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What Tokenization Can Do for Development Finance

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Forewords

Zakaryae Boudi, CEO, FeverTokens & Chair, Tokenized Economies Institute

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Development finance stands at a crossroads. As global challenges multiply - from geopolitical shocks and climate vulnerability to persistent inequality and financial exclusion - there is growing pressure on development finance institutions to do more, with less, and faster. Yet while the needs have escalated, the systems and instruments we rely on have often remained constrained by legacy models, limited transparency, and fragmented infrastructure.

At the same time, the digital assets and tokenization space has moved rapidly from experimentation to early maturity. We are now seeing scalable, programmable, and secure infrastructure emerge across multiple domains of finance - offering new tools to mobilize capital, track impact, automate compliance, and empower a broader range of stakeholders. This presents a timely opportunity to ask: what can tokenization do for development finance?

This paper explores that question in depth. From banking access in fragile states to sustainability-linked instruments, from programmable infrastructure bonds to decentralized governance models - it shows that tokenization is not just about digitizing existing processes. It is about rethinking how development capital is structured, deployed, monitored, and trusted. We also make policy and institutional recommendations based on a comprehensive review of completed and ongoing development finance initiatives related to tokenization by MDBs and DFIs.

This work is part of a broader effort led by the Tokenized Economies Institute, a research and collaboration platform launched by FeverTokens and its partners to advance tokenization through public-private dialogue. By bringing together development finance institutions, regulators, researchers, technologists, and civil society, we aim to produce research that is not only thoughtful but useful, grounded in real-world constraints, mindful of risks, and oriented toward practical implementation. That includes open reference frameworks and tools to accelerate learning and reduce duplication across the ecosystem.

We hope this paper contributes meaningfully to that collective effort and inspires further experimentation and collaboration at the intersection of tokenization and development finance.

Nadia Filali, Head of Innovation & Development, Caisse des Dépôts

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From the earliest emergence of blockchain technologies, we at Caisse des Dépôts recognized their potential to fundamentally reshape the infrastructure of financial markets. Guided by this conviction, we launched LiquidShare in 2017, an ambitious initiative undertaken in partnership with leading financial institutions. The platform aimed to modernize the post-trade processing of unlisted securities, with a particular focus on SMEs and mid-cap enterprises, through a shared, secure, and decentralized infrastructure. At the time, this was a bold move, anticipating a shift that is only now becoming widely acknowledged: tokenization as a transformative force in the financial back office.

Today, that foresight has been validated. Tokenization has emerged as a defining technological advancement, with the capacity to overhaul the mechanisms through which economies are financed. The Tokenized Economies Institute (TEI) report, released in July 2025, articulates four core pillars of this transformation: widening access to capital, enhancing transparency and traceability of financial flows, reducing transaction costs and settlement times, and stimulating innovation through the creation of novel financial instruments. These priorities resonate deeply with our strategic outlook: tokenization is not an abstract promise, but a practical lever for building a more inclusive, efficient, and future-ready financial system, capable of supporting broader economic development.

With this vision in mind, Caisse des Dépôts has launched a series of strategic initiatives aimed at testing and deploying tokenization use cases at both national and European levels. Most recently, we embarked on a pilot for an interbank settlement token, developed in collaboration with financial and technological partners. This digital settlement asset known as the CiDC enables real-time simulation of settlements for tokenized financial assets, circumventing traditional clearing mechanisms. It represents a concrete response to one of TEI's central themes: reducing operational friction and accelerating transaction workflows, while reinforcing the security and resilience of financial infrastructure.

These efforts reflect our broader commitment to exploring the potential of tokenization while upholding the highest standards of regulatory compliance, digital sovereignty, and systemic security. Our ambition is unequivocal: to harness innovation in service of a financial system that is transparent, inclusive, and aligned with long-term public policy objectives, from financing ecological transitions and supporting local enterprise to modernizing the infrastructure underpinning Europe's capital markets. In doing so, we aim to establish tokenization not merely as a technological trend, but as a strategic lever for public value and sustainable economic development.

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1. Introduction

Development finance refers to the financial services and instruments that support economic development, particularly in low- and medium-income countries. Spanning both public and private sectors, with increasing emphasis on **public-private partnerships (PPPs)**, it plays a crucial role in social and economic development in large parts of the world. Essential infrastructure projects are often also credited to development finance.

Two critical groups of players in development finance are **Multilateral Development Banks (MDBs)** and **Development Finance Institutions (DFIs)**. MDBs are international financial institutions created by groups of countries primarily for public sector finance, large infrastructure projects, and social development. They operate under clearly defined policy mandates rooted in their founding charters or treaties, governed by rules set by member countries, and expressed in medium-term strategic frameworks. DFIs are specialized institutions owned by individual governments or MDBs that invest in private sector projects. Among them, multilateral DFIs are subsidiaries of MDBs, while bilateral DFIs are funded by individual governments.

Against the current backdrop of surging nationalism and isolationism in some of the main backers of MDBs and DFIs, development finance is facing unprecedented challenges posed by shrinking development support at a time when poverty, inequality, and natural disasters are the likely results of said nationalism and isolationism.

Tokenization can transform development finance by increasing transparency, effciency, participation, liquidity, and credibility. In the current context, it is further able to help development finance circumvent single points of failures and achieve global development goals.

In technical terms, tokenization is the process of representing **real-world assets (RWA)** or rights as digital tokens on **distributed ledger technologies (DLT)**. It has broad applications in finance, but the complexity, duration, and organizational inertia common in development finance mean that tokenization has yet to receive similar recognition. Incidentally, thanks to the international nature of development finance, usually with unreliable financial infrastructure, tokenization and blockchain can deliver the maximum impact.

In this paper, we begin by exploring the **functional areas** and **operational domains** that tokenization can transform, in Chapters 2 and 3 respectively. Functional areas refer to the core roles and processes within a development finance project, while operational domains relate to the different types of projects and contexts in which development finance operates. In Chapter 4, we examine how tokenization can reshape the system architecture of development finance. Chapter 5 provides an overview of real-world cases, offering insight into what MDBs and DFIs have experimented with so far, with raw details in the Appendix. Finally, Chapter 6 addresses broader considerations and policy and institutional recommendations.

2. Functional Areas Where Tokenization Can Transform

Tokenization can be transformative in how development finance projects are structured, financed, managed, and monitored. It also provides the financial infrastructure that makes formerly infeasible projects feasible. As a primer to help readers visualize the impacts that tokenization will bring, we examine six functional areas throughout the lifecycle of development finance projects in this section. The list is not exhaustive, and innumerable variations in how tokenization can be applied mean this merely serves as the hors d'oeuvre.

2.1 Banking Access and Capital Mobilization

War-torn or crisis-stricken economies experience the direst need of international development finance. However, such countries lack reliable financial infrastructure, with nonexistent or shattered banking systems, absence or disruption in the rule of law, and often unstable or fractured political systems. These are the circumstances under which foreign aid agencies, development finance institutions, and private investors demand radical, often unrealistic changes as preconditions, even though the will to help exists.

Blockchain and tokenization offer a robust alternative to traditional banking technologies. Characterized by decentralized control, the blockchain eliminates the reliance on intermediaries and reduces the points of failure associated with centralization. Its inherent properties of transparency, security, and immutability make it an ideal foundation for financial systems.

Tokenization of assets and subsequent automation of transactions and services via smart contracts can provide a more stable, accessible, and efficient infrastructure. Its associated decentralized governance models also provide separation from failing legal and political systems, as needed. An international team leading the work on banking access through tokenization in this context is the DebLeb Protocol, who are making impactful progress towards rebuilding the financial system in Lebanon.

With such alternative financial infrastructure underpinned by tokenization, the aforementioned war-torn or crisis-stricken economies will have the access to a reliable banking system, whose governance can have high degrees of separation from troublesome local legal and/or political systems. Consequently, development finance projects otherwise infeasible may become viable. Naturally, this is not to say that these countries can thrive without their own local banking, legal, and political systems.

However, tokenization does provide the solution to the "chicken or the egg" problem, paving the way for local systems to develop organically. Tokenization represents a cost- and time-efficient solution for building the local banking infrastructure as well.

Operational domains where this aspect of tokenization may be extra valuable include public sector finance, financial inclusion, local economic development, and capital market development. It can deliver profound impacts in project origination, project feasibility, and deal structuring; banking or financial infrastructure based on such technology can also be the core deliverable of standalone development finance projects.

A Perspective from Proparco: Unlocking Microfinance in Crisis-Affected Economies through Tokenization

By Sébastien Fleury, Regional Director of Middle East, Proparco – AFD Group

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At Proparco, our mission is to support the private sector across emerging markets, with a strong presence on the MENA region. Within that landscape, **microfinance stands out as a key driver of resilience and development**, particularly in fragile environments such as Lebanon. We believe that empowering microentrepreneurs and small businesses is essential to sustaining livelihoods, especially in regions where traditional financial intermediation has broken down.

Since the onset of the Lebanese crisis, marked by the paralysis of the banking system, a prolonged economic downturn, and more recently, the impact of regional conflict, **the AFD Group has been deeply concerned by the economic deterioration and the shrinking room for effective intervention**. Our mandate to support the local economy has faced significant constraints, particularly in ensuring the secure and efficient flow of funds, the sustainability of investments, and the integrity of financial relationships in a context of institutional erosion.

It is in this context that **we view blockchain and tokenization not as abstract innovations, but as concrete and promising tools to address a series of structural challenges**. These technologies offer unique capacities for **compliance-by-design, traceability and real-time**

monitoring of funds, mobilization of new liquidity, automated reconciliation and reporting, and lower-cost infrastructure, all of which are critical to re-establishing trust and operational viability in crisis-affected markets.

This is precisely why we believe in the **DebLeb** initiative. From the research and exploratory phase to technical design and now toward **pilot implementation in Lebanon's microfinance sector**, we see DebLeb as a serious attempt to build a new infrastructure for decentralized financial coordination, grounded in standards, transparency, and local collaboration. Looking ahead, we also see potential for replication in other MENA economies facing similar constraints.

Of course, it is not always easy to initiate such innovations, particularly when it comes to **regulatory alignment and governance coordination**. These are complex topics that require time, trust-building, and dialogue among diverse stakeholders. However, we are convinced that the potential benefits in terms of impact, accountability, and system resilience make it well worth the effort.

Despite common misperceptions around blockchain, often seen as complex or speculative, we are convinced that, when applied thoughtfully, it offers a **counterintuitively sober, secure, and risk-reducing path forward**. It may not eliminate risks entirely, but it can meaningfully reframe and reduce them, particularly in the domains of capital deployment, fund governance, and post-crisis reconstruction.

As an institution on the front lines of development finance, and in direct contact with the realities on the ground, we are committed to supporting this approach, not as a technological gamble, but as a pragmatic, forward-looking solution tailored to the structural needs of the private sector in fragile economies.

Sébastien Fleury, Regional Director of Middle East, Proparco – AFD Group

2.2 Project Financing

With a viable financial infrastructure in place, investors in development finance need to fulfil their fiduciary duties in executing their mandates. This involves aspects of due diligence and project appraisal that benefit from detailed, reliable, and immutable research and monitoring data that tokenization will provide, as we shall discuss in Section 2.4. It also requires careful structuring of deals and capital, along with effective portfolio management. We refer to these functions collectively as **project financing**.

Specifically, funding is secured from institutions such as DFIs, commercial lenders, and/or equity investors. A blend of capital instruments, including debt, equity, and mezzanine, alongside other supporting elements such as grants and guarantees is chosen. Then, a funding deal is struck with monitoring and fund release mechanisms that allow investors to discharge their fiduciary duties and development finance mandates. Some unique aspects here include the duty to balance financial returns with development impact, the duty to uphold **Environmental, Social, and Governance (ESG)** standards, and the duty to promote **additionality** (i.e. to complement rather than to compete against commercial finance), etc.

Tokenization brings both new ways to development project financing deals and new features that facilitate their management.

For example, **Programmable Infrastructure Bond** is an emerging instrument that integrates tokenization with traditional infrastructure bonds. New blockchain-based programmable features such as real-time reporting, greater transparency, automated, conditional disbursement, and automated compliance checks, etc., become possible throughout the lifecycle of an infrastructure project. Tokenization also brings the potential of easier trading for investment positions, which improves liquidity and facilitates portfolio management. Such instruments can also be made more readily accessible to smaller investors, thereby increasing inclusion.

Another example that is receiving attention in commercial finance but also extends to development finance is **tokenized Climate Bonds** and its society-oriented cousin, **Impact-Linked Finance**. Tied to ESG and/or **UN's SDG (Sustainable Development Goals)** indicators as well as metrics in health and education, they are a new class of instruments particularly useful for environmental impact and social development finance. Tokenization similarly brings the possibility of real-time impact tracking, broad investor access, improved efficiency, reduced cost, and rich programmability.

Operational domains where this aspect of tokenization is most evident include private sector development finance, infrastructure finance, and social development finance, among others. It brings new features and new possibilities that safeguard the investment, facilitate the management, and augment the impact of development finance.

Connectivity Credits: Tokenized Incentives for Universal Internet Access

By Harry Wilson, Product, Giga – UNICEF
and Christopher Fabian, Co-Lead, Giga – UNICEF

Giga is a joint initiative between UNICEF and the International Telecommunications Union with the mission to **connect every school to the internet**, and every young person to information, opportunity, and choice.

Around the world, however, financing connectivity faces a common problem in public subsidies – ensuring that money truly translates into functional, reliable internet access.

Last-mile connectivity to schools depends on navigating a complex and opaque value chain. Reaching the 50% of the world's population that remains offline requires coordination between public funding, large infrastructure providers (such as fiber, tower, and data center companies), and small, local internet service providers (ISPs).

Large infrastructure firms often possess underutilized assets that could serve unconnected areas, but lack a viable business case to operate in underserved regions. Conversely, small ISPs do have the local demand and economic incentives—but typically lack the collateral, liquidity, or administrative capacity to qualify for and deliver on public subsidies. Meanwhile, available public incentives—distributed across international, national, and local levels—are often under-deployed due to inefficiencies and trust gaps.

Connectivity Credits are a tokenized asset designed to align these stakeholders without requiring traditional trust mechanisms like heavy reporting or upfront collateral. The Credits act as **programmable 'proofs of connection'** for socially valuable institutions and can be redeemed for infrastructure access or public incentives.

Each time a small ISP connects a public institution (e.g., a school or health center), they earn Connectivity Credits. These Credits are minted using real-time data from an open-source monitoring app installed at the connected institution. Typically, the small ISP redeems the Credit with a large infrastructure provider (infraco) for excess data capacity, which the ISP can resell locally. The infraco, in turn, can use the Credit to claim reimbursement from a subsidy pool composed of **blended public and private capital**.

By functioning as a **pay-for-results** mechanism, Connectivity Credits reduce friction and build trust in subsidy disbursement. They also bring full transparency to transactions across the value chain. The Connectivity Credits model **is currently being piloted** in Kenya, Malawi, Mexico, and South Africa.

