managers—each responsible for specific dimensions of oversight. Tokenization does not eliminate these requirements. It changes how they are coordinated and executed, and in doing so, introduces new dependencies that must be designed for explicitly (MAS, 2024).

The servicing challenge differs meaningfully across the three asset classes central to this paper. For tokenized funds — including money market funds, government bond vehicles, and similar pooled structures — the primary servicing functions are subscription and redemption processing, NAV calculation, and investor communications—all well-understood and supported by established fund administration infrastructure. For tokenized private credit, servicing involves loan monitoring, interest collection, covenant surveillance, and enforcement of security interests in the event of breach—functions that are largely off-chain and require continuous human judgment. For tokenized infrastructure, servicing spans construction monitoring, revenue collection from operational assets, regulatory reporting to multiple jurisdictions, and management of contractual counterparties over multi-decade horizons (Sing, 2024b). The complexity compounds as asset illiquidity and contractual specificity increase.

For tokenized assets, servicing must bridge on-chain and off-chain dimensions in ways that are not automatic. Cash flows generated by the underlying asset—interest payments on a loan, distributions from a fund, revenue from an infrastructure concession — must be collected and verified through processes that remain anchored in off-chain legal and operational reality, even where AI-assisted monitoring and smart sensors can automate parts of the measurement and reporting chain — before they can be distributed to token holders. These events cannot be directly observed or enforced by smart contracts. Bridging the gap requires reliable verification mechanisms—trusted data sources, agent banks, or structured reporting protocols—that remain robust under both normal operations and stress. When these mechanisms fail, the smart contract cannot self-correct. The off-chain process determines what the on-chain record reflects.

Reporting and auditability present parallel challenges. Institutional investors require consistent, timely reporting on asset performance, risk exposure, and compliance status. These reports must align with both on-chain records and off-chain realities, and must meet regulatory and fiduciary standards that exist independently of the blockchain. While DLT can improve transparency and reduce reconciliation errors in some contexts, it does not eliminate the need for interpretation, validation, and presentation of data in forms that regulators and investment committees can act on (BIS, 2024). The audit trail on-chain is a starting point, not a substitute for institutional reporting.

In institutional portfolios, assets are managed over years, not issued once.

The most demanding servicing function is managing exceptions. Real-world assets are subject to events that disrupt normal operations, and these events are precisely the ones that determine institutional trust. For tokenized private credit, this means identifying covenant breaches early, executing on security interests without triggering disorderly on-chain activity, and coordinating restructuring processes that may involve multiple off-chain counterparties. For infrastructure, it means navigating regulatory interventions, force majeure events, and concession renegotiations that may take years and involve sovereign counterparties. For funds, it means managing redemption gates, side pocket allocations, and liquidity mismatches in ways that are fair to all investors and consistent with fund documentation. None of these scenarios can be managed by code alone.

Tokenization frameworks that focus primarily on automated execution are structurally unprepared for exception management. Smart contracts can facilitate routine processes, but they are not designed to resolve disputes, renegotiate terms, or exercise judgment under uncertainty. These functions require clearly defined authority structures, escalation pathways, and documented decision-making processes—the elements of governance that must be designed at the outset and remain operational throughout the life of the asset. Tokenization must incorporate, not bypass, these capabilities (Sing, 2023b).

The absence of robust servicing frameworks is a primary reason tokenization efforts stall after initial deployment. A system may perform well at issuance and in the early operational period, when assets behave as expected and no exceptions arise. As assets evolve—as loans are amended, fund strategies shift, or infrastructure concessions are renegotiated—systems without mature servicing capabilities become operationally fragile. They cannot adapt, and institutions cannot rely on them.

A more complete approach treats servicing as a core design consideration, not an operational afterthought. This means designing workflows that integrate on-chain efficiency with off-chain oversight; building data pipelines and verification protocols before assets are issued, not after; and ensuring that exception management processes are documented, tested, and understood by all parties before capital is deployed.

The viability of a tokenized asset depends less on how it is created than on how it is sustained. Issuance demonstrates technical capability. Servicing determines institutional durability. Without it, tokenization remains confined to pilot environments, unable to support the ongoing demands of institutional capital.

