

GBBC
Global Blockchain
Business Council

# 101 REAL-WORLD BLOCKCHAIN USE CASES HANDBOOK

## 2025 EDITION

# FOREWORD FROM GBBC

Welcome to the inaugural Global Blockchain Business Council (GBBC)'s 101 Real World Blockchain Use Cases Handbook (the 'Handbook'), 2025 Edition!

**What is the backstory?**
GBBC has existed since 2017, and yet, we are posed the same question time and time again, so we decided to answer it: What is 'real' in blockchain technology? Forget about the hype. Show me the use cases!

**Which use cases are solving real-world problems to help society?**
The Handbook is our first attempt to collate, edit, and segment across different industries, jurisdictions, and organizations, drawing from our GBBC members and wider community.

From tokenization of financial products to tracking and tracing commodities to help farmers and consumers to regulatory innovations...this is a snapshot, and by no means comprehensive, nor encompassing the biggest or most well-known use cases. Some use cases fall into multiple categories. This is our best first attempt to organize into understandable topics.

If you flip through the Table of Contents, we are confident you will see at least one new use case you did not realize was happening, and, we hope, gain a better understanding of the vast array of blockchain, AI, and digital assets use cases around the world.

For government agencies, regulators, and central banks, if you would like a hard copy of this handbook, please send us an email and we will do our best to send one your way at no cost: info@gbbcouncil.org.

***All GBBC information is freely available.***

Please use the Handbook as a reference, share it with others, give us feedback, and join our community by following us online and engaging in our work.

Sincerely,
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GBBC
Global Blockchain Business Council

Global Blockchain Business Council (GBBC) is the trusted non-profit association for the blockchain, digital assets, and emerging technology community. Founded in 2017 in Davos, Switzerland, GBBC comprises more than 500 institutional members and 284 Ambassadors across 124 jurisdictions and disciplines. GBBC USA is the U.S.-based entity.

GBBC furthers adoption of blockchain and emerging technologies by engaging regulators, business leaders, and global changemakers to harness these transformative tools for more secure and functional societies.

**INITIATIVES**

| | | |
|---|---|---|
| GBBC BiTA Standards Council | GBBC Giving | GBBC GSMI |
| Global companies with a shared vision to leverage blockchain to define and grow open-source supply chain standards | A 501(c)(3) nonprofit organization under the aegis of GBBC dedicated to empowering underserved communities | Global Standards Mapping Initiative (GSMI) is the most comprehensive, crowd-sourced mapping of the blockchain and digital assets ecosystem |
| GBBC InterWork Alliance | GBBC USA | GBBC U.S. Blockchain Coalition |
| Empowering organizations to adopt and use token-powered services in their day-to-day operations | Serves as the U.S.-focused arm of GBBC, looking specifically at federal and state level topics | Highlighting use cases of blockchain across the U.S. and providing education to policymakers |

**LEARN MORE AT GBBC.IO**

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# THANK YOU TO OUR CONTRIBUTORS

- 1inch
- 21x
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- 677 Financial Group
- Accenture
- Aleo
- Algorand Foundation
- Animoca Brands
- Archax
- ARCHIP by Maerki Baumann
- Asian Development Bank (ADB)
- Ava Labs
- B2C2
- Balcony Technology Group
- Bank of England
- Bergen County, New Jersey Government
- Birina Handmade
- BTG Pactual - Mynt
- Calastone
- Canton Network
- Carbonmark
- Cardano
- CattleProof Verified
- Chainalysis
- Chainlink
- Clearstream
- Consensys
- Coorest
- Crystal Intelligence
- Depository Trust and Clearing Corporation (DTCC)
- Deutsche Bank
- Digital Asset (DA)
- Digital Token Identifier Foundation (DTIF)
- Droit FinTech
- Druk Holding & Investments (DHI)
- EcoRegistry
- Elliptic
- Euroclear
- Filecoin Foundation
- Folks Finance
- Fundación Pachamama
- Global Ledger
- Global Legal Entity Identifier Foundation (GLEIF)
- Hashed
- Hedera
- Hedera Foundation
- IDB Lab & International Fund for Agricultural Development (IFAD)
- Interop Labs
- InterWork Alliance (IWA)
- IoBuilders
- IOTA
- Kadena
- Kaiko
- KALYP
- Kinexys by J.P. Morgan
- Kintsugi Technologies
- KlimaDAO
- Learning Tokens Lab at LF Decentralized Trust
- Latham & Watkins
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- Taxbit
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- The Provenance Chain™ Network (PCN)
- Token Recovery
- ULALO
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- United Nations Joint Staff Pension Fund (UNJSPF)
- VerifyVASP
- Verra
- W3 SaaS
- Wave Digital Assets
- World Bank
- Yale University
- Zodia Custody

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# THE ORIGINAL USE CASE

**Did you know?**

This continuously published series of widely witnessed hashed values has appeared in the print edition of the Sunday New York Times since October 13th, 1991.

Dr. Scott Stornetta and Dr. Stuart Haber, whose academic publications are cited in 3 of the 8 references in the Bitcoin white paper, laid the foundations for blockchain technology with their research on time-stamping in the 1990s. Their joint endeavor through a company called Surety pioneered the first blockchain use case by verifying records.

A weekly hash of the digital records on this early — but still continuing— blockchain infrastructure is still made publicly available, as seen in the image to the right from the June 8th, 2025 edition of the New York Times, page 15 (New York edition).



NOTICES

5100\5102\5103

GENERAL/MISC 5100

Universal Registry Entries:
Zone 2—
2ZyohgZQHLUZgs6oSPLHfn3
OMKWSCq6+0L+p08Tz36qQqA
HM2UC+92SEKR80lLIQnh/7Zw==
Zone 3—
+vfd6v0nb6cl0+eYX2tLVpF
q116i8Zoj81DWtiN95axp0e1JP0l
7TMyf7LfFKOz4rOnW/Q==
Zone 4—
MLmsAfa+pasA3vTBHk8qh+Fc
qnK5yQMpRwRoo9B4zRS20Az
W+Bc9ExQ+l0jvjQEOGNoEng==
These base64-encoded values represent the combined fingerprints of all digital records notarized by Surety between 20250528Z - 20250603Z
www.surety.com 239-436-2790

SECTION I

# AGRICULTURE, COMMODITIES & ENERGY



## ARCHAX
# TOKENISATION OF URANIUM: THE U308 USE CASE

Much has been written about the benefits of tokenisation and the killer use cases of stablecoins and real-world assets (RWAs) through tokenised money market funds (MMFs). The inflection point for institutional adoption was arguably the 2024 launch of the Blackrock spot ETF and their tokenised MMF, BUIDL, which has now surpassed $2.5bn.

But there are many other applications of tokenisation and the underlying blockchain technology which will have a huge impact on current markets. Archax has tokenised multiple asset classes, from debt to equity to commodities, enabling fractional ownership and 24/7 global access. One such asset class is Uranium xU308 which is transforming the market for retail access, providing direct, digital ownership of physically-stored uranium.

Archax, through its custodian, broker and tokenisation offering, support the Tezos-powered Uranium.io offering which uses Etherlink blockchain technology, an EVM L2 on Tezos.

xU308 was delivered in response to the growing demand for low-emission nuclear energy driven by global policy and the growth of digital assets and AI. Tokenisation provides a pathway to wider investor participation in this spot uranium commodity as an asset class.