Internet connectivity is often hampered by a confusing mix of regulations, technical limitations, political constraints, and funding inefficiencies. A marketplace for Connectivity Credits introduces a transparent, results-based model for incentivizing and financing last-mile access. Leveraging public blockchain technology, it offers the potential to correct market failures and ensure that critical public goods—like the internet—are accessible to all.

By Harry Wilson, Product, Giga – UNICEF
and Christopher Fabian, Co-Lead, Giga – UNICEF

2.3 Risk Management

While the development and management of development finance projects are functional areas that tokenization can contribute to, the underlying logics and mechanisms follow what we have just discussed. More pertinent to investors in development finance, and an area further enriched by tokenization, is risk management.

Like international commercial finance, development finance projects are sensitive to credit risk, political risk, currency risk, and market risk, etc. In the case of debt instruments such as bonds, tokenized bonds are being explored as a promising approach, offering innovative system architectures that enhance transparency and streamline processes. A crucial aspect in their design is how to leverage tokenization to mitigate risks and improve risk management.

For example, programmable smart contracts can automate repayments and flag default risks early, while real-time visibility into cash flows and project performance helps credit assessments; both serve to mitigate credit risk. Cross-border investments via tokenized assets, especially using infrastructure as described in Section 2.1, reduce dependency on local banking infrastructure as well as exposure to political and sovereign risks. **Blockchain-based FX swaps** may offer cheaper hedging options against currency risk. Similarly, tokenization broadens market participation and promotes price discovery, reducing market risks. These considerations directly apply to development finance.

Some risks are unique, or at least uniquely salient, to development finance, such as environmental and social risk, reputational risk, and development impact risk, etc. Tokenization technologies are now being tailored to address these dimensions more effectively. For example, during the COP28 TechSprint - a global competition organized by the Bank for International Settlements (BIS) alongside the COP28 Presidency and the Central Bank of the UAE - a winning, open-source green bond solution by FeverTokens showcased how **modular smart contracts** can be used to ensure data integrity and compliance with green bond standards.

An integral component of risk management is **compliance**. Tokenization has also proven to be an asset for compliance in commercial finance in ways that translate well into development finance. First, tokenization improves transparency and auditability, thanks to immutable ledgers and real-time monitoring that we referred to repeatedly above. Similarly, impact and ESG compliance can be assured. Second, smart contracts can automate access control and rule enforcement, improving compliance efficiency and removing the human factor. Regulatory reporting can similarly be automated. Third, token issuance and trading can act as gatekeepers for KYC/AML, ensuring compliance henceforth.

Additionally, unique tokenized vehicles are becoming available for risk management in development finance. For instance, **Tokenized Credit Enhancement** is the use of blockchain-based tokens to facilitate credit enhancement mechanisms that reduce the credit risk.

A **first-loss token** may be used to absorb default losses before senior tranches, reserve funds locked by smart contract may be triggered when conditions are met, or **tokenized guarantees** may become redeemable when credit events occur.

MDBs, DFIs, and development agencies could use tokenized vehicles like these to help other investors participate.

FundsChain: End-to-End Traceability for World Bank Investment Project Financing

Compiled by Ronnie Hammad, Consultant, World Bank

Beginning July 1, 2025, **all new Investment Project Financing (IPF) operations will be launched with FundsChain**, the World Bank's blockchain-based platform designed to digitize recordkeeping and enable full traceability of fund flows throughout the project lifecycle.

IPF operations represent the core of the Bank's development lending, channeling medium- to long-term investments into sectors such as infrastructure, health, education, agriculture, and public administration across low- and middle-income countries. Historically, these projects have depended on fragmented and paper-intensive systems, where disparate ledgers slow down disbursements, complicate audits, and limit the effectiveness of fiduciary controls.

FundsChain replaces this patchwork with an **integrated, tamper-proof ledger accessible to all authorized stakeholders, including borrowers, development partners, and auditors**. The platform enables real-time tracking of disbursements and expenditures, enhancing transparency, reinforcing trust, and strengthening oversight.

By streamlining records management and harmonizing reporting across jurisdictions, the platform delivers **faster and more cost-effective transactions, improves auditability, and reinforces anti-corruption safeguards**. Since its initial deployment in September 2024, FundsChain has supported eight projects across nine countries, ranging from MSME competitiveness in Moldova to flood management in the Philippines, youth employment in Kenya, and resilience programs across Bangladesh, Madagascar, Comoros, Mozambique, and Mauritius. Initial feedback from country teams and clients has been overwhelmingly positive.

Designed to integrate seamlessly with existing workflows, **FundsChain does not replace current disbursement or reporting procedures but enhances them**. Through API connectivity with the Bank's Client Connection, it will automate key processes such as reporting, onboarding, withdrawals, and reimbursements. Every transaction is immutably recorded on a distributed ledger, down to the invoice level. Supporting documentation is uploaded to secure storage according to borrower-defined criteria; while missing files lower a project's Traceability Index, they do not interrupt disbursements. Access is strictly role-based to ensure data relevance and confidentiality. The system also accommodates project restructurings without compromising historical data integrity.

Looking ahead, **future enhancements include automated financial reporting, programmable disbursements through digital tokens, and interoperability with central bank digital currencies**. Integration with the Bank's procurement platform, STEP, is also planned, paving the way for full-cycle automation in audit trails and contract monitoring.

Compiled by Ronnie Hammad, Consultant, World Bank

2.4 Monitoring & Evaluation

One functional area closely entwined with others throughout the lifecycle of a development finance project is **monitoring and evaluation (M&E)**. Tools unlocked by tokenization can transform development finance not only in intra-project M&E but also in inter-project M&E.

In terms of **intra-project M&E**, tokenization helps with **results-based fund disbursement** and impact monitoring, as we have discussed above. It enables more efficient and resilient deal structures and funding options. During the development and operation of development projects, M&E empowered by tokenization expedites adjustments in contingencies, making the project more resilient.

In terms of **inter-project M&E**, tokenization transforms learning and adaptation. Whereas traditionally much of learning comes from reviews and assessments at the end of a project, with the outcome constituting the main knowledge carried over to future projects, tokenization further makes raw data easily accessible for future reviews and adaptations. Aided by the current explosion in computing power and artificial intelligence, this aspect can be increasingly helpful even for improving day-to-day tasks.

An emerging tool powered by tokenization in development finance that falls under M&E is **Decentralized Aid Tracking**. It refers to the use of blockchain to track the flow, use, and outcomes of aid funds from donor to end beneficiary.

Instead of relying on centralized databases, decentralized systems combined with the possibility to verify, audit, and automate transactions independently can transform the deployment of aids. Transparency, immutability, disintermediation, and real-time traceability are some of the advantages that decentralized aid tracking brings.

2.5 Sustainability & ESG

A topic that is gaining a lot of attention, including controversy in certain sectors of society and political persuasion, is ESG. In development finance, sustainability and ESG goals are the core objectives that face growing challenges. Tokenization can alleviate the stress that development finance experiences on the front of ESG by making it more transparent, efficient, accessible, and liquid.

The mechanisms through which this works follow the same logic as laid out in the preceding paragraphs in Section 2. Instead of repeating them, let us examine some applications that blend tokenization in ESG.

Tokenized Green Bonds and **ESG Bonds**, for example, combine traditional development finance with ESG trackers powered by tokenization. They leverage elements that we have discussed in 2.2 through 2.4. Results-Based Financing that **conditions token payouts** on verified ESG outcomes can complement said bonds or act as features in other development finance scenarios.

Tokenization also paves the way for new markets and market participation. For example, **tokenized Carbon Credits** and **Biodiversity Units** allow for standardized, liquid, and trackable trading.

Blockchain is instrumental in verifying the originality, authenticity, and lifecycle of each traded unit. Further, tokenization opens the door for **Fractional Ownership**, which not only improves market participation, thereby increasing liquidity, but also boosts inclusion by letting small investors participate in large-scale ESG projects.

How Can the Tokenization of Financial and Real-World Assets Accelerate Impact Finance?


By Louis Bertucci, President, Blockchain for Good
and Jacques-André Fines Schlumberger, Director of Operations, Blockchain for Good

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Impact finance, which aims to accelerate a sustainable or even regenerative transformation of the real economy while providing evidence of its positive outcomes, can find in Web3 technologies a powerful amplification lever. Tokenization, when combined with oracles and digital Measurement and Reporting and Verification (dMRV) systems, can enhance the transparency, efficiency, and automation of impact-driven digital assets.

Smart contracts, autonomous programs deployed on public blockchains, enforce predefined rules without intermediaries. In impact finance, they enable automated asset management, reduce transaction costs, ensure regulatory compliance, and facilitate the tracking of impact commitments, for example, through **conditional disbursements or early risk alerts**.

Oracles connect smart contracts to real-world environmental and social data, allowing clauses to be automatically triggered based on measurable indicators. dMRV systems support reliable, real-time monitoring of impact performance, helping to prevent greenwashing.

Tokenizing impact aligns with the principle of **double materiality**: it captures both the effects of environmental and social risks on an asset's value ("outside-in") and the effects of economic activity on the broader world ("inside-out"). Tokenization also improves liquidity, enables portfolio diversification, and supports fractional ownership, thereby opening access to smaller or cross-border investors in impactful projects.

Despite its promises, the adoption of Web3 tools in impact finance faces challenges: legal uncertainty, limited blockchain interoperability, scalability constraints, and security risks related

to smart contract code and private key management. Structural barriers also persist—such as the difficulty of quantifying adaptation costs or accessing reliable, localized data. This is particularly evident in **biodiversity finance**, where the lack of a unified metric and varied methodologies hinders consistent assessment.

As economists increasingly explore how to integrate nature into macroeconomic models, decentralized technologies—by redistributing trust, certifying data, and enabling new governance models—may play a foundational role in the evolution of impact finance.

By Louis Bertucci, President, Blockchain for Good
and Jacques-André Fines Schlumberger, Director of Operations, Blockchain for Good

2.6 Stakeholder Engagement & Partnerships

Last but certainly not least, tokenization holds transformative potential for stakeholder engagement and partnerships in development finance. Traditionally, **this field is heavily top-down**, with donors, governments, and large institutions making decisions; the communities that development finance projects supposedly serve are usually only consulted, without co-ownership. Participation, even from those limited high-level stakeholders, usually ends after implementation or reporting.

With tokenization, projects can be structured to **reward participation**, turning passive stakeholders into active partners. Moreover, real-time, long-term monitoring and reporting entail that the communities that these projects serve, and whose **interests are aligned with positive outcomes**, play active roles that ensure lasting impact even after projects end.

In terms of partnership structures, development finance projects are traditionally rigid, with **limited appetite for innovation** in project design or funding structure. With tokenization, new actors such as tech startups, community groups, global investors, and concerned citizens can participate more easily.

For example, **Decentralized Autonomous Organizations (DAOs)** made up of these players can engage governments, MDBs, and DFIs, etc. in deal structuring as well as project governance. Innovative financial instruments have also become available, some of which we have discussed in the preceding paragraphs in Section 2.

One concept that is emerging, for instance, is **Public-Private-Community Partnership (PPCP)**, which uses tokens to align interests across governments, private investors, and local stakeholders.

The **speed and flexibility enabled** by tokenization also open new avenues for development finance. Whereas traditionally development finance projects are slow-moving, due to bureaucracy, risk aversion, and institutional inertia, tokenization is marked by near-instant transactions, automation via smart contracts, and agile reallocation of funds. It forces a change in the system that emphasizes adaptation to on-the-ground conditions, which more closely determine the results and impacts of development finance projects.

This change is conducive to **cross-border collaboration,** traditionally worse affected by inefficiencies. It motivates and incentivizes actions from the diaspora; further, it encourages multilateral collaboration in achieving the common development goal.

3. Operational Domains Where Tokenization Can Transform

As analyses in the last section show, tokenization presents an intersectional opportunity for development finance, unlocking new capital flows, improving transparency, advancing efficiency, and increasing participation. Having examined what this looks like in several illustrative functional areas, we move on to explore how tokenization transforms development finance across functional areas in representative operational domains in this section.

3.1 Public Sector Finance

Public sector development finance refers to publicly backed financial efforts aimed at supporting economic, social, and infrastructure development, especially in developing countries or underserved areas. This includes **multilateral** aid in the form of loans and grants (e.g. through MDBs), **bilateral** loans (through DFIs) and grants, sovereign lending, and budget support, etc.

As the level and complexity of bureaucracy involved are particularly high, public sector finance tends to be slow, complex, and inefficient. Tokenization is well-suited to address these issues. Since we have discussed many of the mechanisms in Section 2, in the following, we only delve into the mechanisms where repetition will not be incurred.

1. Transparency and accountability are traditionally wanting, due to the scales of public sector finance projects and the number of players involved. Once funds are disbursed, it is often hard to see where they go and what impact they have. Tokenization creates **immutable audit trails** for every transaction, reducing corruption and fund misallocation. Technologies enabled by tokens further facilitate impact tracking. With improved transparency and accountability, more donors will likely be willing to engage, and support from the citizenry will increase.

2. Intermediary costs and bureaucracy are traditionally high. Funds pass through multiple layers of agencies, banks, and consultants, eating up resources and causing delays. Meanwhile, funds often sit idle. Tokenization can support disintermediated fund allocation. Smart contracts and tokens can automate processes based on clearly defined criteria (results, impact verifications, or ESG metrics, etc.), too. These features serve to reduce overhead, boost efficiency, and reduce cross-border risks.

3. Pools of capital are traditionally limited, especially in emerging economies. A few large players, often burdened by geopolitics, dominate, and many good projects are underfunded or overlooked. Tokenization facilitates broader participation, including cross-border investments. It also enables new financial instruments with lower entry points and global reach.

4. Reporting and monitoring are traditionally delayed, which compromises the agility of public sector finance and makes impact assessment difficult. Tokenization alongside technologies such as **Internet of Things (IoT)** holds the cards to transform this aspect, as we discussed in Section 2.4.

5. Community inclusion and local ownership are traditionally overlooked. Tokenization opens the door to numerous paths where inclusion and partnership can be reimagined, as we discussed in Section 2.6.

3.2 Private Sector Development Finance

Private sector development finance refers to financial support aimed at enabling private companies in developing economies or underserved areas to grow, especially in ways that contribute to sustainable development goals (SDGs). MDBs, DFIs, and impact investors are the typical supporters, including the application of blended finance structures. It suffers from a different set of challenges compared to public sector finance, though with some similarities.

1. Access to capital is traditionally limited for private sector development, especially in areas in dire need of assistance. **Small and mid-sized enterprises (SMEs)** often cannot access enough capital due to perceived risks, while local capital markets are often shallow and underdeveloped. Tokenization, thanks to fractional ownership and to cross-border access that we have repeatedly emphasized, holds the cards to expand access to capital, especially for SMEs. The cross-border aspect also helps with **Diaspora Engagement**.