7. Secondary Markets and Liquidity: Reality vs. Narrative

One of the most frequently cited benefits of tokenization is enhanced liquidity. By representing assets as transferable digital tokens, proponents argue that previously illiquid assets can be more easily traded, fractionalized, and accessed by a broader investor base. The logic is intuitive. It rests, however, on an assumption that does not hold in institutional markets: that liquidity is primarily a function of technology, and that reducing transfer friction is equivalent to creating a liquid market.

Liquidity is a function of market structure, not technology.

Institutional liquidity depends on the sustained presence of buyers and sellers, standardized information, credible and transparent pricing mechanisms, and regulatory frameworks that support orderly trading activity. These conditions are determined by the underlying characteristics of the asset itself — its cash flow profile, risk exposure, governance structure, and investor base — not by the medium through which ownership is recorded (BIS, 2024; OECD, 2020). Tokenization can reduce friction in transferring ownership. It cannot create demand, supply counterparties, or resolve the informational asymmetries that cause investors to withdraw from markets under stress.

The implications differ across asset classes, and the differences matter for institutional portfolio construction. Tokenized money market funds and short-duration fixed income instruments can support meaningful secondary market activity because the underlying assets are homogeneous, frequently valued, and held by investors with similar information sets. The conditions for liquidity exist independently of tokenization; the technology may reduce settlement friction at the margin. For tokenized private credit, liquidity is structurally limited: loans are bilateral agreements with idiosyncratic terms, limited price discovery, and a narrow universe of informed buyers. Tokenizing the claim does not change any of these characteristics. For tokenized infrastructure, secondary liquidity is largely notional — the assets involve decade-long cash flows, bespoke concession structures, and risks that require specialist underwriting to evaluate. Fractionalization expands the potential investor pool in theory; in practice, it does not generate the market depth or institutional buyer demand required for orderly secondary trading (Sing, 2024b).

The mismatch between perceived and actual liquidity introduces a specific and underappreciated risk. When tokenized assets are marketed or structured in ways that suggest liquidity that the underlying asset cannot support, investors form expectations that market conditions cannot meet. Under stress — rising rates, credit events, or broader market dislocations — the consequences

are predictable: disorderly redemption pressure, fire-sale pricing, sharply widened bid-ask spreads, or the absence of buyers and sellers willing to transact. For institutional allocators, this is not just a performance risk. It is a fiduciary risk. Predictable illiquidity, properly disclosed and structured, is manageable. Uncertain liquidity, particularly where the uncertainty is not understood by investors, is not.

Institutional markets have developed precisely the tools needed to manage this problem: explicit liquidity terms embedded in fund documentation. Redemption notice periods, side pocket provisions, gating mechanisms, and lock-up structures align investor expectations with the actual liquidity profile of underlying assets. These mechanisms are deliberate, governed, and subject to regulatory oversight. Tokenization does not eliminate the need for them. If anything, it makes them more important, because the technical ease of on-chain transfer can create the impression of liquidity that the underlying asset does not support. Designing transferability constraints into token architecture — not merely permitting unrestricted transfer because the technology allows it — is an essential discipline for institutional tokenization.

Properly understood, tokenization is not a mechanism for creating liquidity from illiquid assets. It is a tool for improving operational efficiency, expanding investor access, and reducing settlement friction within the liquidity constraints that the underlying asset genuinely supports. Where those constraints are respected and communicated clearly, tokenization adds value. Where they are obscured by the technology's transfer capabilities, it introduces risk that institutional capital cannot absorb.

8. Geographic Convergence: Institutional Tokenization Across Jurisdictions

A prevailing narrative in tokenization holds that jurisdictions are competing to become leading digital asset hubs, and that regulatory differences across markets will determine which financial centers capture the most activity. This framing is not wrong, but it is incomplete. A more important dynamic is occurring beneath the competitive surface: the major institutional tokenization markets are independently arriving at the same design conclusion. Tokenization advances not by creating parallel financial systems, but by operating within the legal, governance, and regulatory frameworks that institutional capital already requires.

The jurisdictions most advanced in institutional tokenization are not those with the most permissive frameworks — they are those with the clearest ones.