## WHAT IS TOKENISATION OF U308 SOLVING FOR?

- **Access for All:** In non-tokenised form, accessing U308 requires a minimum investment size of 100lb of uranium, or around $8m, and an account at a uranium depository. These barriers are removed through tokenisation, enabling a $1 access point and removing third party risk.

- **Settlement:** In non-tokenised form, settlement of a uranium purchase can take up to one month, but once tokenised, settlement can be real time 24/7, on chain, thus removing counterparty risk, enabling a better use of capital, and providing collateral and liquidity.

- **Distribution:** In non-tokenised form, distribution is limited to institutional investors, while in tokenised form it can be added to multiple alternative investment platforms, enabling retail access and diversification of portfolio.

- **Price Stability:** As an alternative asset it has demonstrated low correlation to US dollar/commodities.

## INSIGHT ON THE STRUCTURE

With infrastructure provided by Tezos's EVM compatible layer 2 Etherlink, physical uranium is purchased via the platform, procured by Curzon Uranium, stored by Cameco, and traded via the Tezos blockchain. Archax, through its nominee, holds legal title to U308 as physical uranium held by Cameco. This is then tokenised by the issuer in the form of 1 token to 1 ounce of U308.

The use of smart contracts automates trade settlement and custody transfers, eliminating the need to rely on traditional intermediaries who could default on their obligations.

## ABOUT ARCHAX

Archax is the UK's first FCA-regulated digital asset exchange, custodian and brokerage, with regulations pending in the EU and US. Archax provides a regulated environment for trading digital securities and other digital assets, creating a gateway between traditional finance and the digital economy. With a focus on transparency, security and innovation, Archax is at the forefront of the digital transformation of financial markets.

## CARBONMARK

# DIGITAL CARBON MARKETS: PROGRAMMATIC RETIREMENT

Carbonmark leverages advanced digital infrastructure to provide secure, auditable, and interoperable products and services to facilitate the trade and usage of environmental commodities. Carbonmark leverages a number of blockchain-native technologies, including a variety of smart contracts and data indexing solutions, with the objective to implement a user-friendly marketplace, as well as a powerful Application Programming Interface (API) product for buying, selling, and retiring carbon credits.

Carbonmark believes blockchain technology provides the infrastructure necessary to create a universal settlement layer for the carbon market and other environmental commodities. Leveraging this technology stack will help transition from a highly fragmented carbon market with little interoperability to a unified, composable, and interoperable market—conditions necessary to enable more innovative and efficient interactions between market participants.

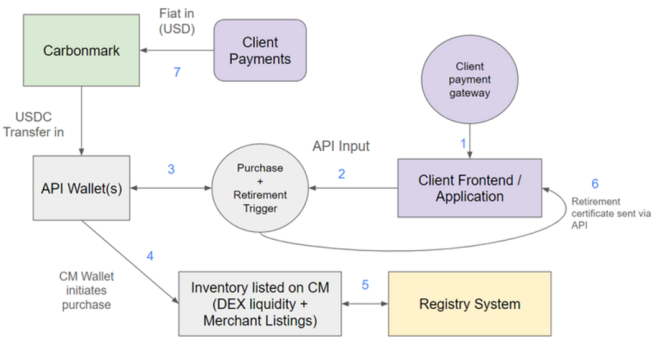
Important to advancing Carbonmark's vision is the focus on increasing access to this technology. This requires abstracting away certain technical complexities from the user experience, including the requirement to use a web3 wallet to sign transactions. Beyond interface improvements, Carbonmark's API removes the need to directly interface with a blockchain to access the on-chain carbon market. This has enabled other companies to seamlessly integrate our API into their own technology stack to support high-throughput transactions purchasing and utilizing carbon credits.

Due to the current infrastructure landscape that most of the carbon market is still facilitated on, significant fragmentation of liquidity in the VCM is the norm—creating an inefficient trading environment where asymmetric information related to the availability and pricing of environmental commodities impedes trading and market access. Concurrently, the technological platforms that traditional market infrastructures are built on do not enable streamlined connections for asset trading—nor do they provide strong data availability.

The aforementioned factors negatively impact the velocity of the market and the throughput of capital to carbon mitigation and removal projects.

## THE INNOVATION & REAL-WORLD APPLICATIONS

The Carbonmark retirement API triggers on-chain carbon acquisition and retirement via a Web2-style REST API. The carbon utilized for this process is 'tokenized,' meaning that these are digital twins of carbon credits held in registry systems, such as EcoRegistry. The credits made available to the API are listed on Carbonmark's marketplace by merchants (including traders and project developers) or via carbon credits held in decentralized exchange (DEX) liquidity pools. Importantly, a number of carbon registries are beginning to issue their credits directly onto blockchain infrastructure, negating the need to create new 'digital twins' of existing carbon credits held on an outside database.




The application of Carbonmark's API hinges on a few key advantages of tokenized carbon credits. First and foremost, this solution makes assets programmable. Smart contracts provide a basis for automating various market operations, including sourcing and retiring the assets. Sourcing includes filtering projects based on certain criteria and initiating the purchase of them (data related to vintage, certification standard, technology type, etc, is held in the metadata of the tokenized carbon credits). By delivering these assets to clients in this way, Carbonmark streamlines their own operations, and ensures advantageous pricing compared to traditional delivery methods.

## CATTLEPROOF VERIFIED
# MODERNIZING LIVESTOCK IDENTITY INFRASTRUCTURE

CattleProof operates at the critical intersection of **agricultural policy, verification standards**, and **digital infrastructure**—delivering a more secure, transparent, and efficient cattle economy. With the potential to facilitate **trillions of dollars** in global cattle transactions, CattleProof enhances both domestic market performance and U.S. competitiveness in international trade. The platform initially targets more than **700,000 U.S. ranches**, many of which are family-owned and vital to the health of rural economies.

## THE PROBLEM

Despite the scale and importance of the cattle industry, its core transaction systems remain virtually unchanged since the 19th century. Current processes are plagued by:

- **Inaccurate or missing data**
- **Delayed payments and settlement**
- **Limited traceability**
- **Rampant fraud**, including "ghost cattle" schemes and animal misrepresentation

These systemic issues erode producer profitability, undermine food safety, and weaken trust in U.S. beef on the global stage.

## THE SOLUTION

CattleProof Verified introduces a **USDA Process Verified identity system** for individual animals, powered by blockchain technology. Each animal is assigned a secure, tamper-proof digital ID that persists across its lifecycle and ownership changes.

This next-generation infrastructure enables:

- **Faster, more secure payments**
- **Improved regulatory compliance and auditability**
- **Streamlined access to domestic and international marketplaces**
- **Real-time, shareable data for buyers, sellers, and supply chain partners**

## WHY IT MATTERS

CattleProof Verified represents more than a technological upgrade—it's a foundational transformation in how cattle are identified, verified, and traded.

The platform's far-reaching impact includes:

- **Strengthened food system integrity** through trusted, verifiable data
- **Fraud mitigation** and enhanced financial transparency
- **Greater liquidity and access to financing** through cattle tokenization
- **Future-proof compliance** with evolving regulatory and trade requirements
- **Digital enablement** for ESG reporting, risk underwriting, and carbon markets

As the global food system demands greater transparency and sustainability, CattleProof Verified is poised to become the **standard for modern livestock identity**.