2. Private capital participation is traditionally low, as private investors are wary of the risks and uncertainties. Blended finance options exist, but they have been complex, often opaque, and poorly understood. With tokenization, new, more efficient **Blended Finance Structures** become available. As before, this involves strategic use of public or philanthropic funds to mobilize private capital for development outcomes. Risks are more easily segmented, and private investors are de-risked while having access to higher yields. Tokens and smart contracts make blended finance considerably more transparent and trustworthy, thereby more effective.

3. Liquidity is traditionally low, with little to no **secondary market access**. Tokenization opens private sector development projects to efficient markets. With broader participation created, tokenization can provide a **viable exit mechanism**; further enlarging the pool of capital, both because capital is recycled faster and because investors previously wary of illiquidity have their liquidity concerns assuaged.

4. Transaction costs and inefficiencies are traditionally high. Private sector development deals are often highly bespoke while involving a considerable number of public sector players and DFIs. Its high level of specificity is at odds with the high level of bureaucracy it experiences. Tokenization can drastically simplify **deal customizations**, at least for features, standards, and requirements that will be automated by smart contracts. While it cannot replace negotiations, it is able to make the implications of each term more predictable as a result.

In production, tokenization improves operational efficiency in ways that we have detailed previously.

5. Reporting and monitoring are traditionally delayed, resulting in poor impact assessment and difficulty in adjusting and adapting. Tokenization's roles are identical to those in public sector finance.

6. Transparency and trust are traditionally issues, too. The ways that tokenization helps are analogous to those in public sector finance.

3.3 Infrastructure Finance

Infrastructure finance focuses on funding large-scale infrastructures essential for economic growth and social welfare, especially in developing economies and underserved regions. It covers diverse projects in transport, energy, water, and telecom, etc. As usual, the drive is beyond immediate returns, with impact, particularly for economic and social development pursuant to SDGs, being the metric against which infrastructure finance projects are evaluated. Often, deals are done with Public-Private Partnerships (PPPs), development banks (MDBs and DFIs), or blended finance.

Many pain points faced by public and private sector development finance also torment infrastructure finance. Issues with liquidity, access to capital, intermediary costs, inefficiencies, and transparency are rather analogous. Some unique or perhaps more uniquely salient issues include risk diversification, compliance, administrative costs, and monitoring gaps.

1. Risk diversification is traditionally hard. Infrastructure projects come with huge upfront investments and long payback periods. During this period, **cumulative risks** are high. Thanks to improved market participation, liquidity, and fractional ownership, tokenization can help investors build a more diversified portfolio of infrastructure tokens, something that only large financial institutions have been able to do, but is now available at a small scale. Moreover, with improved blended finance structures, risk-sharing becomes easier.

2. Compliance is traditionally another hurdle that introduces inefficiencies. Tokenization allows regulatory requirements to be embedded directly into tokens, streamlining compliance across multiple jurisdictions. As such, tokenization can be a great asset to PPPs with strict oversight.

3. Administrative costs are traditionally high, especially when compliance and PPPs are involved. The risks of corruption, cost overruns, and misuse of funds are high, especially in regions with weak governance. Tokenization presents a solution not dissimilar to how it automates regulatory compliance. Much of the human factor in project administration can be supplemented or substituted with smart contracts. Even when smart contracts offer limited direct support, tokenization can enhance monitoring and reporting, improving project administration and oversight.

4. Monitoring gaps are traditionally wide. It is often difficult to track project milestones, fund usage, or performance in real-time, especially when impact, e.g. in terms of sustainability and ESG metrics, is concerned.

The challenge here is more salient than in common public and private sector finance scenarios, due to the complexity and duration of the projects, and the difficulty and time required for impact assessment. Nonetheless, the ways tokenization can help remain consistent with those outlined in the earlier operational domains.

3.4 Social Development Finance

Social development finance refers to the funding of projects and initiatives aimed at improving social outcomes, including education, healthcare, security, and essential sustenance (e.g. clean water, affordable housing, and climate resilience), especially in underserved communities. Social development finance covers social protection programs that secure funding for safety nets such as pensions and unemployment benefits, as well as humanitarian and emergency funding such as disaster relief, among others.

Since social development finance shares aspects of public sector and infrastructure finance, it has many similar pain points that tokenization can likewise address. Access to capital, liquidity, transaction cost, bureaucracy and inefficiency, and transparency and accountability are among them. However, social development finance stands out in a couple of ways: Beyond the usual players in the aforementioned operational domains, philanthropic organizations and NGOs have a significant presence; thus, grants constitute a significant portion of the funding.

Even compared to infrastructure finance, impact materializes over a **longer timeframe** and is **difficult to ascribe**. These idiosyncrasies correlate with unique pain points.

1. Incentivizing outcomes is traditionally hard, as grants and loans tend not to tie into tangible results. With programmable smart contracts, tokenization can support monitoring and evaluation over a long timeframe and apportion rewards to stakeholders according to proven, long-term performance.

2. Real-time monitoring is traditionally lacking, with heavy reliance on siloed, often paper-based data. Tokens can integrate with real-time tracking of impact metrics. Together with the point above, this aligns financial returns, especially over time, with verified social outcomes.

3. Agility is traditionally low in response to fast-developing events such as crises, wars, and pandemics. Tokenization helps by disintermediating part of the process, reducing bureaucracy and complexity. Global philanthropic investors and donors can engage directly with local agents on issues that they care about. While this aspect might increase certain risks, other tools and features of tokenization can effectively mitigate them.

3.5 Financial Inclusion

Financial inclusion in the context of development finance refers to the process of providing affordable, accessible, and sustainable financial products and services to those traditionally unserved or underserved communities. These services include savings, credit, insurance, payments, and remittances, etc. delivered in a responsible and transparent manner.

As we discussed in Section 2.1, financial inclusion is often the prerequisite for many development finance initiatives, including aid distribution. It is also the foundation on which the local economy and capital market can reliably grow. Thus, it faces certain unique challenges, unlike the operational domains that we have analyzed so far. Nevertheless, tokenization is able to address them.

1. Access to investment is traditionally poor. Residents of low-income and underbanked regions cannot participate in capital markets or own high-value assets. This deficiency holds local communities back from accumulating generational wealth, keeping them poor as a result. Banking system based on blockchain and tokenization, in comparison, offers broad, affordable access not only to savings services but to investment opportunities. Thanks to fractional ownership, assets split into smaller, tradable digital tokens significantly lower the access barrier.

2. Access to credit is traditionally poor, too, as traditional efforts in financial inclusion have been limited by conventional banking models that require local intermediaries.

Tokenization paves the way for innovative **DeFi (Decentralized Finance)** options. Furthermore, token-based banking systems—such as those outlined in Section 2.1 and developed by industry leaders like DebLeb—enable traditional financial institutions and governments to collaborate with impact investors and DeFi providers to address urgent financial inclusion challenges, chief among them being access to credit.

3. Community participation is traditionally low in development projects, due to a top-down approach that cannot **take into account local needs** and peculiarities sufficiently. The token-based financial system that we are referring to has the tools to engage local communities more closely, as laid out in Section 2.6. Thus, community members can invest in projects that directly impact themselves, increasing ownership and improving oversight.

4. Transparency and trust are traditionally low in financial systems in underserved communities. With financial inclusion powered by tokenization, transactions are recorded on an immutable and auditable ledger. This helps track how aid or investment funds are used. It also deters corruption and boosts trust among donors, governments, and beneficiaries.

5. Financial transactions are traditionally expensive and inefficient. Underserved communities often rely on unreliable intermediaries for sending and receiving money, which incurs high fees, delays, and potential losses. Blockchain minimizes transaction costs and makes them virtually instantaneous.

6. Aid distribution is traditionally hindered. Due to poor banking infrastructure and corruption, aid and subsidies are often delayed or misallocated. Tokenization enables **programmatic aid distribution** via smart contracts, upon live metrics against preset conditions, directly and instantaneously to the intended recipients.

Likewise, many traditionally unthinkable financial services in the context of financial inclusion are made possible by tokenization. For example, **smart contract-based insurance** addresses not only the issue of availability but also boosts transparency, trust, and reliability.

3.6 Local Economic Development

Local economic development finance refers to financial initiatives aimed at improving the economic outlook and quality of life for a specific area, often through promoting business growth, job creation, and sustainable development. It is intimately linked to development finance topics such as infrastructure, small business financing, PPPs, and ESG.

Compared to private sector development finance, local economic development is unique in the actors involved, financial tools available, and development strategy. It is often led by local governments, community organizations, and local NGOs. Municipal bonds, community grants, and local tax incentives are some of the tools often used. Most importantly, local economic development finance is **location-based** rather than sector- or firm-based. As such, it faces unique challenges that nonetheless can benefit from tokenization.

1. Access to capital is traditionally limited, especially in small and/or underserved communities, especially for large infrastructure projects, due to limited borrowing capacity and a lack of investor interest. Tokenization, with fractional ownership of assets, opens investment opportunities to a broader investor base, particularly local stakeholders. It also makes attracting investment from the diaspora easier.

2. Community engagement is traditionally low, as local economic developments often lack local buy-in due to top-down management. Tokenization opens the door to plebiscites on fund allocation, both attracting local, grassroots investment and encouraging civic participation. The latter involves **gamification** with tokens, e.g. by rewarding engagement and contributions.

Beyond these points, local economic development finance also benefits from increased transparency, operational efficiency, and improved access to capital—paralleling many of the advantages discussed in Section 3.5 on financial inclusion.

3.7 Capital Market Development

Capital market development finance refers to initiatives aimed at developing and strengthening a country's capital markets, especially in emerging economies. This includes creating regulatory frameworks, supporting financial infrastructure, and broadening the investor base, among others. Capital market development improves capital access for commercial as well as other development finance projects.

As such, it is **one of the most complex and durable operational domains** of development finance. MDBs and DFIs, local financial authorities, market infrastructure providers, financial institutions, and institutional investors, etc. all play integral roles. Many of the pain points that it suffers are analogous to the ones that we have analyzed above, notably in transparency and efficiency. Still, some aspects are more salient in this context.

1. Liquidity is traditionally low in fledgling capital markets. This discourages participation and hinders market development, which forestalls amelioration in market access. Tokenization is equipped with fractional ownership, low transaction cost, uninterrupted secondary market availability, and cross-border access; consequently, it represents one of the best tools available for enhancing liquidity.

2. Transactions are traditionally costly and slow. Intermediaries add layers of cost and delay, reducing the efficiency of issuance and trading. Tokenization helps disintermediate capital markets, enabling more direct and streamlined access. For those intermediaries that remain essential, tokenization integrates seamlessly with existing infrastructure to accelerate processing and reduce complexity.

3. Transparency is traditionally low in emerging capital markets. Weak disclosure practices, inefficient reporting, and the absence of real-time data reduce investor confidence, thwarting capital market growth as a result. Tools to remedy these are traditionally either cost-prohibitive or unavailable due to the market's immaturity. Tokenization offers low-cost, accessible tools that improve transparency and boost investor confidence.

4. Compliance is traditionally costly and ineffective. Tokenization introduces programmable compliance with smart contracts. While not omnipotent, it effectively simplifies compliance and promotes market participation.

5. Financial inclusion and community engagement have traditionally been limited in emerging capital markets. The mechanisms through which tokenization addresses these challenges mirror those discussed in Sections 2.6, 3.5, and 3.6.

4. Risks, Considerations, and System Design

As great as the potential for tokenization to transform every aspect of development finance, the actualization is not without risks and pitfalls. Meticulous system design by key stakeholders for issues across five major categories is crucial for avoiding the pitfalls and for addressing the risks.

4.1 Legal and Regulatory Issues

At the top of the list, legal and regulatory uncertainty hinders the implementation of tokenized development finance and has been the go-to line for opponents of change.

Specifically, **legal and contractual ambiguities** persist around tokenized assets. Many jurisdictions have yet to clearly define whether a token constitutes a security, commodity, or another asset class. This creates confusion around the **enforceability of rights** and frustrates **fiscal planning** and accounting.

Further, both local governments and businesses worry about regulatory changes occurring mid-project. In public sector finance, questions of legal enforceability at the local level can introduce unforeseen complications. Ultimately, one question encapsulates this issue: *While smart contracts may be enforceable on-chain, what happens to enforceability off-chain?*

Related to legal and regulatory ambiguity across jurisdictions is **cross-border legal complexity**.

Tokenized assets promise global reach, but legal systems — particularly given the ambiguity above — differ drastically, especially around investor protection, taxation, and data residency. For projects spanning multiple jurisdictions, legal enforceability and compliance become even more complex. One question sums up the issue: *While some jurisdictions have legal clarity, what happens to international projects?*

Another facet of cross-border legal disparity is **regulatory arbitrage**. Some development finance businesses, especially fintechs, may deliberately base themselves in jurisdictions with looser regulation. This undermines both global regulatory maturing and the spirit of development goals central to development finance. The question that summarizes this issue is this: *What is stopping a race to the bottom in terms of regulation in tokens?*

Beyond these, an issue that spans legal and technological concerns relates to due diligence and fraud risk. At times, tokenization may **overly abstract RWAs**, which goes beyond the experiences and established practices in data and verification. This raises concerns about asset verification, fraud, and misuse of funds.

The question that condenses this issue is this: *If tokens represent some kind of ownership, what is it exactly, and what happens if a project never materializes or underperforms?*

Eventually, these issues should be addressed with legal and regulatory clarity, including regulatory alignment across major economies. As we explained in Section 1, development finance is facing unprecedented challenges that necessitate answers at the international level. Hence, regulatory alignment should ideally be multilateral, possibly becoming part of international law.

In the meantime, however, pioneering projects should follow the dual principles of **high standards** and **high agility**. We should voluntarily align with jurisdictions having the highest regulatory standards around tokenization that may be involved or implicated directly or indirectly in the project. When no regulatory clarity exists, we should make the best effort in securities compliance, KYC/AML, licensing, custody, taxation, data protection, and investor protection, etc. These efforts should follow clearly-defined, publicly-available rules.

Meanwhile, the smart contract architecture on which tokenization systems are built should be agile. This affords us the flexibility to adapt to changing regulatory landscape, especially considering that many development finance projects last years or decades.

4.2 Technology Issues

Another major category of issues is technological. They are less ambiguous, but addressing them is no less urgent if tokenization is to realize its full potential.