Singapore's approach, anchored in the Monetary Authority of Singapore's Project Guardian, has progressed from controlled experimentation to active commercialization. In November 2024, MAS published two industry frameworks developed collaboratively with over forty financial institutions: the Guardian Funds Framework, which provides standards for tokenized fund lifecycle management, on-chain share register design, and asset servicing; and the Guardian Fixed Income Framework, which integrates International Capital Market Association's (ICMA) Bond Data Taxonomy, Capital Markets and Technology Association (CMTA) token standards,

and Global Financial Markets Association (GFMA) design principles into a structured guide for tokenized debt capital markets issuance (MAS, 2024). These frameworks are significant not for their technological ambition but for their institutional discipline: they extend and formalize existing market standards rather than replacing them. Singapore’s model is one in which the regulator convenes industry to produce standards, then facilitates commercialization within those standards.

In the United States, institutional adoption has been market-led rather than regulator-convened. Large asset managers and financial institutions have advanced tokenization within existing securities law frameworks, concentrating innovation in operational infrastructure rather than legal form. The Franklin OnChain U.S. Government Money Fund is the clearest institutional illustration: a registered investment company using blockchain for share registration while preserving its full regulatory treatment under the Investment Company Act (Franklin Templeton, 2023). The legal structure is unchanged; the operational layer is improved. The growth of tokenized US Treasury funds more broadly reflects the same logic: government bonds, as the most standardized and credit-risk-free fixed income instrument, provide the clearest institutional on-ramp for tokenized fixed income adoption. This pattern — incremental adoption within existing legal form — has characterized US institutional tokenization more broadly, where regulatory caution has channeled innovation toward areas of lower legal ambiguity.

Hong Kong’s approach has emphasized government-led demonstration of institutional viability. The Hong Kong Monetary Authority’s (HKMA) Project Evergreen produced the world’s first tokenized green bond issuance by a government, executed in February 2023. The institutional design features of that issuance are analytically instructive: settlement was conducted on a delivery-versus-payment basis using HKD cash tokens issued by the HKMA, cleared through the Central Moneymarkets Unit, and governed by statutory settlement finality under Hong Kong law (HKMA, 2023). The on-chain record was the legally definitive record of ownership. The issuance demonstrated that DLT can operate at the center of a regulated capital markets transaction — not at its periphery — provided the legal and regulatory architecture is built to support it.

Abu Dhabi Global Market has built one of the most structurally complete institutional frameworks for digital assets, with a virtual assets regulatory regime that has been operational since 2018 and has been refined through successive iterations. The framework is distinctive in several respects. It operates under English common law, providing legal certainty familiar to global institutional counterparties. It defines specific criteria for Accepted Virtual Assets, creating a structured pathway for regulatory approval of new instruments. It also includes a dedicated DLT Foundations framework that provides governance structures for blockchain-based entities, including decentralized autonomous organizations (DAO) (ADGM, 2023). Abu Dhabi Global Market’s (ADGM) model is one in which regulatory clarity precedes market activity, providing institutions with the framework certainty they require before committing capital.

Across these four jurisdictions, the approaches differ substantially in method: Singapore convenes industry consensus; the United States relies on market-led adoption within existing law; Hong Kong deploys government-led demonstration; Abu Dhabi provides framework clarity in advance of market activity. What they share is the institutional design conclusion they have reached independently. In each case, tokenization is advancing not by circumventing institutional frameworks — the legal, governance, and regulatory systems through which institutional capital is deployed — but by embedding itself within them. Enforceability, accountability, and investor protection are not obstacles that tokenization must overcome. They are the conditions that institutional capital need in order to participate at scale.

The implications for practitioners are direct. Tokenization initiatives designed for institutional adoption should be evaluated against the standards emerging in these jurisdictions, not against a generic notion of regulatory compatibility. The trajectory of the field is not toward fragmentation or regulatory arbitrage, but toward convergence around a shared set of institutional principles. The jurisdictions that have advanced furthest are those that have provided the most institutional clarity — and that clarity is increasingly available as a template for markets still developing their approaches.

9. Design Principles: An Institutional Playbook for Tokenization

The preceding analysis yields a set of design principles for institutional tokenization. These are not abstract prescriptions derived from theory. They are diagnostic tools derived from observed failure modes: the points in the lifecycle where tokenization initiatives have consistently encountered institutional resistance, stalled after pilots, or been excluded from investment mandates. Each principle addresses a specific and recurring gap between how tokenization has been built and what institutional capital requires.