## EARLY ADOPTERS

- **Choctaw Ranches:** Managing livestock across 63,000 acres, the Choctaw Nation is using CattleProof to enhance agricultural trust and profitability at scale.
- **Jorgensen Land & Cattle:** The largest registered bull seller in the U.S., Jorgensen is implementing CattleProof to support verifiable animal identities and data-backed transactions.

Learn more at: cattleproofverified.com

## COOREST

# DIGITAL CARBON MARKETS: PUBLIC BLOCKCHAIN ISSUANCE WITH SATELLITE DMRV

This case study delves into Coorest's pioneering efforts in revolutionizing the voluntary carbon markets through the integration of blockchain and DeFi technology. Focused on building an on-chain registry, Coorest aims to address the longstanding challenges plaguing carbon offset transactions. By standardizing critical processes such as project registration, measurement, reporting, verification, and tokenization, Coorest leverages the power of a decentralized form of digital measurement, reporting, and verification (dMRV), which leverages the benefits of blockchain technology. This innovative approach promises to bring about transparency, efficiency, and accessibility to carbon markets, ultimately facilitating a more sustainable future.

Traditional carbon credit registries suffer from fragmentation, lack of transparency, and susceptibility to fraud. These shortcomings are significant barriers to the scalability and integrity of carbon markets. In response to these challenges, Coorest embarked on building a blockchain-based registry to address the shortcomings of traditional registries. Through collaborative efforts and iterative development, key lessons were learned, including the importance of transparency, neutrality, decentralization, and community consensus.

By leveraging blockchain technology, Coorest created a registry that enables seamless project registration, transparent measurement, reliable reporting, and verifiable issuance of carbon credits.

## DEVELOPMENT

dMRV can be applied in many different ways, leading to a lack of clarity in the market. Companies providing dMRV services can come to a consensus on how to standardize their services in order to remove this lack of clarity. Consensus around sensor usage and data storage is essential. The process Coorest utilizes for registration, dMRV and tokenization is visualized below.

## THE INNOVATION & REAL-WORLD APPLICATIONS

Coorest's blockchain-based solution utilizes distributed ledger technology to standardize project registration, measurement, reporting, verification, and tokenization processes. Smart contracts automate the execution of agreements, ensuring trustless and efficient transactions. Chainlink's technology is leveraged for secure and reliable data oracles, enabling the integration of external data sources into the blockchain pertaining to carbon project performance.

In practice, a number of key steps must be undertaken along the credit generation and usage journey.

1. The registry is deployed on a decentralized storage system like Filecoin. Filecoin provides a robust and distributed system for storing large datasets securely and transparently. By leveraging this type of decentralized storage, Coorest ensures that the registry data—comprising project information, asset tracking, and transaction histories—is immutable, resistant to censorship, and fault-tolerant.

2. Monitoring, reporting and verification (MRV) data sets are stored on Filecoin. MRV data is also stored on Filecoin, which plays a critical role in ensuring that carbon project performance metrics are securely recorded and made accessible in a decentralized manner. The MRV process includes the collection of environmental data, such as biomass changes, which directly impacts the calculation of carbon credits. By storing this data on decentralized storage, we can ensure data integrity, scalability, transparency, and cost efficiency.

3. Satellite data is provided via Chainlink's Floodlight Oracle. This provides updates on carbon project performance via changes in biomass levels.

4. Smart contracts generate carbon tokens based on satellite MRV data on the Polygon PoS blockchain.

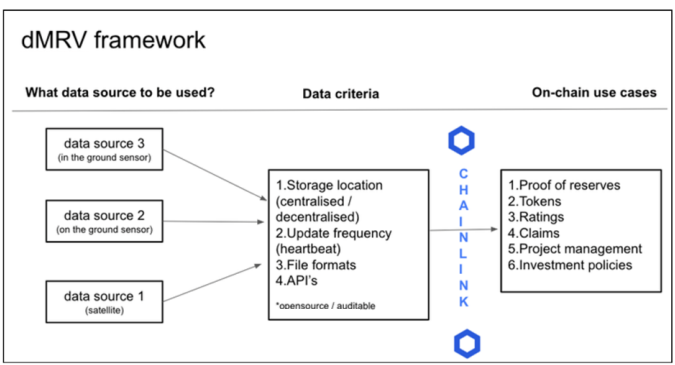
5. Smart contracts are invoked when carbon retirements are initiated. These ensure the tokens are not double counted and provide a carbon retirement proof.

## KEY TAKEAWAYS

Coorest identified several key takeaways from the development of their carbon standard and offsetting product. Chief among these includes a reflection on development time, which Coorest categorized as lean and fast, highlighting "Blockchain infrastructure and dMRV integration can be done with small teams." Despite the quick development, they noted that gaining mainstream adoption of the solution remains difficult. Companies are unfamiliar with the tech and lost a lot of trust in the voluntary carbon market (VCM) in general.

Regarding the technology, Coorest found the token ecosystem to be very useful to have full on-chain carbon accounting. However, the user experience needs improvement to take away direct interfacing with the underlying blockchain infrastructure.

Lastly, regarding the carbon credits themselves, Coorest highlighted the need for an integrated insurance finance solution to protect consumers and investors against project failure. This is important to realize the ultimate function of the credits, which is to finance agriculture projects and to offer an investable real-world asset class for investors outside of the VCM.



**ECOREGISTRY**

# DIGITAL CARBON MARKETS: PRIVATE BLOCKCHAIN BACKEND

Distributed ledger technology (DLT) entered the carbon market ecosystem with the promise of giving access to a broader type of customers and connecting different participants around the world with modern financial infrastructure. One of the most important capabilities of DLT to achieve this goal is the capacity to maintain traceability and the ability that it offers to the general public to track every single transaction on the network. This issue is critical for carbon markets, enhancing their integrity, as well as supporting new functionality, greater efficiency, and fairness.

Some important characteristics of DLT are:

- **Attribute management:** DLT solutions offer the deployment of tokens to differentiate assets that have different attributes, but represent the same type of asset. EcoRegistry implements this functionality to include the attributes of each environmental asset in the creation process of each carbon credit unit.

- **Robustness:** Robustness comes from the technology itself, and the general use has been tested in different environments, including cryptography. By their nature, DLT solutions are redundant to failure of an individual node and resilient to infrastructure failures like local power outages. This provides a robust and stable implementation suitable for specific applications, like environmental assets.

- **Issuance traceability:** With the capacity to natively work with cryptographic signatures, the system allows multiple signatures to be required prior to issuing any type of asset. This prevents a single user from abusing the system unilaterally, requiring multiple approved users responsible for issuing the asset to enter the platform and execute a digital signature approving the creation of an asset.

- **Smart decisions:** With Smart Filters and Smart Contracts, developers can create customized validation rules that enforce integrity in the registry's backend systems.

EcoRegistry uses a Multichain Blockchain Network solution, with capability to connect to other networks, including Ethereum, Polygon, the Chia Network, and many others. EcoRegistry focuses on the issuance and tracking of carbon units, safeguarding all the supporting evidence for the quantification of issued units from carbon projects.

EcoRegistry is a solutions provider that believes in the positive impact that technology can bring to the carbon markets and any other environmental asset.