At the core of technology issues is the consideration of **interoperability and standards**. Many token platforms are siloed and not easily compatible, which locks projects into closed ecosystems and hinders the free transfer of value. Without interoperability, it is hard to scale or integrate projects, especially as they evolve and expand across regions. In addressing this issue, we should ask: *How can tokenization be more interoperable?*

While interoperability is part of the answer to **scalability**, smart contract design and architecture are another crucial aspect. Poorly written smart contracts may come with bugs, vulnerabilities, or inefficiencies that hinder their operations at scale. As projects evolve, flexibility in the smart contract architecture that makes updates more manageable is also conducive to scalability. Here, the question is: *How can smart contracts themselves be written better?*

Beyond scalability, **data integrity and cybersecurity** are major considerations; the risks become more critical when **token custody** is required. Blockchain projects are vulnerable to hacking, coding errors in smart contracts, and loss of private keys. Since ledgers are open to the public, data privacy and surveillance concerns also arise. With good practices, nevertheless, tokenization could be made safer than existing alternatives. Hence, the question to ask is: *What are the best practices in data and security in tokenization?*

Meanwhile, with tokenization as an option, one may go to the other extreme and over-engineer convoluted systems when simpler solutions would suffice. Perhaps certain features need not rely on tokens; perhaps less computationally expensive smart contracts are more appropriate. When improperly balanced, projects risk becoming too complex, unmaintainable, or out of touch with local realities. In considering this issue, the question to ask is: *Where should tokenization be used for the benefit of the project, and how?*

The answer to these questions lies in good system design principles at the technology level, with emphasis on, just as is the case with regulatory issues, high standards and high agility. In the former, this entails high degrees of openness, perhaps through **open sourcing**, and primary emphasis on interoperability, scalability, security, and efficiency. Whenever existing industry standards are clear, their adherence should be a priority; when standards are lacking, best efforts should be made to enhance key issues that underpin interoperability, scalability, security, and efficiency.

In the latter case, because standards are evolving and best practices improve over time, tokenization for development finance must be agile. Systems should be easily maintainable and upgradable, with minimal downtime and maximum robustness. A **package-oriented smart contract framework** is best positioned to be the solution in this regard.

4.3 Market and Operational Issues

The third category of issues is sometimes mingled with technology concerns, but the factors to consider go beyond technological ones and the expertise to address it spans multiple fields. These are market and operational issues.

Closest to technology is the **on/off-chain asset mismatch**. Many tokenized assets still reference or depend on off-chain claims. Hence, the token is vulnerable to off-chain processes and contingencies; its validity also relies on timely data sync, with lag being a risk that could lead to market failures (e.g. with information arbitrage). This issue is encapsulated by the question: *Is the token as good as what it represents?*

This potential for mismatch also opens the door to intentional abuse through fraud and scams. Vulnerable populations that development finance aims to serve—such as those targeted by financial inclusion or social impact initiatives—may be disproportionately exposed. In turn, this erodes trust in the technology and slows adoption. The central concern here becomes: *Can the public easily avoid becoming victims of scams?*

Another issue that may seek technological solutions is custody and identity management. On the one hand, losing a private key could mean losing access to a tokenized asset. On the other hand, using digital custody solutions brings security and privacy concerns that we discussed above. Compliance may also be complicated by the use of decentralized or pseudonymous wallets.

This issue reflects essentially this question: *What is the appropriate balance of efficiency and compliance, of convenience and security, and of decentralization and centralization?*

Perhaps the headline issue when it comes to market and operation, however, goes to **volatility and liquidity**. Just because tokens can be traded does not guarantee liquidity. When liquidity is low, price volatility can be more pronounced. Tokens can also be exposed to market speculation or manipulation. These idiosyncrasies are not aligned with development goals. Worse, they could undermine development projects. Here, we ask: *Is the promise of liquidity an advantage to the project?*

Unlike the previous issues, market and operational issues do not have universal "best practices". Rather, the best practice is to analyze each case for a customized mix of answers when it comes to the questions that we have raised above (and many others). For major players in development finance, it is also important to consider each case in view of their entire portfolios as well as their own expertise and experiences.

4.4 Governance Issues

Tokenization promises to improve access as well as stakeholder engagement and accountability, which are development goals themselves and qualities vital for the success of development finance projects. Decentralized Autonomous Organizations (DAOs) are playing central roles in implementing this.

Still, governance and accountability issues warrant careful design and full transparency in operation. Who controls the protocol, who can update the smart contracts, and how decisions are made are just some of the questions that must be clarified. This is especially true for **private and consortium blockchains**. The question that captures this issue is: *Which governance structure aligns with the development finance project the best?*

Another related issue is the **digital divide**, which is particularly palpable in development finance. While tokenization can democratize access, it can also exacerbate exclusion if rural or marginalized populations lack digital access or education. The latter aggravates market and operational issues, too, making underserved communities more vulnerable. The question that expresses this concern is: *Is the target community prepared for tokenization?*

Like market and operational issues, these governance issues do not have universal answers, and each case must be examined individually.

Nevertheless, there are best practices in carrying out said examinations so that pitfalls can be avoided and the maximum potential benefits from tokenization can be actualized. They include:

1. Align governance with development goals so that the governance model is structured to promote and protect long-term development objectives. Mechanisms to monitor and evaluate KPIs beyond financial returns should be integral parts of the design.

2. Build for transparency and auditability by storing decisions, voting records, and key project metrics on-chain or with cryptographic proofs and by setting regular, periodic reporting processes.

3. Phase in decentralization by starting with a more centralized or foundation-led model and gradually increasing token-holder engagement and community control as the ecosystem matures. This requires clearly defined upgrade paths and community consensus requirements.

4. Strive for inclusive stakeholder representation by including representatives from all key stakeholders, including local communities. When digital education is poor, **delegated governance** may be an option.

5. Design tokenomics to align incentives so that monitoring, community engagement, and ESG objectives, alongside financial returns, are rewarded.

6. Attend to education and onboarding so that all stakeholders are clear with the governance mechanism and that underserved communities are digitally literate and ready to participate.

4.5 Adoption Issues

Lastly, a consequential but often underplayed category of issues concerns adoption. Standards and fragmentation are perhaps the most significant among them. With numerous platforms and protocols emerging, there is no global standard yet for tokenized assets.

In the larger ecosystem, the regulatory landscape is marked by gaps, imbalances, incongruities, and contradictions. The question that must be answered is: *How can standards be aligned and fragmentation be bridged?*

Beyond innate issues of tokenization, **political resistance and institutional inertia** play an equally poignant role in impeding the growth of tokenization in development finance. Many governments and banks are risk-averse and slow to adopt new technologies, especially in regions where trust in institutions is already fragile. Here, the question is: *How can we institute change in a slow-moving landscape?*

Equally important is the **negative perceptions** of token and blockchain from hype to complexity due to undelivered and unscrupulous projects that failed their promises. In many regions, regulators and conventional investors are wary of tokenized assets as a result. The question that we should answer is: *How can sound development projects distinguish themselves?*

In terms of standards, we believe that existing **standard-setting bodies**, including ICMA, ISDA, and BIS, etc., have central roles to play in token finance. They enjoy recognition by a wide range of stakeholders, and the interoperability with existing, off-chain standards that their solutions can deliver is game-changing. As an extension, we can also work with influential development finance players such as the World Bank or regional development banks to co-create standards that align with ESG, KYC/AML, and fiduciary goals.

Beyond standards, a general road map may be useful:

1. Partner with established actors, such as DFIs, global NGOs, large institutional investors, and reputable fintech companies to leverage their credibility and bring legitimacy to tokenized finance models.

2. Build regulatory sandboxes with central banks and financial authorities for experimentation to satisfy institutional due diligence. As proof of concept, this helps overcome resistances in production.

3. Educate the public and train key actors so that the target community is able to distinguish sound projects from unsound ones. This is also central to governance, as we explained in Section 4.4.

4. Emphasize alignment with development goals by broadening access to capital and improving transparency and monitoring. The former serves to bring in diaspora and retail capital to overcome institutional inertia and regional perception. The latter allows institutions and communities to become more comfortable with tokenization over time.

Embedding Trust in Tokenized Development Finance: The Role of LEI and vLEI

By Alexandre Kech, CEO, GLEIF

As tokenization continues to reshape how assets are exchanged, capital flows, and financial development goals are achieved, the need for secure and standardized digital identity has become increasingly urgent, particularly in fragile and underbanked economies. While tokenization offers unprecedented transparency, efficiency, and stakeholder inclusion, these gains hinge on a critical prerequisite: trust.

A key driver of this transformation is the emergence of **digital asset-agnostic infrastructure**, capable of supporting the seamless exchange of any asset across any platform or protocol. By definition, this kind of infrastructure must be flexible and interoperable, able to accommodate **evolving asset classes** while also bridging traditional and decentralized financial systems.

Success here, however, is dependent on the establishment of a **shared, verifiable identity layer** that is recognized globally.

This is where the Global Legal Entity Identifier Foundation (GLEIF) plays a vital role. With the **Legal Entity Identifier (LEI)**, GLEIF anchors trust in global markets through an ISO-standardized, 20-character alphanumeric code, linked to an entity's verified record in the Global LEI Index— a data bank that is available to everyone, everywhere, free of charge.

Pioneered by GLEIF as the secure digital counterpart to the LEI, the **verifiable LEI (vLEI)**, is a globally standardized form of digital organizational identity. By equipping organizations and their representatives with these cryptographically verifiable identities, the vLEI offers a comprehensive solution for establishing a global digital trust ecosystem.

Unlocking Inclusive Digital Finance

In development finance, where participants range from multilateral institutions to grassroots cooperatives, this digital identity infrastructure is transformative. The LEI/vLEI framework enables:

- **Inclusive onboarding** of microfinance institutions, NGOs, cooperatives, and local banks into tokenized ecosystems.
- Credential-based **access control**, facilitating automated, privacy-respecting KYC/AML processes.
- Verification of issuers, custodians, and fund administrators, boosting **integrity** in capital flows.
- **Cross-border operability**, streamlining aid disbursements, remittances, and blended finance with transparency and traceability.

A Digital Trust Public Good for Development

The success of tokenized systems in driving real-world impact, especially in underserved regions, depends on shared, verifiable identity. The LEI and vLEI provide a not-for-profit, commercially independent, and universal system purpose-designed to meet this challenge. GLEIF calls on policymakers, innovators, and financial institutions to embrace them not merely as regulatory tools, but as essential building blocks for a globally trusted, inclusive digital financial future.

By Alexandre Kech, CEO, GLEIF

5. The State of Practice: Research, Pilots, and Adoption Pathways

Adopting an emerging, transformative technology requires a meticulous, structured process to ensure effective integration while minimizing risk. Research and feasibility studies, proof-of-concept (PoC), and pilot implementation typically precede full-scale deployment. In this section, we first present an overview of current efforts by major development finance institutions, focusing on the existing landscape and functional priorities.

We then discuss how proofs of concept and pilot implementations in other, potentially even more impactful functional areas could take place, with an emphasis on technological architecture that empowers such endeavors. The full overview of completed and ongoing development finance initiatives related to tokenization by MDBs and DFIs can be found in the Appendix.

5.1 State of Play Review

The evolution of tokenization within development finance has progressed gradually but with increasing momentum. While interest in distributed ledger technology (DLT) and smart contracts has grown substantially across the public and private sectors, the translation of that interest into operational impact remains in the early stages. Most multilateral development banks (MDBs), development finance institutions (DFIs), UN agencies, and philanthropic actors are now engaging with tokenization at one of two levels: either by piloting infrastructure-focused projects that modernize core financial mechanisms, or by implementing mission-driven, impact-oriented use cases focused on service delivery, inclusion, or accountability.

At the infrastructure level, institutions such as the World Bank, BIS, and the Swiss National Bank have collaborated on initiatives like Project Promissa, which digitizes government-issued promissory notes using blockchain technology. This experiment seeks to modernize the capital contribution mechanisms of MDBs, replacing paper-based workflows with tokenized instruments that enable automation, real-time tracking, and cost efficiencies. Such projects, while technically contained, are emblematic of a broader shift toward modernizing the machinery of multilateral finance.

In contrast, humanitarian agencies have adopted tokenization to address operational challenges at the last mile. For instance, the UNHCR piloted blockchain-based cash transfers in refugee settings, delivering aid via digital wallets without requiring bank accounts or intermediaries. These pilots illustrate blockchain's potential to facilitate secure identity management, reduce leakage, and empower beneficiaries directly.

Though diverse in design, both institutional categories treat these initiatives as experimental, and rightly so. As with any emerging technology, PoC efforts serve primarily as learning exercises, generating insights for policy, technical design, and ecosystem coordination.

From a technological standpoint, both public and private blockchains have seen comparable levels of use, with each offering distinct advantages and trade-offs. Public blockchains typically provide stronger interoperability, decentralization, and auditability—characteristics that align with the transparency and global accessibility ambitions of many development actors. However, concerns over cost, privacy, and regulatory compliance have led some institutions to adopt private or permissioned networks, which offer more granular control, lower operational thresholds, and greater ease in aligning with local or institutional data governance norms.

These architectural choices are not trivial, and their implications are explored further in Section 5.2 and revisited in our institutional recommendations (Section 6). Some organizations are already navigating this trade-off creatively. A notable example is the IDB's LACChain initiative, which champions a public-permissioned blockchain model—a hybrid architecture designed to combine interoperability and trust with compliance and scalability across Latin American and Caribbean jurisdictions.

A consistent pattern across early-stage implementations is the prioritization of relatively well-understood use cases. Projects have predominantly focused on traceability, transparency, and SDG/ESG-linked monitoring, reflecting a convergence between long-standing technical discussions within the blockchain community and actionable development priorities. These applications map most closely to the functional areas of Monitoring and Evaluation (Section 2.4) and Sustainability & ESG (Section 2.5), where tokenization can immediately enhance data integrity, impact verification, and alignment with performance-based disbursement models.

In sum, while the field is still nascent, the current landscape suggests a growing institutional willingness to experiment with blockchain technologies across both systemic and mission-driven use cases. These early efforts form the empirical foundation for the deeper analysis of initiatives that follow.

5.2 Analysis of Tokenization Initiatives in Development Finance

The following provides a comprehensive review of over 40 blockchain-based initiatives implemented or piloted by development finance institutions (DFIs), multilateral development banks (MDBs), UN agencies, and development partners.

The initiatives span a broad spectrum of use cases and geographies, offering insight into where tokenization is taking root—and where its potential remains largely untapped. A detailed listing of these initiatives is provided in the Appendix.

1. Functional Coverage: A Strong Focus on Transparency and Risk Reduction

The most frequently addressed functional area is monitoring and evaluation (M&E). Across humanitarian, financial, and climate-related applications, tokenization has been leveraged to strengthen real-time traceability, automate reporting, and ensure fund disbursement aligns with outcomes. Flagship initiatives such as WFP's Building Blocks, IFAD's Trace, and KfW's TruBudget illustrate how distributed ledger technologies (DLTs) are increasingly seen as tools to improve visibility across the full project lifecycle.

Closely following M&E, risk management emerged as another dominant functional priority. From sovereign bond settlements (e.g., Project Promissa, KfW Polygon issuances) to supply chain integrity projects (e.g., JICA's cocoa initiative, WandX Shine), blockchain is being used to reduce fraud, enhance compliance, and mitigate counterparty and operational risks.

Project financing, particularly through tokenized bonds and trade finance, also features prominently. Institutions such as the European Investment Bank, CDP, and ADB have explored blockchain's capacity to digitize bond issuance and settlement.

In trade finance, pilots like Contour and we.trade demonstrate how tokenization can streamline Letters of Credit and reduce documentary friction.