Governance precedes automation. Decision rights, escalation mechanisms, and override capabilities must be specified before smart contracts are deployed, not designed around them afterward. Automation is an efficiency tool within a governance framework; it cannot substitute for one. Systems that automate execution without defining authority structures do not reduce governance requirements — they obscure them (CPMI-IOSCO, 2012).

Legal enforceability anchors token design. Tokens derive their economic meaning from the legal rights they represent, and those rights must be enforceable under applicable legal regimes before issuance. Tokenization does not create legal structures; it depends on them. Jurisdictional selection, legal form, and rights documentation must be resolved at the structuring stage, not revisited after the on-chain record becomes the default authority (OECD, 2020).

Asset selection determines viability. Tokenization is most effective when applied to assets that align with standardized legal frameworks, predictable cash flows, and established governance mechanisms. Tokenized government bond vehicles and money market funds

provide the strongest structural foundation for institutional adoption, with private credit representing a viable but more governance-intensive second phase. Bespoke, governance-intensive assets present challenges that tokenization amplifies rather than resolves (Hart & Moore, 1990; Sing, 2024a).

Liquidity must reflect asset reality. Tokenization does not transform the fundamental liquidity characteristics of an underlying asset. On-chain transferability and market liquidity are different properties. Token architecture must incorporate explicit liquidity constraints — transfer restrictions, lock-up periods, and redemption terms — that align investor expectations with what the asset can actually support. Designing for unrestricted transferability when the asset is illiquid is a structural error, not a design feature (BIS, 2024).

Issuance is alignment, not innovation. The objective of on-chain issuance is alignment with the legal and governance structures established off-chain. Smart contracts should enforce rules that have been defined in legal documentation; they should not define rules independently. Token logic, transfer restrictions, and compliance checks must be consistent with existing documentation and ownership records. Over-engineering the on-chain layer cannot compensate for weak off-chain design (De Filippi & Wright, 2018).

Servicing is non-negotiable. Tokenization must extend beyond issuance to encompass the full servicing lifecycle: cash flow management, investor reporting, compliance monitoring, and exception handling for defaults, restructurings, and regulatory interventions. Systems that perform well at issuance but lack robust servicing capabilities cannot support institutional mandates and remain confined to pilot environments. Servicing infrastructure must be designed before assets are issued, not built after the first problem arises (MAS, 2024).

Institutional integration is the condition for scale. Tokenized assets must operate within existing financial infrastructure: custody systems, regulatory reporting frameworks, compliance monitoring, and intermediary networks. Institutions do not rebuild their operational infrastructure to accommodate new asset classes — they require new asset classes to fit their existing systems. Tokenization initiatives that treat institutional integration as a later-stage problem will not achieve scale adoption regardless of technical quality.

Tokenization succeeds when it behaves like infrastructure, not innovation.

10. Conclusion: Tokenization as Institutional Infrastructure

Tokenization of real-world assets has crossed a threshold. The technology works. Blockchain-based issuance, settlement, and record-keeping have been demonstrated across asset classes and jurisdictions at institutional scale. The question that determined early discourse — whether tokenization was technically feasible — has been answered. A more consequential question has taken its place: whether tokenization can be designed to meet the requirements of the institutions whose capital determines whether any market reaches scale.

This paper has argued that the binding constraints on institutional tokenization are structural, not technical. Asset selection, legal structuring, governance design, issuance, servicing, and secondary market architecture each introduce requirements that exist independently of the blockchain. They are embedded in fiduciary duty, regulatory oversight, and decades of financial market practice. Where tokenization is designed to satisfy these requirements from the outset, it gains institutional traction. Where it treats them as secondary considerations — problems to be resolved after the technology is deployed — it produces systems that function technically but cannot attract or retain institutional mandates.

Tokenization is not a shortcut around institutional complexity. It is an implementation challenge within it.