Through the implementation of technology and data driven decisions, EcoRegistry focuses on providing solutions that can bolster the implementation of more sustainable solutions around the globe. Since 2017, EcoRegistry has been recognized as a robust registration platform provider to independent standards for the voluntary carbon market, biodiversity, and the circular economy. EcoRegistry has already implemented demo solutions for specific country needs, like a Monitoring, Reporting and Verification (MRV) platform, Nationally Determined Contributions (NDC) tracking systems, and general Greenhouse Gas emissions from countries, corporates, and industry.

In the voluntary carbon market, EcoRegistry has issued more than 100M ton$CO_2$ on its platform, with most coming from the Cercarbono Standard. In addition, EcoRegistry is connected with the Climate Action Data Trust via an API, and also has the capability to connect to other platforms, exchanges, and marketplaces, regardless of the technology used.

Liquidity and access to broader markets is key for the continuous development of multiple projects. Environmental projects need to have consistent cash flows that allow them to implement, ensure a return on the investment, and continue new developments. When market activity slows or stops, for any reason, projects are hurt the most because they stop getting the income needed to support conservation, reforestation, or more generally, continued implementation of any solution.

The main reason for these marketplaces to exist is to give new opportunities for all projects to access multiple markets, thus supporting ongoing cash flows. Through the integration of these technologies, the expectations from project developers, communities, and project owners is that market activity continues and expands.

## FUNDACIÓN PACHAMAMA
# THE BIOCULTURAL JAGUAR CREDIT

The Amazon rainforest is one of Earth's most vital ecosystems, playing a critical role in maintaining global biodiversity and regulating the planet's climate. However, this irreplaceable resource faces escalating threats from deforestation, habitat destruction, and climate change. Regen Network, in partnership with Indigenous communities and allies including Fundación Pachamama, is leveraging cutting-edge blockchain technology to address these challenges through innovative and regenerative solutions.

A cornerstone of our work in the Amazon is our collaboration with the Sharamentsa and the broader Achuar Nation. This partnership places Indigenous wisdom and ancestral land stewardship at the heart of ecological preservation. The Sharamentsa community has long protected their biodiverse territories, including jaguar habitats and pristine rainforests, ensuring the vitality of these ecosystems for generations.

Regen Network amplifies their efforts by providing the tools and infrastructure to tokenize ecological assets while respecting their sovereignty over the design, deployment, and management of these assets. Regen, Sharamentsa, and allies worked together to develop the Biocultural Unit Paradigm. As Regen Network Development CEO Gregory Landua explained, *"...Biocultural Units are a profound theory of reweaving relational value, symbolizing a harmonious balance between human activities and the Earth's ecosystems. This initiative heralds a shift towards more equitable, transparent, and effective mechanisms for environmental stewardship, grounded in the principles of ancestral wisdom and collaborative partnership."*

The Biocultural Jaguar Credit system exemplifies this integrated approach, linking cultural and ecological conservation by safeguarding approximately 10,000 hectares of jaguar habitat. Each credit represents a measurable commitment to preserving biodiversity while aligning with the values and traditions of the Achuar Nation.

By facilitating transparent and equitable relationships between Indigenous communities, buyers, scientists, conservation organizations, and institutions, the project resolves longstanding challenges that have historically plagued interactions between Indigenous stewards and global organizations. The credit design ensures that the value generated directly benefits these communities, empowering them as equal partners in global ecological markets.

This initiative with Fundación Pachamama is strengthened through deep partnerships with organizations such as Stoknes Futures and the Amazon Sacred Headwaters Alliance. After a successful launch of the pilot, IDB Labs and NaturaTech LAC have joined our coalition to support program expansion to neighboring communities, in an effort to hold the line against road encroachment into indigenous territories. These allies work in concert to support the Sharamentsa and Achuar Nation, combining technical expertise, cultural advocacy, and ecological strategies to ensure the success and scalability of the project. Together, these collaborations create a robust network that integrates Indigenous leadership, conservation science, and technological innovation.

At the heart of Regen Network's efforts is its powerful Regen Ledger, an open-source, decentralized blockchain purpose-built for ecological markets. Regen Ledger provides the infrastructure needed to securely store, verify, and exchange ecological data, ensuring transparency, accountability, and trust among all stakeholders. It serves as the foundational platform for tools such as the Ecocredit Module, which facilitates the creation, verification, and trading of ecological credits, and the Regen Data Stream, a robust data pipeline that integrates satellite imagery, ground-truth observations, and scientific inputs to verify ecological outcomes in real time.

Together, these technologies create an ecosystem of trust and scalability that empowers communities, organizations, and investors to collaborate effectively in the preservation and regeneration of ecosystems.

This approach addresses more than ecological concerns; it also creates sustainable economic opportunities for the Sharamentsa and other Indigenous communities. By funding their unparalleled stewardship of the land, these communities secure a sustainable income stream that reinforces their role as guardians of the Amazon. The model ensures a balance between local economic development and environmental regeneration, creating a template for equitable, long-term sustainability.



Looking forward, Regen Network, Fundación Pachamama, and the Biocultural Jaguar Strategy group remain committed to scaling these efforts, deepening partnerships, and exploring new applications of blockchain to amplify Indigenous-led stewardship and planetary regeneration. Together, we can ensure the Amazon thrives and continues to provision the rest of society with clean air, water, and a depth of biological and cultural diversity Earth needs for a resilient future.

## IDB LAB & IFAD

# AGROWEB3: BLOCKCHAIN INNOVATION FOR A MORE INCLUSIVE AND SUSTAINABLE AGRICULTURE

Small-scale farmers produce **over 85% of the world's food**, yet they face persistent barriers to growth, including **limited access to financing and markets**. Rural communities, particularly women farmers, are among the most affected.

To address these challenges, LACChain, an IDB Lab initiative, together with the International Fund for Agricultural Development (IFAD), has developed AgroWeb3. This blockchain-based initiative enables organizations to interoperate through a **verifiable credentials protocol and digital wallets**, fostering a transparent and efficient agricultural ecosystem. Currently, AgroWeb3 is being deployed in **Peru, Argentina, and other Latin American and Caribbean countries**, and is now being **rolled out in Kenya**. The initiative is supporting **farmers proving compliance with the EU's new zero-deforestation regulations**, ensuring they meet the **stringent traceability and sustainability standards required for exports**.

## HOW IT WORKS

Through this protocol, various providers of agri-food traceability platforms and digital wallets can coexist with certification entities, verifying production capacity, quality standards, and compliance credentials—such as those required by the EU's **deforestation-free supply chain regulations**.

By enabling interoperability, AgroWeb3 allows governments and stakeholders to adopt customized solutions, fostering seamless collaboration across agricultural networks.

Additionally, the initiative supports the tokenization of farmers' accounts receivable, creating an innovative factoring mechanism that improves liquidity and credit access for small farmers.

## REAL-WORLD IMPACT

AgroWeb3 aims to benefit one million small and rural farmers in its first phase, leveraging successful pilot projects in Peru and Belize, where value chains for avocado, sugar, and coffee are already being impacted through blockchain-enabled transparency.