Banking access and capital mobilization remain central in initiatives targeting underserved populations. Refugee-focused identity systems (NASIRA, UNHCR ZKPs), humanitarian transfers (Oxfam's Unblocked Cash, Building Blocks), and microinsurance schemes (Igloo) reflect a concerted effort to bypass exclusionary banking infrastructure with token-based alternatives.

While stakeholder engagement and ESG alignment are frequently embedded as cross-cutting goals, they are less often positioned as standalone drivers. Nonetheless, participatory governance models (LACChain, Giga) and ESG-linked financial instruments (tokenized Sukuk, biodiversity tokens) suggest a growing awareness of blockchain's potential to support inclusive, accountable development.

2. Operational Domains: Humanitarian and Public Finance at the Forefront

In terms of operational reach, public sector finance remains the most covered domain. Sovereign and multilateral actors have been particularly active in testing tokenized instruments (Promissa, KfW), building foundational infrastructure (BNDES RBB, LACChain), and enhancing transparency in aid flows (FundsChain, TruBudget).

Social development finance constitutes a second major pillar, with blockchain-enabled projects targeting health (LifeBank), education (Giga), refugee services (UNHCR, WFP), and labor rights (BlocRice). These efforts often intersect with humanitarian finance and benefit from the traceability and efficiency gains DLTs offer.

Unsurprisingly, financial inclusion emerged as a strong domain of application. Initiatives focused on digital identity, microinsurance, and conditional cash transfers—especially in contexts where traditional financial infrastructure is absent or inadequate—demonstrate the technology's potential to connect marginalized groups to formal economic systems.

Private sector development finance is commonly addressed through equity investments in blockchain-enabled startups or blended finance models supporting SMEs. In contrast, capital market development is largely explored through tokenized bonds, digital settlement infrastructure, and Delivery vs Payment (DvP) experiments (EIB Project Venus, CDP–Polygon, ADB's Tridecagon).

More sparsely represented are local economic development and infrastructure finance. While some supply chain or identity projects support local resilience, few initiatives explicitly target municipal finance or hard infrastructure—a gap that points to future directions for tokenized models.

3. Institutional Leadership: Public DFIs and UN Agencies Driving Innovation

Among the most active institutions, several stand out for their breadth and depth of engagement. KfW (Germany) leads with a diversified portfolio encompassing digital bonds, aid management platforms (TruBudget), and multilateral collaboration (BRICS MoU). EIB is a pioneer in tokenized sovereign instruments (Project Venus), while ADB is advancing interoperability in cross-border finance.

In the humanitarian sector, UNHCR and WFP have demonstrated global leadership in deploying blockchain for identity verification, cash distribution, and refugee inclusion. Meanwhile, IDB Lab has emerged as a regional anchor in Latin America and the Caribbean, championing digital public goods (LACChain) and ESG-linked use cases (Biodiversity Challenge).

DFIs such as FMO, FinDev Canada, and the FCDO have also contributed significantly, supporting pilots in financial inclusion, health, and governance, often in fragile or underserved contexts.

4. Geographical Distribution: From Fragile States to Financial Hubs

Geographically, the most active implementation regions are Sub-Saharan Africa and South and Southeast Asia. Projects in Nigeria, Kenya, Côte d'Ivoire, Cambodia, Bangladesh, and the Philippines reflect strong demand for trust-enhancing infrastructure in contexts marked by weak systems or high informality.

Latin America and the Caribbean, anchored by the IDB, have seen coordinated efforts to build shared DLT infrastructure and tokenized tools for biodiversity, education, and digital identity. Meanwhile, Europe remains the epicenter of tokenized capital market experimentation, supported by regulatory clarity and advanced financial infrastructure.

5. Business Sectors: Trade, Supply Chains, Climate, and Capital Markets

The case landscape also reveals a concentration in key business sectors. Trade finance is a standout, with platforms like Contour, we.trade, and Rong-E Lian supporting real-time document exchange and financing access. Supply chain traceability, notably in food and precious metals, has seen applications for ethical sourcing (Shine, JICA Cocoa, BlocRice).

Climate and biodiversity finance is emerging as a growth area, particularly for monitoring, reporting, and ESG-linked token design (CLI, EBRD MRV, IDB Lab tokens). Health and microinsurance projects (Igloo, LifeBank) illustrate blockchain's relevance to social protection infrastructure, while aid delivery and fundraising have tested both stablecoin transfers and NFTs (Unblocked Cash, UNHCR–NMKR).

Finally, identity and credentialing—though often framed as enabling layers—have become central in linking beneficiaries to digital finance systems, with several initiatives adopting zero-knowledge proofs and self-sovereign identity models.

6. Concluding Observations

This mapping reveals a landscape of increasing maturity, in which tokenization is no longer confined to isolated pilots but is being tested across real-world, multilateral applications. Yet, despite notable breadth, certain domains —particularly infrastructure finance and municipal governance—remain underexplored.

Additionally, while technical experimentation abounds, standardization and system interoperability continue to lag behind. These findings underscore the value of institutional coordination and open reference implementations such as those promoted by the Tokenized Economies Institute, which aim to bridge the gap between innovation and systemic integration.

For a full list of the initiatives reviewed in this analysis, including project names, descriptions, and mappings to functional and operational domains, please refer to the Appendix.

5.3 Underexplored Frontiers and Their Tech Enablers

While a diverse array of tokenization initiatives has emerged across development finance, the preceding analysis highlights a set of functional areas and use cases where impactful experimentation remains limited. These "underexplored frontiers" are increasingly within reach, thanks to the maturation of blockchain infrastructure, interoperability standards, and smart contract architecture. Areas such as blockchain-native banking infrastructure, project financing through PPPs,

risk management, and participatory governance merit renewed attention, particularly through targeted proof-of-concept (PoC) initiatives. For technical foundations of each, see Sections 2.1 (Banking Access), 2.2 (Project Financing), 2.3 (Risk Management), and 2.6 (Stakeholder Engagement).

1. Blockchain-Native Banking Infrastructure and Financial Inclusion

Building end-to-end banking infrastructure on public blockchains was once seen as prohibitively complex. Today, composable, open-source smart contract frameworks—such as package-oriented architectures—and emerging interoperability standards are making this vision more feasible. These advances enable financial institutions and development actors to deploy secure, modular, and scalable financial services without relying on legacy banking rails. Given the success of pilots in humanitarian and cash transfer programs, further PoCs focusing on financial inclusion—especially in contexts of fragility or displacement—could unlock transformative reach and efficiency.

2. Project Financing and Public-Private Partnerships (PPPs)

Tokenization remains underutilized in the structuring and financing of public-private development projects. Historically, this has stemmed from both the abundance of available capital in traditional markets and concerns over fraud, complexity, and volatility in crypto-linked ecosystems.

However, as geopolitical and macroeconomic uncertainty reshape global capital flows, tokenized funding structures may become more attractive. Advances in on-chain compliance, modular architecture, and programmable governance now allow for de-risked, transparent, and accountable PPP frameworks—potentially reviving trust and mobilizing untapped pools of capital.

3. Risk Management: From Challenge to Differentiator

Tokenization has traditionally been viewed as a compliance and risk management challenge. Yet recent projects demonstrate that it can, in fact, enhance both. With auditable transaction trails, automated enforcement via smart contracts, and real-time visibility into fund flows, tokenization introduces new risk mitigation capabilities that extend beyond conventional finance. These features are increasingly being integrated into bond issuance, climate MRV, and impact-linked finance. As technological governance continues to evolve, risk management may shift from a barrier to a differentiating advantage of tokenized systems.

4. Stakeholder Engagement and Token-Based Incentive Models

While many tokenization initiatives have implicitly engaged communities and beneficiaries, few have formalized the role of tokens as instruments of stakeholder participation, alignment, or governance.

The potential of token-based incentive models—in areas such as education, data validation, and decentralized project oversight—remains largely unexplored.

One limiting factor has been the lack of scalable, user-friendly **decentralized applications (dApps)**. This is now changing, with the advent of standard-compliant tooling, modular engagement layers, and cross-chain identity systems.

The Case for Public Blockchain Infrastructure

A further consideration is the choice of blockchain environment. Although many early-stage pilots have favored private or permissioned networks for control and compliance, the case for public blockchain infrastructure is growing stronger. The conventional trade-off—sacrificing interoperability for institutional assurance—is being eroded. Today, public chains increasingly support:

- **Modular compliance tooling:** Offered through standardization efforts and regulator-endorsed frameworks, these enable public chains to meet sector-specific KYC/AML and reporting requirements.
- **Customizable deployment:** Through reusable smart contract packages and ecosystem hubs, organizations can deploy compliant, bespoke solutions with lower technical overhead and greater extensibility than closed systems.

Given the goals of development finance—transparency, inclusion, replicability, and trust—public infrastructure, when responsibly configured, may offer the greatest long-term return. As such, future PoCs and pilots may **benefit from defaulting to public chains**, unless compelling reasons suggest otherwise.

From Digital Islands to Interoperable Systems: Aligning Blockchain with Global Trade Standards

By Pankhuri Bansal, Blockchain Expert, UN/CEFACT

As blockchain reshapes global supply chains, trade finance, and cross-border transactions, one critical challenge remains: interoperability and standardization. The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) plays a key role in addressing this through globally harmonized frameworks.

Standards may not seem exciting, but they are the common language enabling systems, organizations, and countries to work together. Without them, blockchain risks becoming a patchwork of isolated "digital islands," much like building a railway network where each country uses different track sizes.

UN/CEFACT has long provided a foundation for structured data exchange through instruments like the Core Component Library (CCL) and Reference Data Models (RDMs). These are now being embedded in blockchain solutions to ensure that distributed ledgers speak the same language as the global trade community. For example, the Buy-Ship-Pay model—used by customs, logistics, and banks—outlines the typical steps in an international transaction, from ordering to shipping and final payment. It can be encoded directly into blockchain systems to **ensure interoperability with existing institutions.**

As a blockchain expert, I help turn blockchain from a promising technology into a trusted infrastructure for global trade by embedding regulatory and commercial requirements into standards-compliant, machine-readable smart contracts. This enables real-time data verification while maintaining **alignment with trade and sustainability norms**.

In parallel, through my work with ISO Technical Committee 307 (ISO/TC 307), I contribute to developing governance and architecture standards for blockchain. Standards such as ISO 22739 (Vocabulary), ISO 23257 (Reference Architecture), and ISO/TR 6277 (Data Flow Models) are helping define how blockchain systems are described, built, and integrated globally, bridging national regulatory environments and enterprise blockchain deployments.

By adopting globally accepted standards, we ensure blockchain supports the digital economy and the UN's SDGs—especially those related to responsible production, climate action, transparency, and inclusion. In an era of digital fragmentation, standards are not just technical frameworks—they are instruments of trust and global cooperation.

By Pankhuri Bansal, Blockchain Expert, UN/CEFACT

6. Policy and Institutional Recommendations

Development finance is a collaborative effort between governments, institutions, private enterprises, and local communities. Still, governments and development finance institutions undoubtedly have leading roles to play.

Having examined the myriads of opportunities that tokenization brings to development finance and itemized an extensive list of considerations for system design, we wish to present six policy and institutional recommendations before concluding this paper. They build on the preceding analyses.

1. Push for legal and regulatory clarity and effectiveness. Ambiguity in the legal and regulatory status has been a main hindrance to the adoption of tokenization in finance, including development finance. This aspect needs no further explanation. Equally important is the effectiveness of laws and regulations in dealing with the idiosyncrasies of tokenized development finance.

For example, data privacy and surveillance concerns have become more salient with tokenization, due to both digitalization and the pseudonymous nature of blockchain ledgers. Legislative efforts to de-risk this aspect for public safety and privacy are warranted. Another example is programmable finance, which offers an innovative option to catalyse transparency, efficiency, and reliability. Some financial operations, however, may face regulatory requirements that diverge from their automated nature. To benefit from this and similar innovations, regulations must adapt to a rapidly evolving technological landscape.

2. Establish standards and interoperability, possibly through public-private consortia and industry bodies. Standards are the prerequisite for highly scalable, interoperable initiatives. They encompass not only financial and accounting standards common with traditional finance but also tokenization-specific standards with profound impact on efficiency, transparency, and security—the exact qualities that tokenized development finance promises.

Beyond standards, policy encouragements for principles that promote interoperability are worth considering. This aspect differs from standards in that projects and technology providers may choose consciously to silo their initiatives for various valid reasons. However, for the greater good, higher interoperability is preferred. Policies, either governmental, institutional, or multilateral, can be leveraged to tilt the calculus to that end.

3. Tackle the digital divide with infrastructure and education. A paradox of tokenization in development finance is that those it aims to help most are often the least prepared to benefit from it.

Hence, infrastructure development that narrows and eventually eliminates the digital divide is essential. Thankfully, tokenized development finance may be viable options for these projects, with the narrowing of digital divide as one of the metrics of success.

Further, digital education, particularly with emphasis on blockchain literacy and tokenization, are worthy efforts that go hand-in-hand with digital infrastructure development.

4. Provide digital public goods such as wallets, IDs, and token registries. These efforts by trusted entities further lay the groundwork for partnership and engagement of local communities in development finance projects. As standalone initiatives, they also contribute to financial inclusion, which aligns with development goals.

5. Incentivize pilots and sandboxes. Materialized, well-documented benefits are considerably more convincing than theoretical ones alone. MDBs and DFIs have potential exemplary roles to play with pilots and trials. These pilots and trials can also feed back to legal and regulatory updates as well as standards and interoperability, two of our main recommendations. Further, they can serve as templates for future tokenized development finance projects to build on.

To overcome institutional inertia and for more cohesive pilots and trials, policies that incentivize pilots and sandboxes are worth considering.

6. Integrate tokenized development finance with tokenization in other aspects of development goals. The opportunities that tokenization presents are not limited to development finance or finance in general. Healthcare, supply chain, legal, and taxation are just some of the sectors with proven applications. When integrated, perhaps with the help of the aforementioned digital public goods, these arenas of tokenization create a more cohesive, productive, and vibrant environment that can be better aligned with development goals.

Part of this is done by holistic, real-time evaluations of ESG and SDG metrics with fewer blind spots. Part of it is through improved stakeholder engagement.