The evidence from major financial centers supports this conclusion. Singapore, the United States, Hong Kong, and Abu Dhabi have each advanced institutional tokenization through frameworks that embed the technology within existing legal, governance, and regulatory systems rather than attempting to replace them (BIS, 2024; MAS, 2024; HKMA, 2023; ADGM, 2023). The approaches differ by method — regulator-convened industry standards, market-led adoption, government demonstration, framework clarity — but they have converged on the same institutional design principle. The field is moving, unevenly but directionally, toward tokenization that operates as financial infrastructure rather than as an alternative to it.

The implications for practitioners vary by role. For institutional allocators, the analysis points to a clear evaluation framework: assess tokenized assets against the same legal, governance, and liquidity criteria applied to conventional instruments, and treat gaps in any of these dimensions as substantive risk rather than transitional friction. For issuers and platform builders, the priority is sequencing: structuring and governance design before issuance, servicing infrastructure before capital is deployed, and liquidity terms that reflect asset reality before transferability is marketed as a feature. For regulators, the evidence from leading jurisdictions suggests that institutional clarity — clear legal treatment, defined governance expectations, and integration with existing market infrastructure — is a more effective enabler of adoption than permissive frameworks that leave institutional questions unanswered.

The development of tokenized real-world asset markets is not primarily a technological story. It is a story about whether a new form of financial infrastructure can earn the trust of the institutions whose participation defines a functioning market. That trust is not granted by technical performance in pilots. It is earned through the quality of legal structures, the credibility of governance arrangements, the reliability of servicing over time, and the consistency of behavior under stress. These are the dimensions on which institutional tokenization will be judged — and on which it will scale or stall.

The question is no longer whether it can be built, but whether it can be governed.

References

- Abu Dhabi Global Market (ADGM). (2023). *Digital asset regulatory framework*.
- BIS. (2024). *Tokenisation in the context of money and other assets*. Bank for International Settlements. <https://www.bis.org/cpmi/publ/d225.htm>
- BIS. (2025). *The next-generation monetary and financial system*. Annual Economic Report 2025, Chapter III. Bank for International Settlements. <https://www.bis.org/publ/arpdf/ar2025e3.htm>
- Committee on Payments and Market Infrastructures (CPMI) & IOSCO. (2012). *Principles for financial market infrastructures*. https://www.bis.org/cpmi/info_pfmi.htm
- De Filippi, P., & Wright, A. (2018). *Blockchain and the law*. Harvard University Press.
- Franklin Templeton. (2023). *Franklin OnChain U.S. government money fund*.
- HKMA. (2023). *Tokenised green bond / Project Evergreen*. Hong Kong Monetary Authority.
- JPMorgan. (2023). *Kinexys / Onyx Digital Assets materials*. JPMorgan Chase.
- Monetary Authority of Singapore (MAS). (2024). *Project Guardian: Funds Framework*. <https://www.mas.gov.sg/publications/monographs-or-information-paper/2024/guardian-funds-framework>
- OECD. (2020). *The tokenisation of assets and implications for financial markets*. Organisation for Economic Co-operation and Development. https://www.oecd.org/en/publications/the-tokenisation-of-assets-and-potential-implications-for-financial-markets_83493d34-en.html
- OECD. (2025). *The tokenisation of assets and distributed ledger technologies in financial markets*. Organisation for Economic Co-operation and Development. https://www.oecd.org/en/publications/tokenisation-of-assets-and-distributed-ledger-technologies-in-financial-markets_40e7f217-en.html
- Hart, O., & Moore, J. (1990). Property rights and the nature of the firm. *Journal of Political Economy*, 98(6), 1119-1158. <https://dash.harvard.edu/server/api/core/bitstreams/7312037c-4b76-6bd4-e053-0100007fdf3b/content>
- Sing, C. H. (2023a). The RWA tokenization stack: Why institutional design determines what technology cannot. Working paper.
- Sing, C. H. (2023b). Fiduciary duty in complex organizations: A process-based framework for governance evaluation and oversight. Working paper

Sing, C. H. (2024a). Why tokenized funds will scale before tokenized projects: Fiduciary risk, governance continuity, and the logic of sequenced adoption. Working paper.

Sing, C. H. (2024b). Renewable energy as an institutional asset class: Why governance failure, not technology risk, drives underperformance. Working paper.

Williamson, O. (1985). *The economic institutions of capitalism*. The Free Press.