In **Belize**, for example, sugarcane producers are now using a **traceability platform** that monitors **planting, harvesting, and transportation** through to **milling and delivery to corporate buyers**. This system allows producers to **demonstrate compliance, receive tokenized payments in real-time, and trade these digital assets within the financial system**, improving access to **working capital and essential farm inputs**.

With its **expansion into Kenya**, AgroWeb3 is further supporting **smallholder farmers in meeting EU regulations**, leveraging **satellite data and blockchain technology** to ensure transparent, verifiable compliance with sustainability requirements.

## A MORE EQUITABLE AND SUSTAINABLE FUTURE

AgroWeb3 is not just about technology—it's about **economic empowerment, sustainability, and inclusion**. By leveraging **blockchain for traceability, compliance, and financial innovation**, it is helping farmers **overcome market barriers, access new opportunities, and compete in global markets**.

With the support of **the European Space Agency and other partners**, AgroWeb3 continues to **transform agricultural value chains**, making them more **resilient, transparent, and inclusive** — paving the way for a **fairer and more sustainable future**.

## KLIMADAO

# DIGITAL CARBON MARKETS: FORWARD FINANCING VIA PUBLIC TOKEN GOVERNANCE

KlimaDAO utilizes innovative, open-source technology to bring greater transparency, liquidity, and access to carbon credits and other environmental assets.

KlimaDAO's activity can be broadly split into two categories:

- Acquiring carbon credits to grow the treasury of carbon assets.
- Providing liquidity for carbon credits on decentralized exchanges (DEXs).

KlimaDAO has also historically developed bespoke software solutions that supported the distribution of (tokenized) carbon credits; however this technology and operation were spun-out from KlimaDAO to a private limited company called Carbonmark (see separate case study).

KlimaDAO utilizes the $KLIMA token for two primary functions:

- It is used as a liquidity pair within DEXs, allowing KlimaDAO to develop liquidity for certain baskets of carbon types.
- It is used to ratify or reject token-based governance decisions.

The governance rights over the DAO allow token holders to participate directly in economic decision making, which primarily define which verified carbon credit projects the DAO will allocate its funding towards. KlimaDAO's primary funding is into forward funding agreements, which allow KlimaDAO to prefinance the development of carbon projects and be an offtaker for spot carbon credits as and when they are issued.

## THE UNDERLYING TECHNOLOGY & HOW IT WORKS

KlimaDAO's forward funding initiatives leverage four elements of the DAO:

***1- THE USDC HELD IN ITS TREASURY***

KlimaDAO's treasury consists of carbon and the USDC stablecoin. KlimaDAO utilizes its stable assets as part of its forward funding process in order to convert into more treasury carbon.

KlimaDAO utilises a Safe Multisig solution to provide the financial backbone for secure financial operations as DAO, for purposes such as paying expenses, managing smart contracts, and deploying approved assets from the treasury.

***2- PUBLIC GOVERNANCE AND CONSENSUS-BUILDING PROCESSES***

KlimaDAO builds consensus on its Forum (hosted by Flarum), and through conversation with its community (hosted on Discord). KlimaDAO is currently developing version 2.0 of the Klima Protocol, which features an innovative Automated Asset Manager (AAM) system that dynamically rewards governance participants for making accurate predictions about the relative value of different types of carbon credits. Scheduled to launch in 2025, this upgrade significantly increases the level of decentralization and automation in the treasury management process.

***3- TOKEN-WEIGHTED VOTING MECHANISM***

KlimaDAO's token $KLIMA has a one-to-one voting ratio; token holders have one vote for every token they hold. KlimaDAO leverages Snapshot to implement its token voting process. The upcoming Klima 2.0 system will also utilize token-weighted voting, but using a custom set of smart contracts rather than proposal-based voting on Snapshot.

***4- CARBON CREDIT EVALUATION FRAMEWORK***

KlimaDAO developed a framework to inform community members of, and publicly evaluate, carbon credit projects for potential financing. This provides a first pass diligence for the market, reveals forward pricing information to the market, and gives project developers a well-known standing reserve for modest sums of capital.

This process involves public reviews on a governance forum, evaluation by expert contributors according to an evaluation framework, and final approval determined via token-weighted voting.

KlimaDAO's carbon credit evaluation framework utilizes a multidimensional scoring system to assess project viability, impact, and alignment with KlimaDAO's mission. The framework considers factors like certification standards, market demand, geopolitical risks, environmental/social impact, financial stability, and methodology robustness. Both quantitative on-chain data and qualitative insights from experts are incorporated.

In order to be considered for funding by the DAO, projects must score at least 50 points across weighted criteria such as financial runway, end market security, on-chain presence, purchase volumes, registry issuance, demand trends, scalability, co-benefits, verification, stakeholder engagement, additionality, diversification, and strategic value. This data-driven approach supports informed decision-making.

The process works as follows:

- A project developer posts an RFC on the KlimaDAO Forum with terms for a forward agreement.
- Community members evaluate the opportunity using KlimaDAO's evaluation framework.
- If deemed appropriate, the proposal moves to token-weighted voting.
- If approved by >50% of token voters, KlimaDAO strikes a deal with the project developer.

Klima 2.0 automates much of this manual process by providing an algorithmic pricing model for potential forward purchases are priced based on their attributes. If the project developer is willing to take the treasury's price for forward units, they can simply sell to the treasury at that price without the cumbersome, if effective, governance process outlined above.

## KEY TAKEAWAYS

KlimaDAO's innovation has garnered recognition for its approach to democratizing climate finance and leveraging decentralized technologies for real-world impact. It has successfully onboarded carbon credits onto the blockchain, demonstrating the potential for tokenization of environmental assets.

Key lessons include the power of decentralized governance and tokenized incentives for addressing complex challenges, the need for innovative solutions to bridge traditional organizations and decentralized ecosystems, and the importance of robust security and data privacy measures.

KlimaDAO's precedent could inspire similar initiatives across various industries and sectors. Readers are encouraged to explore KlimaDAO's ecosystem and collaborate with the organization to drive sustainable initiatives forward.

KlimaDAO advanced the industry standards for transparency, liquidity and programmability by leveraging blockchain primitives like smart contracts and DEXs. Instead of making phone calls to a network of brokers, emailing spreadsheets and PDFs and settling transactions in weeks with a wire transfer, carbon market purchasers can browse a wide range of projects with transparent pricing and liquidity, settle transactions in seconds, and receive a unique shareable URL that they can embed in their website or social media profiles. With transparent credit provenance and publicly auditable transaction history, KlimaDAO's use of blockchain for carbon credits addresses longstanding concerns around double counting and fraudulent transactions.

## MERCY CORPS

# ANTICIPATORY ACTION LEVERAGING BLOCKCHAIN FOR DROUGHT-IMPACTED PASTORALISTS IN THE HORN OF AFRICA

## BACKGROUND

Pastoralism is a way of life for 50 million people across sub-Saharan Africa, who depend on their livestock for income and subsistence. Climate change is threatening the way of life of pastoralists in the Horn of Africa with increases in prolonged and lengthy droughts. Moreover, 99% of humanitarian aid is issued reactively, when the negative impacts have already been experienced, making recovery more difficult. Yet research shows that more than half of all humanitarian crises are somewhat predictable, and at least 20% are highly predictable.