Appendix – Landscape of Tokenization Use Cases by MDBs and DFIs

	Initiative	Description	Related Functional Areas	Related Operational Domains
1	**Institution** UNHCR **Title** Refugee Support via Crypto-Staking ETP **Status** Pilot **Duration** 2025 **Use Case** Refugee aid funding via staking returns **Blockchain Type** Public **Blockchain Network** Cardano	An innovative exchange-traded product (ETP) stakes ADA (Cardano tokens) and donates the rewards to the United Nations High Commissioner for Refugees (UNHCR)'s programs. Built on the Cardano blockchain and listed on SIX Swiss Exchange, it introduces a new decentralized way to fund humanitarian aid.	**2.1 Banking Access and Capital Mobilization** – Unlocks new digital capital flows through staking. **2.5 Sustainability & ESG** – Aligns financial innovation with humanitarian and social impact. **2.6 Stakeholder Engagement & Partnerships** – Builds bridges between blockchain communities, NGOs, and institutional donors.	**3.4 Social Development Finance** – Directs funding toward vulnerable populations. **3.5 Financial Inclusion** – Demonstrates a decentralized mechanism for inclusive aid distribution. **3.6 Local Economic Development** – Supports host communities through sustained refugee funding.
2	**Institution** ADB **Title** Bamboo Carbon Credit Blockchain Platform **Status** Pilot **Duration** 2025 **Use Case** Carbon sequestration MRV in bamboo projects **Blockchain Type** Public-permissioned **Blockchain Network** N/A	The Asian Development Bank tracks bamboo carbon credits with blockchain-enabled monitoring, reporting, and verification—ensuring accurate credits and benefit sharing.	**2.2 Project Financing** – Mobilizes climate-linked capital via carbon credits. **2.4 Monitoring & Evaluation** – Tracks sequestration and compliance. **2.5 Sustainability & ESG** – Strengthens transparency in carbon offset markets.	**3.4 Social Development Finance** – Supports environmental restoration with social benefit. **3.7 Capital Market Development** – Expands tokenized carbon credit markets.
3	**Institution** IDB **Title** GBP Digital Bond **Status** Production **Duration** 2025 **Use Case** Capital market issuance **Blockchain Type** Private-permissioned **Blockchain Network** HSBC Orion Platform	The Inter-American Development Bank (IDB) issued its first GBP digital bond on blockchain, enhancing issuance efficiency, transparency, and secondary market support.	**2.2 Project Financing** – Showcases tokenized capital issuance. **2.3 Risk Management** – Improves control and recordkeeping. **2.4 Monitoring & Evaluation** – Enhances traceability and audit functions.	**3.1 Public Sector Finance** – Governmental issuer innovation. **3.7 Capital Market Development** – Grows institutional blockchain-based capital markets.

	Initiative	Description	Related Functional Areas	Related Operational Domains
4	**Institution** KfW **Title** CHF Digital Bond **Status** Production **Duration** 2025 **Use Case** CBDC-settled capital market issuance **Blockchain Type** Private **Blockchain Network** SDX DLT	Germany's state-owned development bank KfW issued a CHF-denominated digital bond listed on the SIX Swiss Exchange and settled via the SDX blockchain platform. The issuance enables settlement in wholesale central bank digital currency (CBDC).	**2.2 Project Financing** – Facilitates CBDC-settled bond issuance. **2.3 Risk Management** – Enhances post-trade control. **2.5 Sustainability & ESG** – Supports scalable digital capital market infrastructure.	**3.1 Public Sector Finance** – Applies to sovereign/agency bond use. **3.7 Capital Market Development** – Builds DLT-based bond ecosystems.
6	**Institution** Proparco, SER **Title** DebLeb **Status** Ongoing **Duration** 2024-Present **Use Case** Financial Infrastructure **Blockchain Type** Public **Blockchain Network** N/A	DebLeb is a decentralized banking protocol piloted in Lebanon to restore financial access, functionality, and trust in fragile economies. Initiated by the Tokenized Economies Institute (TEI) and backed by Proparco (AFD) and the French Economic Service (SER), the pilot's focus is on helping IFIs channel funding efficiently to microfinance institutions (MFIs) and SMEs.	**2.1 Banking Access and Capital Mobilization** – Enables decentralized access to deposits and credit in underserved markets. **2.2 Project Financing** – Channels IFI funding to microfinance institutions and SMEs. **2.3 Risk Management** – Restores trust in financial flows via auditable, programmable smart contracts. **2.4 Monitoring & Evaluation** – Supports real-time tracking of fund deployment and impact metrics.	**3.2 Private Sector Development Finance** – Strengthens SME financing and ecosystem crisis resilience. **3.5 Financial Inclusion** – Lowers the barriers of access to banking services. **3.6 Local Economic Development** – Revitalizes grassroots economic activity through robust banking infrastructure. **3.7 Capital Market Development** – Lays groundwork for future tokenized capital instruments in unstable monetary environments.
5	**Institution** WB **Title** FundsChain **Status** Pilot **Duration** 2024–Present **Use Case** Fund traceability **Blockchain Type** Private **Blockchain Network** N/A	The World Bank leverages blockchain to enhance oversight of fund distribution, reduce reconciliation delays, and streamline verification processes. Ensures transparent disbursement of funds to intended beneficiaries. Piloted in Moldova and Bangladesh, with plans for broader implementation.	**2.4 Monitoring & Evaluation** – The initiative strengthens verification and real-time oversight mechanisms. **2.3 Risk Management** – By improving transparency and reducing reconciliation delays, it mitigates and fraud risks. **2.6 Stakeholder Engagement & Partnerships** – Ensures that beneficiaries are more directly engaged through transparent fund flows.	**3.1 Public Sector Finance** – Piloted in national-level public service contexts (Moldova and Bangladesh). **3.4 Social Development Finance** – Targets fund distribution to beneficiaries, likely in social or humanitarian sectors.
7	**Institution** QDB **Title** Digital Asset Lab **Status** Ongoing **Duration** 2023–Present **Use Case** Islamic Finance **Blockchain Type** Public-permissioned **Blockchain Network** N/A	The Qatar Financial Centre Digital Asset Lab fosters innovation in tokenized Islamic finance, including the development of Sharia -compliant Sukuk tokens. Collaborating with institutions like Qatar Development Bank (QDB) and Qatar Central Bank, the Lab aims to provide ethical and sustainable investment opportunities through distributed ledger technology.	**2.2 Project Financing** – Focus on structuring tokenized Sukuk instruments (Islamic finance bonds). **2.5 Sustainability & ESG** – Emphasis on ethical and sustainable investment aligned with Sharia principles. **2.3 Risk Management** – Islamic finance inherently includes strict compliance and risk-sharing frameworks, which tokenization helps enforce.	**3.2 Private Sector Development Finance** – Supports private sector growth through financial innovation. **3.7 Capital Market Development** – Develops tokenized capital instruments and financial infrastructure.

	Initiative	Description	Related Functional Areas	Related Operational Domains
8	**Institution** KfW **Title** Digital Bond Issuance **Status** Production **Duration** 2022–Present **Use Case** Capital Market Issuance **Blockchain Type** Private **Blockchain Network** DAML/Canton	The German state-owned investment and development bank KfW has issued multiple digital bonds totaling €17.5 billion through Deutsche Börse's Clearstream D7 platform. These issuances, under German law, aim to enhance efficiency in capital market operations.	**2.2 Project Financing** – Involves structuring and issuing tokenized debt instruments. **2.3 Risk Management** – Digital bonds enhance transparency, efficiency, and traceability, which support improved risk control. **2.4 Monitoring & Evaluation –** Through improved data integrity and post-trade infrastructure.	**3.1 Public Sector Finance** – KfW is a state-owned development bank issuing public sector-aligned debt. **3.7 Capital Market Development** – Contributes to the evolution of digital securities infrastructure in Germany and Europe.
9	**Institution** Finnfund **Title** Igloo Insurtech **Status** Ongoing **Duration** 2022–Present **Use Case** Microinsurance & Climate Resilience **Blockchain Type** Public **Blockchain Network** Ethereum	Finland's DFI Finnfund invested $6 million in Igloo, a Singapore-based insurtech, as part of a $27M Series B round led by the InsuResilience Investment Fund II. Igloo provides digital microinsurance across Southeast Asia, targeting underserved communities. It launched Vietnam's first blockchain-based parametric weather index insurance, automating payouts for farmers affected by climate events. To date, it has facilitated over 300 million policies, with strong reach among women entrepreneurs and gig workers.	**2.1 Banking Access and Capital Mobilization** – Expands financial access to underserved communities. **2.3 Risk Management** – Uses blockchain-based parametric insurance and smart contracts to automate claims and mitigate climate risk. **2.5 Sustainability & ESG** – Focus on climate resilience, inclusion, and support for women and vulnerable workers. **2.4 Monitoring & Evaluation** – Through real-time, automated claims and performance data.	**3.4 Social Development Finance** – Addresses health, climate, and livelihood resilience in vulnerable populations. **3.5 Financial Inclusion** – Targets underserved groups with microinsurance, including women and gig workers. **3.2 Private Sector Development Finance** – Supports an insurtech startup with catalytic impact. **3.6 Local Economic Development** – Enables economic resilience at the community level, especially for farmers and informal workers.
10	**Institution** IFAD **Title** TRACE Blockchain **Status** Production **Duration** 2021–present **Use Case** Fund traceability **Blockchain Type** Hybrid (Public & Private) **Blockchain Network** Ethereum, Hyperledger Fabric	Launched by the International Fund for Agricultural Development (IFAD), a UN specialized agency, Trace blockchain tracks $300M+ in funds to 500k+ farmers across 7 countries; scaling to 90. Enables donor-to-farmer traceability, smart contract disbursement, AML/fraud compliance, and impact data visibility.	**2.4 Monitoring & Evaluation** – Enables real-time impact tracking, data visibility, and adaptive learning. **2.3 Risk Management** – Supports AML and fraud prevention through traceability and compliance logic. **2.6 Stakeholder Engagement & Partnerships** – Connects donors directly with end beneficiaries, empowering farmers and enhancing trust. **2.1 Banking Access and Capital Mobilization** – Facilitates more efficient and transparent fund flows to smallholders.	**3.4 Social Development Finance** – Focuses on rural livelihoods and agricultural development. **3.5 Financial Inclusion** – Directly reaches underserved farmers across multiple countries.
11	**Institution** UNHCR **Title** Stellar Aid Assist **Status** Ongoing **Duration** 2022–Present **Use Case** Humanitarian Aid **Blockchain Type** Public **Blockchain Network** Stellar	The United Nations High Commissioner for Refugees (UNHCR) launched a cash-based intervention for Ukrainian refugees using digital wallets and USDC on Stellar, enabling secure, fast, and transparent aid without bank intermediaries. Offers traceability, transparency, and lower distribution costs. **KPIs**: $4.6M in cash aid transfered to ~2,500 households in Ukraine	**2.1 Banking Access and Capital Mobilization** – Provides direct access to financial resources without needing a traditional bank account. **2.4 Monitoring & Evaluation** – Enables traceability and transparent tracking of fund flows and outcomes. **2.3 Risk Management** – Reduces risk of fraud, loss, and misuse in aid distribution. **2.6 Stakeholder Engagement & Partnerships** – Empowers recipients through direct ownership and reduces dependency on intermediaries.	**3.4 Social Development Finance** – Delivers emergency aid to vulnerable populations in conflict zones. **3.5 Financial Inclusion** – Targets unbanked or underbanked refugee households with digital wallet solutions.

	Initiative	Description	Related Functional Areas	Related Operational Domains
12	**Institution** EBRD **Title** MRV Pilot under GEFF **Status** Pilot **Duration** N/A **Use Case** Emission Tracking & MRV **Blockchain Type** Private **Blockchain Network** N/A	The European Bank for Reconstruction and Development (EBRD) supported a blockchain MVP to automate Monitoring, Reporting & Verification (MRV) of GHG reductions in Turkey's Green Economy Financing Facility. Developed to digitize emissions data for energy efficiency investments and enable potential monetization of verified savings. Aimed at increasing trust, speed, and scalability of green finance.	**2.4 Monitoring & Evaluation** – Core focus on automating MRV processes for emissions and energy savings. **2.5 Sustainability & ESG** – Supports climate-related reporting and potential ESG-linked financing. **2.3 Risk Management** – Increases data integrity and trust in impact claims, reducing reputational and environmental risk.	**3.2 Private Sector Development Finance** – Supports green investment by businesses through improved reporting tools. **3.7 Capital Market Development** – Lays the groundwork for potential monetization of verified carbon or energy savings.
13	**Institution** UNDP **Title** Indian Spices Traceability **Status** Ongoing **Duration** 2021–Present **Use Case** Agriculture Supply Chain **Blockchain Type** Private **Blockchain Network** N/A	The United Nations Development Programme (UNDP) Accelerator Lab in India, in partnership with the Spices Board of India and NEC Corporation, is developing a blockchain-based traceability platform to improve transparency in the Indian spices supply chain. Funded by the Japan Cabinet Office, the initiative aims to enhance market access and incomes for smallholder chili and turmeric farmers by securely recording value chain data and enabling direct trading through smart contracts on the eSpice Bazaar platform.	**2.4 Monitoring & Evaluation** – Enables real-time, tamper-proof tracking of spice quality and supply chain data. **2.5 Sustainability & ESG** – Reduces export rejections and promotes responsible, traceable sourcing practices. **2.6 Stakeholder Engagement & Partnerships** – Connects farmers, certifiers, and exporters in a transparent, shared data system.	**3.4 Social Development Finance** – Enhances farmer livelihoods through fairer market access and value retention. **3.5 Financial Inclusion** – Digitally integrates smallholders into formal trade systems, improving credit visibility. **3.6 Local Economic Development** – Boosts competitiveness and integrity of regional spice economies.
14	**Institution** DFC **Title** WandX Solutions **Status** Ongoing **Duration** 2021–Present **Use Case** Gold Supply Chain **Blockchain Type** Public **Blockchain Network** Ethereum	WandX Solutions, listed in the US International Development Finance Corporation (DFC)'s 2021 investment portfolio, developed Shine, a platform aimed at enhancing traceability in India's gold supply chain. By leveraging smart contracts, Shine ensures transparency from sourcing to retail. The project collaborates with the Indian Gold Policy Centre and the World Gold Council to promote ethical sourcing and combat fraud in the precious metals sector.	**2.3 Risk Management** – Targets fraud reduction and supply chain integrity through smart contract-based traceability. **2.5 Sustainability & ESG** – Promotes ethical sourcing and responsible mineral supply chains. **2.4 Monitoring & Evaluation** – Enables data visibility across the supply chain.	**3.2 Private Sector Development Finance** – Supports responsible business practices in the gold sector. **3.7 Capital Market Development** – Transparency in commodities like gold underpins responsible investment.
15	**Institution** EIB **Title** Project Venus **Status** Ongoing **Duration** 2022–Present **Use Case** Capital Market Issuance **Blockchain Type** Private **Blockchain Network** GS DAP™	Project Venus marked the European Investment Bank's (EIB) issuance of a €100 million, two-year digital bond on GS DAP™, developed by Goldman Sachs. It was the first euro-enominated digital bond issued by the EIB using private blockchain technology, and was settled using a tokenized representation of euro central bank money, facilitated by an experimental wholesale Central Bank Digital Currency (wCBDC) provided by Banque de France and Banque centrale du Luxembourg.	**2.2 Project Financing** – Involves structuring and issuance of a tokenized bond instrument. **2.3 Risk Management** – Use of wCBDC and tokenized central bank money improves settlement security and reduces counterparty risk. **2.4 Monitoring & Evaluation** – Enhanced transparency and automation in settlement can support better reporting infrastructure.	**3.1 Public Sector Finance** – Led by the EIB, a major public-sector development finance institution. **3.7 Capital Market Development** – Advances infrastructure for digital capital markets and sovereign/DFI-led issuance. **3.2 Private Sector Development Finance** – Through infrastructure spillover effects and potential replication by other financial actors.