In September 2023, Mercy Corps Ventures partnered with Fortune Credit, Shamba Network, and DIVA Technologies to launch a pilot testing the use of blockchain-powered smart contracts to deliver anticipatory cash transfers to pastoralist communities in Kenya. Research shows that anticipatory action (aid delivered before disaster strikes) is 7x more cost-effective than traditional humanitarian aid. At the core of this pilot was a smart contract which held donated funds in escrow and was programmed to only disburse the funds if pasture conditions were deemed distressful for pastoralists. A total of 11,271 USDT was disbursed to 262 pastoralists in this initial proof of concept.



## PILOT INSIGHTS

**The pilot resulted in a 75% reduction in transaction costs as compared to traditional transfers.** DIVA's blockchain tech stack reduced the cost to transfer funds end-to-end to recipients to 2.5% of the transaction value, compared to the 10-35% in fees and operational costs of traditional transfer methods.

**The pilot resulted in a 90% reduction in time for the delivery of donation funds from release to beneficiary.** Pastoralists in the pilot received disbursements through M-PESA 14.5 hours after release from the smart contract. In comparison, cash payments made through similar non-blockchain programs take approximately 7 to 10 days to reach beneficiaries.

**Pilot participants reported financial improvements consistent with the payouts received.** Over 75% of survey respondents reported having experienced a slight improvement in their financial security and corresponding stress levels. Additionally, 53% reported an improvement in their ability to meet a major unexpected expense exceeding 10,000 KES.

> *"Our mission is to provide products that enhance financial inclusion but we found that some of our target customers such as pastoralists could not afford to pay the insurance premiums we charged…so we decided to seek out partners such as DIVA and Shamba, that could enable us to expand our reach to offer solutions to vulnerable populations that are largely ignored by traditional financial institutions"*
>
> *Janet Kuteli | Founder & CEO, Fortune Credit*

## WHAT'S NEXT

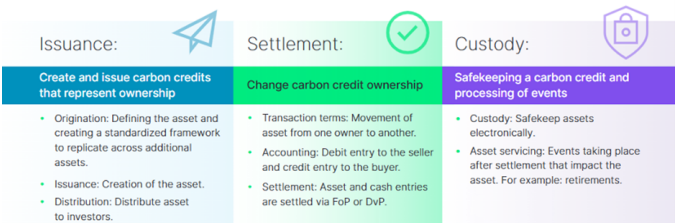
Mercy Corps Ventures is actively looking to scale up this use case in different geographies and for different climate triggers. As part of that effort, Ventures recently launched the AA Accelerator, offering grant funding to tech and humanitarian partners piloting this use case in 2025. An additional pilot implemented by Mercy Corps Nepal and Rumsan is also underway to provide trigger-based cash for areas impacted by monsoon flooding.

## NASDAQ

# NASDAQ'S DIGITAL ASSETS AND CARBON MARKETS SOLUTIONS

As digital assets and carbon markets mature, organizations looking to capitalize on growth opportunities in these areas will require agile technology designed to scale.

Nasdaq's Digital Assets and Carbon Markets solutions are designed to address the evolving needs of modern marketplaces by providing institutional-grade security, performance, accessibility, and scalability. These offerings aim to solve critical challenges in digital assets and carbon markets, such as ensuring transparency, trust, and liquidity by providing digital assets infrastructure that supports high-volume trading while maintaining reliability and scalability. This is crucial for market participants who require a secure and efficient platform to engage in digital asset transactions. For carbon markets, Nasdaq's technology facilitates better transparency and liquidity, addressing the need for reliable carbon registries and exchanges that can handle the complexities of carbon credit trading.




The Digital Assets platform provides a Software-as-a-Service (SaaS)-deployed infrastructure that supports exchanges, marketplaces, and registries and is particularly beneficial for the carbon markets use case, where it enhances transparency and certainty through advanced tracking and monitoring capabilities. The tailored technology for carbon registries provides a single service for secure, scalable, and efficient issuance, settlement, custody, and retirement of carbon credits.

Nasdaq's approach to carbon management leverages smart contracts, giving carbon registry operators full auditability, while reducing manual processing and complexity, improving access, and driving growth across the emerging carbon ecosystem. By leveraging smart contracts, carbon market operators and registries can easily create and distribute standardized credits with a full audit trail throughout the entire lifecycle. Clients also benefit from the optionality to operate the platform on a central database or a private-permissioned network, enabling flexibility as the carbon market grows.

By leveraging Nasdaq's core competencies of operating and modernizing critical financial infrastructure, Nasdaq's solutions for digital assets enable both market infrastructure operators and market participants alike to engage in digital assets with institutional-grade performance, accessibility, and scalability.



## NATURE WIRED

# ADVANCING EQUITABLE CORPORATE CLIMATE ACTION

### THE PROBLEM

The global community is urgently seeking innovative solutions to combat climate change. While carbon and other nature markets have emerged as a promising pathway to promote sustainable development and reduce greenhouse gas emissions, they require stricter integrity principles and safeguards to ensure fair and genuine impact.

### HOW IT WORKS

Nature Wired connects businesses with verified, high-impact nature-based projects to offset their carbon footprint and support ecosystems and communities worldwide. Our **Credit Harbor** marketplace offers projects such as reforestation, biodiversity conservation, mangrove restoration, and water security, empowering companies to achieve sustainability goals while fostering ecological integrity and social benefits.

As a member of the **GBBC InterWork Alliance's (IWA) Voluntary Carbon Market Taskforce** and the **United Nations Population Fund (UNFPA)'s Equity 2030 Alliance**, Nature Wired prioritizes transparency, equity, and innovation. While our marketplace is in its early stages, we are actively piloting projects, collaborating with project developers, and engaging with corporate buyers to refine our platform.

Guided by IWA's **dMRV Framework**, we are building a strong foundation to adopt advanced tools for digital monitoring, reporting, and verification (**dMRV**).

By fostering connections between corporate sustainability efforts and verified high-integrity projects, Nature Wired strives to scale climate solutions that align with the **United Nations Sustainable Development Goals (SDGs)** and trusted industry standards, while supporting our Equity 2030 Alliance goals to promote fairness and inclusion.

- *For more information: naturewired.earth/*
- *Follow us on LinkedIn: linkedin.com/company/nature-wired-inc/*
- *Contact us: hello@naturewired.earth*

**PRISMIQ**

# NUTRICHAIN ZAMBIA: TOKENIZING NUTRITION FOR EQUITABLE SCHOOL MEAL DISTRIBUTION

In Zambia, **over 5 million children** lack access to consistent, nutritious school meals, with only **25% receiving any food at school**. Those who do often rely on maize-based meals that fail to meet essential nutritional requirements, exacerbating malnutrition and poor educational outcomes—especially for girls. Compounding this crisis are **fund mismanagement, inefficiencies, and lack of transparency** in meal distribution, leading to wasted resources and unmet needs.

## A BLOCKCHAIN-POWERED SOLUTION

**NutriChain Zambia** is a blockchain-based system designed to **ensure transparent, traceable, and equitable meal distribution** in schools. Built on the **IOTA blockchain and soon to be on Ethereum**, NutriChain uses **tokenized school meals** to eliminate inefficiencies, reduce fraud, and ensure that every donor dollar translates into a nutritious meal for a child in need.