	Initiative	Description	Related Functional Areas	Related Operational Domains
16	**Institution** FinDev Canada **Title** LifeBank Investment **Status** Ongoing **Duration** 2021–Present **Use Case** Healthcare Supply Chain **Blockchain Type** Private **Blockchain Network** N/A	FinDev Canada, Canada's development finance institution set up in 2018 invested in LifeBank, a Nigerian health-tech company that leverages blockchain technology to improve the traceability and efficiency of medical supply chains. This investment supports the development of digital platforms aimed at enhancing healthcare delivery and outcomes in Africa.	**2.3 Risk Management** – Improves reliability and transparency of medical supply chains using blockchain. **2.4 Monitoring & Evaluation** – Enhances traceability and operational oversight, supporting outcome-based health interventions. **2.5 Sustainability & ESG** – Contributes to improved health systems, particularly in underserved regions, aligning with SDG goals.	**3.4 Social Development Finance** – Directly supports healthcare delivery and public health outcomes. **3.2 Private Sector Development Finance** – Invests in a tech-enabled African startup with scalable social impact.
17	**Institution** Oxfam **Title** Unblocked Cash **Status** Ongoing **Duration** 2019–Present **Use Case** Humanitarian Aid **Blockchain Type** Public **Blockchain Network** Ethereum	Oxfam's Unblocked Cash enables blockchain-based cash aid via NFC cards and stablecoins (DAI), piloted in Vanuatu with 35K+ users. It improves speed, transparency, and reduces delivery costs by 50%. Recognized with EU Horizon 2020 Prize; plans to scale to PNG, Venezuela, Solomon Islands. **KPIs:** - $2M USD in aid distributed digitally - 35,000 beneficiaries assisted in the Pacific - Delivery time reduced by 96% - Distribution costs lowered by 75%	**2.1 Banking Access and Capital Mobilization** – Provides financial access through NFC cards and stablecoins, bypassing traditional banking infrastructure. **2.4 Monitoring & Evaluation** – Enables real-time tracking of fund distribution and outcomes. **2.3 Risk Management** – Reduces leakage, fraud, and inefficiencies in aid delivery. **2.6 Stakeholder Engagement & Partnerships** – Empowers beneficiaries and enables local-level participation in aid ecosystems.	**3.4 Social Development Finance** – Focuses on humanitarian and cash-based assistance in vulnerable communities **3.5 Financial Inclusion** – Brings digital finance to unbanked or underbanked populations in remote areas.
18	**Institution** DBS Bank **Title** Rong-E Lian **Status** Ongoing **Duration** 2019–Present **Use Case** SME Supply Chain Finance **Blockchain Type** Private **Blockchain Network** Rong-E Lian Platform	The Development Bank of Singapore Ltd (DBS) launched Rong-E Lian, a blockchain-based platform to provide multi-tier financing solutions for SMEs in China's logistics supply chain. The platform aims to offer faster access to trade financing, enhancing liquidity and financial inclusion for smaller suppliers.	**2.1 Banking Access and Capital Mobilization** – Enables SMEs to access financing more efficiently, especially those traditionally excluded from formal credit. **2.2 Project Financing** – Provides structured, blockchain-based trade finance solutions. **2.3 Risk Management** – Enhances transparency and traceability across supply chains, reducing credit and fraud risks.	**3.2 Private Sector Development Finance** – Supports SME growth through targeted trade financing tools. **3.5 Financial Inclusion** – Facilitates access to finance for smaller suppliers in complex supply chains. **3.6 Local Economic Development** – Strengthens regional economic ecosystems via SME liquidity.
19	**Institution** UNICEF **Title** Giga **Status** Ongoing **Duration** 2019–Present **Use Case** Fundraising **Blockchain Type** Public **Blockchain Network** Ethereum (for NFTs)	Giga, a joint initiative by UNICEF and ITU, addresses last-mile connectivity for schools via blockchain-based tools. Its Patchwork Kingdoms NFTs raised over $700K to fund school internet. Separately, Connectivity Credits are a tokenized proof-of-connection system aligning stakeholders. These credits are minted from real-time monitoring data and redeemed for infrastructure access or funding—solving trust gaps without bureaucratic overhead and enabling results-based financing.	**2.1 Banking Access and Capital Mobilization** – Uses blockchain and NFTs for innovative fundraising to support public infrastructure. **2.4 Monitoring & Evaluation** – Leverages decentralized, community-validated data to track school connectivity and infrastructure needs. **2.6 Stakeholder Engagement & Partnerships** – Engages global citizens and communities through incentivized participation in data validation. **2.5 Sustainability & ESG** – Aligns with inclusive and equitable access to education (SDG 4).	**3.4 Social Development Finance** – Targets education infrastructure in underserved regions. **3.5 Financial Inclusion** – Promotes digital inclusion by bridging the connectivity gap in schools. **3.6 Local Economic Development** – Enhanced connectivity can contribute to broader local development over time.

	Initiative	Description	Related Functional Areas	Related Operational Domains
20	**Institution** BNDES **Title** RBB **Status** Ongoing **Duration** 2018–Present **Use Case** Public Finance **Blockchain Type** Permissioned **Blockchain Network** Hyperledger Besu	The Brazilian Development Bank (BNDES) has been developing the Brazilian Blockchain Network (RBB) since 2018, utilizing Hyperledger Besu to enhance transparency and trust in public finance. The network employs a permissioned blockchain to record and track public expenditures, aiming to improve accountability in government spending. BNDES's involvement in the Hyperledger Besu Financial Services Working Group.	**2.4 Monitoring & Evaluation** – Core focus on tracking and auditing public expenditures. **2.3 Risk Management** – Enhances transparency and reduces the risk of misallocation, corruption, and fraud. **2.6 Stakeholder Engagement & Partnerships** – Strengthens trust in public finance through transparent systems involving multiple institutions.	**3.1 Public Sector Finance** – Focused explicitly on government spending and accountability.
21	**Institution** BRICS DFIs **Title** Blockchain MoU **Status** Pilot **Duration** 2018–Present **Use Case** Development Finance **Blockchain Type** Private **Blockchain Network** N/A	In July 2018, the development banks of BRICS nations, notably Brazil's BNDES, Russia's Vnesheconombank (now VEB.RF), China's CDB, and Southern Africa's DBSA signed a Memorandum of Understanding to collaboratively research and explore the applications of blockchain and distributed ledger technologies. This initiative aims to enhance operational efficiencies and foster the development of the digital economy across member countries.	**2.3 Risk Management** – Aims to enhance operational efficiency and system reliability through blockchain. **2.6 Stakeholder Engagement & Partnerships** – A multilateral collaboration fostering knowledge exchange and shared infrastructure.	**3.1 Public Sector Finance** – Involves national development banks focused on improving state-aligned financial operations. **3.7 Capital Market Development** – Could lay the groundwork for digital economy initiatives and tokenized financial instruments. **3.6 Local Economic Development** – Supports digital infrastructure as a driver of future local and regional growth.
22	**Institution** IDB Lab **Title** LACChain **Status** Ongoing **Duration** 2018–Present **Use Case** Digital Infrastructure **Blockchain Type** Public-permissioned **Blockchain Network** Hyperledger Besu	A regional public-permissioned blockchain led by IDB Lab, the innovation and venture capital arm of the Inter-American Development Bank Group (IDB), to foster digital identity, tokenization, and inclusive finance. Live in 15+ LAC countries, supporting IFIs, startups, and governments. Built on Hyperledger Besu with robust governance, LACChain enables high-trust, regulated applications including tokenized money and credentialing. Over 80 organizations run nodes.	**2.1 Banking Access and Capital Mobilization** – Enables inclusive financial services through tokenized money and digital identity. **2.6 Stakeholder Engagement & Partnerships** – Multi-stakeholder governance model with governments, startups, and IFIs. **2.3 Risk Management** – Provides a secure and regulated infrastructure for trusted applications. **2.4 Monitoring & Evaluation** – Facilitates transparent, traceable financial and credential flows.	**3.1 Public Sector Finance** – Supports government-aligned use cases and regulated applications. **3.5 Financial Inclusion** – Core focus on digital identity and access to financial services across underserved populations. **3.6 Local Economic Development** – Strengthens digital infrastructure across Latin America and the Caribbean. **3.7 Capital Market Development** – Lays groundwork for tokenized financial instruments at scale.
23	**Institution** KfW **Title** TruBudget **Status** Ongoing **Duration** 2018–Present **Use Case** Fund Disbursement **Blockchain Type** Private **Blockchain Network** N/A	TruBudget (Trusted Budget Expenditure) is a blockchain-based, open-source workflow tool developed by KfW to enhance transparency and efficiency in donor-funded development projects. It enables all stakeholders to track and coordinate project implementation in real-time, ensuring that all activities are documented and tamper-proof.	**2.4 Monitoring & Evaluation** – Central focus on real-time tracking, documentation, and coordination of development projects. **2.3 Risk Management** – Enhances accountability and reduces fraud or mismanagement through immutable records. **2.6 Stakeholder Engagement & Partnerships** – Supports collaborative workflows among donors, implementers, and recipients.	**3.1 Public Sector Finance** – Designed for use in donor-funded public development initiatives. **3.6 Local Economic Development** – Supports project delivery and trust at the local implementation level.

	Initiative	Description	Related Functional Areas	Related Operational Domains
24	**Institution** WFP **Title** Building Blocks **Status** Ongoing **Duration** 2017–Present **Use Case** Humanitarian Aid **Blockchain Type** Private **Blockchain Network** Ethereum, then private	WFP's Building Blocks uses blockchain to deliver cash assistance securely and efficiently to 1M+ refugees in Jordan and Bangladesh. It reduces transaction costs, enhances privacy, and enables real-time auditability. Initially on Ethereum, it shifted to a private chain for scalability. Recognized for inter-agency potential and transparent delivery.	**2.1 Banking Access and Capital Mobilization** – Provides unbanked refugees with direct, digital access to cash assistance. **2.4 Monitoring & Evaluation** – Enables real-time auditability and transparent tracking of aid flows. **2.3 Risk Management** – Reduces fraud and operational inefficiencies in humanitarian finance. **2.6 Stakeholder Engagement & Partnerships** – Recognized for its potential to support coordination across UN and humanitarian actors.	**3.4 Social Development Finance** – Humanitarian cash assistance targeting vulnerable refugee populations. **3.5 Financial Inclusion** – Delivers digital financial tools to those outside the formal banking system. **3.1 Public Sector Finance** – Supported by multilateral public sector funding and humanitarian aid systems.
25	**Institution** BIS, World Bank **Title** Project Promissa **Status** Completed **Duration** 2023–2025 **Use Case** Promissory Notes **Blockchain Type** Private **Blockchain Network** N/A	Project Promissa is a proof-of-concept developed by the BIS Innovation Hub, World Bank, and Swiss National Bank to digitize promissory notes—key instruments for member countries' financial commitments to multilateral development banks. The project aims to replace paper-based processes with tokenized promissory notes on a DLT platform, enhancing automation, transparency, and cost efficiency.	**2.2 Project Financing** – Focused on digitizing promissory notes, which are foundational to capital commitments for development projects. **2.4 Monitoring & Evaluation** – Increases visibility and tracking of financial commitments. **2.3 Risk Management** – Enhances transparency, reduces operational risk, and supports secure, auditable recordkeeping.	**3.1 Public Sector Finance** – Directly linked to government-to-MDB funding commitments. **3.7 Capital Market Development** – Establishes a DLT-based infrastructure that could evolve into broader public capital instruments.
26	**Institution** UNHCR **Title** ZKP DID **Status** Ongoing **Duration** 2024–Present **Use Case** Digital Identity Verification **Blockchain Type** Public **Blockchain Network** N/A	UNHCR is exploring decentralized identity solutions using zero-knowledge proofs (ZKPs) to safeguard refugees' identities. This approach allows for identity verification without revealing sensitive personal data, addressing challenges faced by refugees in proving their identity when crossing borders	**2.3 Risk Management** – Enhances privacy and reduces the risk of identity fraud or exposure of sensitive data. **2.1 Banking Access and Capital Mobilization** – Enables refugees to access services requiring identity verification, including financial aid. **2.6 Stakeholder Engagement & Partnerships** – Builds interoperable identity systems with potential for cross-border institutional coordination.	**3.4 Social Development Finance** – Supports humanitarian protection and access to essential services. **3.5 Financial Inclusion** – Provides foundational identity for accessing financial and public services.
27	**Institution** KfW **Title** €100M Bond on Polygon **Status** Completed **Duration** 2024 **Use Case** Capital Market Issuance **Blockchain Type** Public **Blockchain Network** Polygon	In July 2024, KfW issued a €100 million syndicated bond on the Polygon blockchain, marking Germany's first such issuance under the Electronic Securities Act (eWpG). The bond, with a 3.125% coupon maturing in December 2025, was part of efforts to explore blockchain's potential in capital markets.	**2.2 Project Financing** – Involves the issuance of a tokenized bond instrument. **2.3 Risk Management** – Demonstrates regulated blockchain issuance under eWpG, reducing settlement and counterparty risks. **2.4 Monitoring & Evaluation** – Improves post-trade transparency and auditability.	**3.1 Public Sector Finance** – Issued by KfW, Germany's state-owned development bank. **3.7 Capital Market Development** – Part of national experimentation with blockchain under new electronic securities law.