Through **programmable smart contracts**, the system enables:

- **Real-time tracking** of tokenized meal funds, from donor contributions to vendor payments.
- **Immutable transaction records**, ensuring full transparency and accountability.
- **Localized meal procurement**, promoting diversity in nutrition and supporting small-scale farmers.

Each meal is **tokenized and stored on the blockchain**, allowing donors, NGOs, and local governments to track fund utilization with **unprecedented transparency**.

**Sub-tokens** enable special allocations, such as holiday meals or funding for kitchen infrastructure.

## PROOF OF CONCEPT & SCALABILITY

The NutriChain model has already been successfully tested in **9 cities with 100,000+ users**. In Zambia, the pilot is with **1,000 students at a partner school**, ensuring **50% gender equity** in distribution. With an agile **scalability plan**, the initiative aims to expand nationwide, targeting **5 million underserved children** and potentially adapting for other nations.

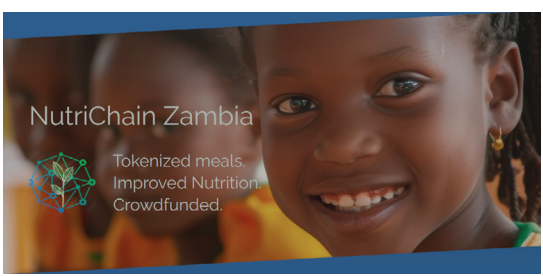
## IMPACT GOALS

By utilizing blockchain, NutriChain Zambia aims to:

- **Enhance Transparency** – 100% of funds accounted for in near real time.
- **Improve Nutrition** – Provide diverse, locally sourced meals beyond maize.
- **Boost School Attendance** – Increase participation rates, especially among girls.
- **Support Local Economies** – Engage small farmers and vendors in sustainable food supply chains.
- **Reduce Corruption** – Immutable records ensure that funds reach intended beneficiaries.
- **Enable Crowdfunding** – Allow individuals and organizations worldwide to directly fund the school.

## A MODEL FOR GLOBAL REPLICATION

Beyond Zambia, NutriChain provides a replicable framework for **digitally transforming humanitarian assistance**. It demonstrates how blockchain can bridge financial inclusion, sustainability, and food security—proving that **technology can serve as a catalyst for real-world impact**.



## REARDEN DIGITAL ASSETS

# TOWARD A MORE ACCOUNTABLE AND EFFICIENT CARBON ECONOMY

Rearden Digital Assets is acting as a product designer and developer for Blockchain for Energy (B4E), disrupting the energy sector's emissions measurement and verification approach through its B4ECarbon solution. This initiative leverages distributed ledger technology to enhance transparency, accuracy, and trust in the carbon emissions data reported by energy companies.

The core of this effort is facilitated by digital Measurement, Reporting, and Verification (dMRV) technology. The platform integrates advanced IoT sensors, distributed ledger technology (DLT), and tokenization to create a seamless and tamper-proof system for tracking carbon emissions and removals. By aligning with the InterWork Alliance (IWA) frameworks, B4ECarbon ensures that CETs (Carbon Emissions Tokens), CRUs (Carbon Removal Units), and RECs (Renewable Energy Certificates), meet rigorous industry specifications for interoperability and auditability.

The initiative also addresses a critical challenge in the energy sector—verifying the accuracy of emissions data. B4ECarbon incorporates cryptographically secure verified credentials for key data inputs, such as sensor calibration certificates, maintenance records, and replacement documentation. These credentials are linked to digital assets, creating an immutable audit trail that enhances data integrity and supports compliance with regulatory and voluntary carbon markets.

Rearden Digital's work with B4E further emphasizes the role of tokenization in driving value for stakeholders. By standardizing and digitizing emissions data, the platform unlocks new monetization opportunities for carbon credits and facilitates their integration into global carbon trading platforms. Additionally, the blockchain-based system mitigates risks of fraud and reversal through its robust verification mechanisms.

Ultimately, this initiative aims to set a new benchmark for the energy sector by combining cutting-edge blockchain innovation with practical, industry-aligned solutions. Rearden Digital and Blockchain for Energy are advancing the digitalization of carbon accounting and creating a scalable framework that can be expanded across the energy sector to enhance their sustainability credentials. Through B4ECarbon, they are paving the way for a more accountable and efficient carbon economy.

## RECYCLEGO + SINANSYS

# OPTIMIZING SUSTAINABLE SUPPLY CHAINS THROUGH BLOCKCHAIN, TRACEABILITY, AND QUANTUM INTELLIGENCE

Policymakers around the world are advancing new frameworks to combat climate change, enforce circular economy mandates, and increase transparency in global trade. From the EU's Carbon Border Adjustment Mechanism (CBAM), to California's SB253 and SB261, to Extended Producer Responsibility (EPR) legislation in Maine, Colorado, Oregon, and Maryland—there is a growing demand for digital infrastructure that can provide **auditable, tamper-proof records of emissions, material flows, and compliance outcomes.**

RecycleGO is meeting this need with a blockchain-based traceability platform that tracks recycled material flows and emissions across global supply chains. The platform captures verifiable data from collection, aggregation, processing, and reintegration of post-consumer materials. These records provide the necessary transparency to verify ESG claims, fulfill regulatory documentation, and support market mechanisms such as carbon accounting, EPR credits, and plastic offset tokens.

RecycleGO has extended its capabilities beyond tracking into regulatory intelligence and risk forecasting with the deployment of the Sinansys module. Sinansys integrates AI-driven disruption detection and quantum-powered simulation to help enterprises anticipate shocks—climate, geopolitical, and logistical—while modeling emissions and compliance outcomes across multiple scenarios. Blockchain data from RecycleGO feeds directly into Sinansys' simulation engine, making regulatory modeling **transparent, traceable, and audit-ready.**

## POTENTIAL FUTURE INITIATIVES INCLUDE:

- Deploying traceability infrastructure in support of U.S. state-level EPR enforcement (beginning with Maryland)
- Introducing **zero-knowledge proofs** for confidential compliance reporting
- Tokenizing verified emissions reductions and recycled content for alignment with Integrity Council for the Voluntary Carbon Market (ICVCM) and voluntary carbon markets
- Advancing interoperability with the EU's emerging **Digital Product Passport (DPP)** framework and GS1 global standards

Together, RecycleGO and Sinansys offer not just a tech solution, but a **regulatory readiness platform**—designed for government-aligned digital compliance, resilient infrastructure, and sustainable economic transition at scale.

## REGEN NETWORK
# MARINE ECOSYSTEM RESTORATION

Seatrees has launched Seatrees+, a premium class of marine ecosystem restoration projects designed to set a new standard in marine conservation through rigorous science, deep community partnerships, and long-term environmental protection that leverage the Regen Network.

Since 2019, Seatrees has planted over 4 million trees, restoring mangrove forests, kelp forests, coral reefs, seagrass meadows, and coastal watersheds around the world. The standard Seatrees restoration project works by supporting local NGO project partners to restore their local marine ecosystems, and while it has been very successful, it can also be improved to meet exponentially increasing threats to ecosystems and climate.

The new program will have three distinct project offerings — Seatrees+Biodiversity, Seatrees+Climate, and Seatrees+Science.