	Initiative	Description	Related Functional Areas	Related Operational Domains
28	**Institution** CDP **Title** €25M Bond on Polygon **Status** Completed **Duration** 2024 **Use Case** Capital Market Issuance **Blockchain Type** Public **Blockchain Network** Polygon	In July 2024, Italy's Cassa Depositi e Prestit (CDP) issued a €25 million digital bond on the Polygon blockchain, underwritten by Intesa Sanpaolo. This issuance was part of the ECB's wholesale DLT settlement trials, utilizing the Bank of Italy's TIPS Hash Link for settlement in central bank money.	**2.2 Project Financing** – Involves the issuance of a blockchain-based bond instrument. **2.3 Risk Management** – Utilizes secure settlement infrastructure (TIPS Hash Link) and central bank money, reducing systemic and counterparty risk. **2.4 Monitoring & Evaluation** – Enhances traceability and auditability of issuance and settlement processes.	**3.1 Public Sector Finance** – Issued by Cassa Depositi e Prestiti, a national public development finance institution. **3.7 Capital Market Development** – Contributes to the ECB's exploration of DLT-based market infrastructure and future interoperability frameworks.
29	**Institution** SIDA / FCDO **Title** J-Palm Palm Oil Traceability **Status** Completed **Duration** 2022–2024 **Use Case** Supply chain transparency & climate resilience **Blockchain Type** Public-permissioned **Blockchain Network** N/A	J-Palm is a startup in Liberia supported by the GSMA Innovation Fund for Climate Resilience and Adaptation, funded by the UK Foreign, Commonwealth & Development Office (FCDO), the Swedish International Development Cooperation Agency (SIDA). The startup helps Liberian smallholders track palm kernel sourcing and processing via blockchain-backed app. Aims to increase efficiency, income, and sustainable practices.	**2.4 Monitoring & Evaluation** – Uses blockchain to track supply chain data and measure performance. **2.5 Sustainability & ESG** – Promotes traceable and sustainable sourcing. **2.6 Stakeholder Engagement & Partnerships** – Strengthens value chain collaboration.	**3.4 Social Development Finance** – Supports inclusive agriculture value chains. **3.5 Financial Inclusion** – Enhances rural farmer access to market. **3.6 Local Economic Development** – Strengthens regional livelihoods via efficient supply chains.
30	**Institution** IDB Lab **Title** Digital Tokens for Biodiversity Challenge **Status** Completed **Duration** 2023 **Use Case** Environmental Conservation **Blockchain Type** Public-permissioned **Blockchain Network** Various	The Inter-American Development Bank Group (IDB) Lab's challenge supports initiatives that use digital tokens to promote biodiversity conservation and climate action. Selected proposals from countries like Colombia, Ecuador, Peru, and Trinidad and Tobago aim to implement distributed ledger technologies to provide greater traceability and transparency in environmental transactions.	**2.5 Sustainability & ESG** – Direct focus on promoting biodiversity conservation and climate-positive outcomes. **2.4 Monitoring & Evaluation** – Supports traceability and transparency in environmental impact measurement. **2.3 Risk Management** – Reduces greenwashing and improves credibility of environmental finance through verifiable data.	**3.4 Social Development Finance** – Contributes to environmental protection and climate resilience in vulnerable communities. **3.2 Private Sector Development Finance** – Encourages innovation from startups and local ventures using tokenized mechanisms. **3.6 Local Economic Development** – Environmental protection linked to economic opportunities at the local level.
31	**Institution** UNHCR **Title** NFT-based Donations **Status** Completed **Duration** 2023 **Use Case** Fundraising **Blockchain Type** Public **Blockchain Network** Cardano	In partnership with NMKR, the United Nations High Commissioner for Refugees (UNHCR) launched an NFT-based fundraising campaign on the Cardano blockchain. The initiative aimed to raise funds for humanitarian aid, leveraging blockchain technology to ensure transparency and engage a global donor base.	**2.1 Banking Access and Capital Mobilization** – Leverages NFTs to unlock new fundraising channels and engage global capital. **2.6 Stakeholder Engagement & Partnerships** – Engages a global donor community through participatory, blockchain-enabled giving. **2.4 Monitoring & Evaluation** – Enhances transparency in fund tracking and donor confidence.	**3.4 Social Development Finance** – Aims to finance humanitarian aid for vulnerable populations.

	Initiative	Description	Related Functional Areas	Related Operational Domains
32	**Institution** ADB **Title** Project Tridecagon **Status** Completed **Duration** 2023 **Use Case** Cross-border Settlement **Blockchain Type** Private **Blockchain Network** Corda, Hyperledger	Project Tridecagon was a proof-of-concept by the Asian Development Bank (ADB) to enable delivery versus payment (DvP) for cross-border bond transactions across the ASEAN+3 region. The project tested interoperability across multiple blockchain networks, aiming to enhance the efficiency and security of international securities settlements.	**2.2 Project Financing** – Focuses on cross-border bond transactions and improving settlement mechanisms. **2.3 Risk Management** – Enhances security and reduces settlement risk through DvP and blockchain interoperability. **2.4 Monitoring & Evaluation** – Improves auditability and transparency in international capital markets.	**3.1 Public Sector Finance** – Led by a multilateral development bank and relevant to sovereign and supranational bond markets. **3.7 Capital Market Development** – Central objective is to improve cross-border securities infrastructure and interoperability.
33	**Institution** SDC **Title** DCI **Status** Completed **Duration** 2019–2023 **Use Case** Climate Action **Blockchain Type** Public **Blockchain Network** Various	The Swiss Agency for Development and Cooperation (SDC) funded the Climate Ledger Initiative (CLI), now rebranded as Digital Climate Innovation (DCI), from 2019 to 2023. This initiative aimed to explore and implement digital technologies, including blockchain, to enhance climate change mitigation and adaptation.	**2.5 Sustainability & ESG** – Core focus on supporting climate mitigation and adaptation through digital innovation. **2.4 Monitoring & Evaluation** – Explores digital tools (including blockchain) for tracking climate actions and outcomes. **2.3 Risk Management** – Supports better climate risk visibility and data integrity.	**3.4 Social Development Finance** – Focused on addressing climate resilience and environmental sustainability.
34	**Institution** EBRD **Title** we.trade **Status** Pilot **Duration** 2021–2022 **Use Case** Green Trade Finance **Blockchain Type** Private-permissioned **Blockchain Network** Hyperledger Fabric	Under its Trade Facilitation Programme, the European Bank for Reconstruction and Development (EBRD) supported partner banks such as QNB ALAHLI, Banca Comercială Română, and UniCredit in testing blockchain-based trade finance on the we.trade platform. Focused on enabling green trade transactions and digital document flows using Hyperledger Fabric (IBM Blockchain Platform).	**2.2 Project Financing** – Supports trade finance transactions with blockchain-enabled instruments. **2.3 Risk Management** – Enhances transparency, traceability, and reduces fraud through digital documentation. **2.5 Sustainability & ESG** – Focus on enabling green trade transactions aligns with ESG and climate objectives.	**3.2 Private Sector Development Finance** – Facilitates SME and corporate trade via participating commercial banks. **3.7 Capital Market Development** – Supports modernization of trade infrastructure that intersects with capital flows.
35	**Institution** JICA **Title** Eliminate Child Labor **Status** Completed **Duration** 2021–2022 **Use Case** Child Labor Monitoring **Blockchain Type** Private **Blockchain Network** N/A	The Japan International Cooperation Agency (JICA) collaborated with Deloitte Tohmatsu Group in an initiative that used blockchain technology to eradicate child labor in the cocoa industry of Côte d'Ivoire. The project aimed to enhance transparency in supply chains and safeguard children's educational opportunities.	**2.3 Risk Management** – Enhances supply chain transparency to identify and prevent exploitative labor practices. **2.5 Sustainability & ESG** – Addresses social sustainability and human rights within agricultural value chains. **2.4 Monitoring & Evaluation** – Provides traceable data to monitor compliance and social impact.	**3.4 Social Development Finance** – Focused on child protection, education, and ethical labor practices. **3.2 Private Sector Development Finance** – Engages agribusiness value chains and promotes responsible sourcing. **3.6 Local Economic Development** – Supports long-term improvement of livelihoods and education in rural communities.

	Initiative	Description	Related Functional Areas	Related Operational Domains
36	**Institution** FCDO **Title** Blockchain Land Records **Status** Completed **Duration** 2021–2022 **Use Case** Land Governance **Blockchain Type** Private **Blockchain Network** N/A	Through its Frontier Technologies Hub, the Foreign, Commonwealth & Development Office (FCDO) of the UK piloted a blockchain-based land records system in Karnataka, India, aiming to create a single source of truth for property ownership and reduce disputes. The pilot provided valuable insights into the challenges of implementing blockchain solutions in complex governmental systems.	**2.3 Risk Management** – Reduces land disputes and fraud by establishing a tamper-proof property records system. **2.4 Monitoring & Evaluation** – Improves visibility and auditability of ownership data across stakeholders. **2.6 Stakeholder Engagement & Partnerships** – Involves public authorities and citizens in co-verifying land ownership.	**3.1 Public Sector Finance** – Addresses a critical area of government service delivery and governance reform. **3.6 Local Economic Development** – Strengthens legal certainty for property rights, enabling investment and economic stability at the community level.
37	**Institution** ADIB **Title** TradeAssets Partnership **Status** Completed **Duration** 2020-2022 **Use Case** Cross-border trade finance origination & distribution **Blockchain Type** Private **Blockchain Network** Hyperledger fabric 1.0	J-Palm is a startup in Liberia supported by the GSMA Innovation Fund for Climate Resilience and Adaptation, funded by the UK Foreign, Commonwealth & Development Office (FCDO), the Swedish International Development Cooperation Agency (SIDA). The startup helps Liberian smallholders track palm kernel sourcing and processing via blockchain-backed app. Aims to increase efficiency, income, and sustainable practices.	**2.1 Banking Access and Capital Mobilization** – Enables digital trade finance. **2.2 Project Financing** – Facilitates origination of trade assets. **2.3 Risk Management** – Improves auditability and transparency.	**3.2 Private Sector Development Finance** – Boosts institutional trade finance access. **3.7 Capital Market Development** – Strengthens digital secondary market infrastructure.
38	**Institution** FMO **Title** NASIRA Program **Status** Completed **Duration** 2019–2022 **Use Case** Refugee Digital Identity **Blockchain Type** Private **Blockchain Network** N/A	Through its NASIRA program, the Dutch Development Bank (FMO) worked with a bank in Jordan to develop lockchain technology that creates digital economic identities for refugees. This allows refugees to build credit histories and access financial services promoting economic inclusion and resilience.	**2.1 Banking Access and Capital Mobilization** – Provides refugees with digital identities to access credit and financial services. **2.3 Risk Management** – Enables the creation of verifiable credit histories, reducing risk for financial institutions. **2.6 Stakeholder Engagement & Partnerships** – Supports inclusion of displaced populations through public-private collaboration.	**3.5 Financial Inclusion** – Directly targets underserved refugee populations to improve financial access. **3.4 Social Development Finance** – Enhances economic resilience and self-sufficiency for vulnerable groups. **3.6 Local Economic Development** – Supports broader integration of refugees into local economies.
39	**Institution** UNDP **Title** CedarCoin **Status** Completed **Duration** 2020–2021 **Use Case** Reforestation Incentives **Blockchain Type** Public **Blockchain Network** Ethereum	CedarCoin was a pilot by the United Nations Development Programme (UNDP) Lebanon to incentivize reforestation using tokenized environmental assets. For each cedar tree planted, a CedarCoin was issued to donors, creating a transparent, blockchain-based link between contributions and reforestation. The project aimed to mobilize diaspora funding and raise climate awareness through traceable digital tokens.	**2.2 Project Financing** – Mobilizes climate-linked funding via tokenized assets tied to reforestation efforts. **2.4 Monitoring & Evaluation** – Uses blockchain to transparently track tree planting and environmental impact. **2.5 Sustainability & ESG** – Incentivizes long-term ecosystem restoration and community-led environmental stewardship.	**3.4 Social Development Finance** – Aligns financial incentives with verified environmental and social outcomes, supporting climate resilience and sustainable livelihoods.

	Initiative	Description	Related Functional Areas	Related Operational Domains
40	**Institution** BIDV, ADB **Title** Blockchain LoC **Status** Completed **Duration** 2020 **Use Case** Trade Finance Digitization **Blockchain Type** Private **Blockchain Network** Contour Network	The Bank for Investment and Development of Vietnam (BIDV) and the Asian Development Bank (ADB) completed a blockchain-based Letter of Credit transaction via the Contour network, digitizing the end-to-end LC process for trade finance. This initiative marked a significant step towards enhancing the efficiency and transparency of international trade transactions.	**2.2 Project Financing** – Digitizes a core trade finance instrument (Letter of Credit) to streamline cross-border funding. **2.3 Risk Management** – Reduces fraud, delays, and documentation errors in international trade. **2.4 Monitoring & Evaluation** – Enhances visibility and auditability throughout the trade finance lifecycle.	**3.2 Private Sector Development Finance** – Supports businesses engaged in international trade with more efficient financing tools. **3.7 Capital Market Development** – Contributes to modernization of financial infrastructure underpinning global trade.
41	**Institution** UNDP **Title** Solar Currency Exchange **Status** Completed **Duration** 2018–2020 **Use Case** Crypto solar energy financing **Blockchain Type** Public **Blockchain Network** ElectriCChain	The United Nations Development Programme (UNDP) partnered with Moldova's Technical University and the SolarCoin Foundation to launch a pilot that rewarded solar energy production with blockchain-based SolarCoins. The initiative aimed to incentivize renewable energy generation through decentralized finance tools, allowing producers to earn digital tokens for each MWh of solar power generated. It showcased a novel mechanism for sustainable financing in emerging markets.	**2.2 Project Financing** – Demonstrates alternative renewable energy financing through token rewards. **2.4 Monitoring & Evaluation** – Links verified energy production to automated token issuance. **2.5 Sustainability & ESG** – Incentivizes clean energy and aligns with green financing goals.	**3.4 Social Development Finance** – Supports energy access and environmental resilience. **3.5 Financial Inclusion** – Provides new value streams to energy producers via digital tokens. **3.6 Local Economic Development** – Promotes community energy generation and decentralization.
42	**Institution** Oxfam **Title** BlocRice **Status** Completed **Duration** 2018–2020 **Use Case** Agricultural Supply Chain **Blockchain Type** Public **Blockchain Network** N/A	BlocRice was a pilot project by Oxfam to empower Cambodian rice farmers by using blockchain-based smart contracts to ensure fair trade terms, transparent supply chains, and direct payments to farmers. The initiative aimed to improve farmers' negotiating power and promote human rights in supply chains.	**2.1 Banking Access and Capital Mobilization** – Facilitates direct digital payments to farmers, bypassing intermediaries. **2.6 Stakeholder Engagement & Partnerships** – Empowers farmers as active participants in fair and transparent supply chains. **2.5 Sustainability & ESG** – Promotes ethical trade, labor rights, and social equity within agricultural value chains. **2.3 Risk Management** – Reduces exploitation and strengthens contract enforcement through smart contracts.	**3.4 Social Development Finance** – Supports livelihoods and rights of smallholder farmers. **3.5 Financial Inclusion** – Integrates marginalized rural producers into formal financial and trade systems. **3.6 Local Economic Development** – Strengthens local economies by ensuring fair value distribution in agricultural exports.
43	**Institution** WB **Title** bond-i **Status** Completed **Duration** 2018–2020 **Use Case** Bond issuance and lifecycle management **Blockchain Type** Private **Blockchain Network** Ethereum	In August 2018, the World Bank launched bond-i, a two-year bond that raised A$110 million. TBond-i was issued and managed throughout its lifecycle via a private Ethereum-based blockchain platform developed in collaboration with the Commonwealth Bank of Australia. This initiative aimed to explore the potential of blockchain to enhance the efficiency and transparency of capital markets.	**2.2 Project Financing** – Demonstrated blockchain's capability in streamlining bond issuance processes. **2.4 Monitoring & Evaluation** – Enabled real-time tracking of bond transactions and ownership. **2.5 Sustainability & ESG** – Supported the World Bank's sustainable development financing objectives.	**3.1 Public Sector Finance** – Innovated government bond issuance and management. **3.7 Capital Market Development** – Pioneered the integration of blockchain in capital markets, setting a precedent for future digital securities.

Authors

FeverTokens, Tokenized Economies Institute
Zakaryae Boudi, Jiulin Teng, Sara Kawas

Chaire FinTech - Université Paris Dauphine - PSL
Hervé Alexandre

Caisse des Dépôts
Nadia Filali