### SEATREES+BIODIVERSITY

Seatrees+Biodiversity projects represent the most advanced ecosystem restoration efforts. The positive impacts of these projects are measured and delivered by Seatrees as Biodiversity Blocks—the world's leading marine biodiversity credit. Biodiversity credits utilize a rigorous science-based approach to quantify ecological benefits and can provide financial support for ecosystems not supported by carbon markets, such as coral reefs.

Seatrees+Biodiversity projects utilize a biodiversity credit methodology that rewards stewardship actions to restore ecosystems. This system improves on existing philanthropic models for conservation funding because of the strong scientific approach and flexibility to launch new projects rapidly, while delivering world-class monitoring and impact reporting.

The first Biodiversity Blocks available for purchase are Mangrove+ Blocks.

Each Block plants one mangrove tree in Kenya and employs the local community over 10 years to maintain the forest and monitor impacts across a suite of ecological and social benefits. Buyers of Mangrove+ Blocks will receive 10 years of impact reports.

All Blocks are issued and tracked on blockchain through the Regen Network registry, ensuring transparency, traceability, and long-term accountability. Seatrees maintains its publicly reviewed, science-based methodology for marine restoration on the Regen Network, reinforcing scientific credibility and verification.

## SEATREES+CLIMATE

Seatrees+Climate combines Biodiversity Blocks and standard carbon credits to protect and restore blue carbon ecosystems like mangroves, seagrasses, and kelp forests. These habitats are essential for sequestering carbon, safeguarding shorelines, and supporting marine biodiversity. Seatrees+Climate will allow donors to support climate change restoration efforts with verification on Regen Network, ensuring long-term impact integrity and monitoring.

## SEATREES+SCIENCE

Seatrees+Science supports leading marine science laboratories to conduct innovative research that is directly relevant to scaling up marine ecosystem restoration. For example, the Kelp Carbon Science Project studies how giant kelp forests sequester $CO_2$ with the goal of eventually being able to fund kelp forest restoration through carbon markets. Donors who support Seatrees+Science projects help build the scientific knowledge base needed for future marine conservation breakthroughs, with data integrity verified through Regen Network's technology.

Through Regen Network's blockchain-based registry, transparency and traceability are ensured for donors and stakeholders. This new approach delivers deeper environmental and community benefits, supported by continuous data collection and assessment.

SECTION II

# AI & BLOCKCHAIN



## HEDERA

# EQTY LAB: BUILDING TRUST IN AI AT SCALE

EQTY Lab Uses Hedera for Transparent, Verifiable AI Development. As AI becomes integral to our global infrastructure, the need for transparency, explainability, and governance is critical. EQTY Lab addresses this by anchoring trust into AI development through blockchain and hardware-rooted verifiability, leveraging Hedera's Consensus Service (HCS) for immutable recordkeeping.

## CHALLENGE

The lack of transparency and inherent opaqueness in how AI models are trained, developed, and deployed presents significant risks not only to enterprises but to society as a whole. Without clear visibility into model development, organizations cannot effectively validate AI outputs, verify compliance, or prevent the deployment of compromised or biased systems that could harm users and erode trust in AI technology.

## SOLUTION

EQTY Lab's AI Integrity Suite enables organizations to track, verify, and govern AI models throughout their lifecycle. Using Hedera's network, every step of development receives a unique cryptographic signature, creating an immutable record of data sources, training parameters, and modifications. Through real-time visualization tools, stakeholders can verify model authenticity and demonstrate compliance with regulatory requirements.

EQTY Lab's solutions support enterprise-scale AI by ensuring that every stage, from data ingestion to training and deployment, is cryptographically signed and recorded on Hedera. This framework already supports vast scale, including 200 million articles ingested, 10 billion web pages crawled, and 7 billion model parameters tracked across EQTY Lab's AI deployments.

## POWERED BY HEDERA

EQTY Lab's selection of Hedera as their foundational trust layer was driven by several key factors that align with both their technical requirements and values. The Hedera network provides the ideal infrastructure for recording AI model workflows through HCS, which ensures each step of model development is immutably recorded with fair ordering and precise timestamping. This capability is crucial for maintaining an accurate, chronological record of model development and modifications.

With a responsible governance structure, high throughput capabilities, and rapid transaction finality, Hedera meets the demanding requirements of enterprise AI development. The network's ability to handle massive transaction volumes while maintaining low, predictable costs makes it a scalable solution for recording the numerous steps involved in AI model development and deployment.

By using Hedera, EQTY Lab can offer their clients a truly transparent and environmentally efficient system for AI model verification without relying on centralized infrastructure or expensive third-party solutions.

## APPLICATIONS

***VERIFIABLE COMPUTE: ANCHORING AI TRUST WITH NVIDIA AND INTEL***

In collaboration with Intel and NVIDIA, EQTY Lab launched Verifiable Compute, the first hardware-based AI audit solution. This system produces tamper-proof certificates of authenticity for AI training, inference, and benchmarking. By linking Trusted Execution Environments (TEEs) with Hedera's timestamping, Verifiable Compute enables real-time observability and compliance at runtime, addressing regulatory needs across industries.

***CLIMATEGPT: INNOVATION MEETS INTEGRITY***

ClimateGPT emerged from a partnership with the Endowment for Climate Intelligence (ECI), uniting stakeholders like Erasmus AI, Apptek, and ADQ. Designed to combat political bias in climate discourse, ClimateGPT uses EQTY Lab's transparency framework to offer verifiable, unbiased insights.

It engaged a diverse array of contributors, from indigenous elders to youth activists, demonstrating how decentralized governance can shape ethical AI.

***AI INTEGRITY SUITE: A FRAMEWORK FOR TRANSPARENT AI***

The AI Integrity Suite offers enterprises tools like Lineage Explorer and Governance Studio to visualize AI development and enforce training rules. Every phase, from data sourcing to fine-tuning and deployment, is assigned a cryptographic signature and logged immutably on Hedera, creating an end-to-end chain of custody.

## THE ROAD AHEAD: AI INTEGRITY AT SCALE

The emergence of EQTY Lab's AI integrity framework represents a pivotal moment in the evolution of artificial intelligence governance. As global regulatory frameworks for AI continue to develop, the need for transparent, verifiable AI systems will only grow more crucial. EQTY Lab's approach, leveraging Hedera's enterprise-grade infrastructure, positions them at the forefront of this emerging requirement.

*Learn more about EQTY Lab here: hedera.com/users/eqty-lab*

## ULALO

# NOCODE PLATFORM TO STREAMLINE BUSINESS PROCESSES WITH AI & BLOCKCHAIN

## PROBLEM

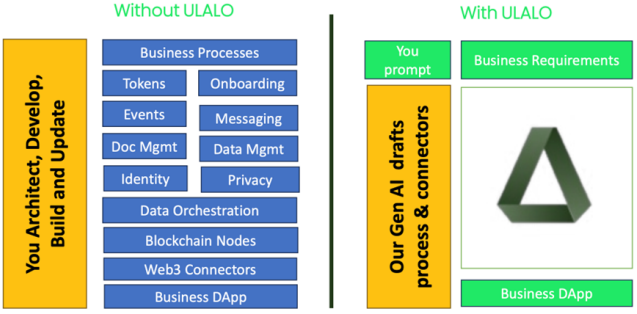
Organizations today increasingly rely on third parties to complete business activities, making cross-organization processes the norm. However, these complex multi-party processes come with challenges such as security, data privacy, and system integration.

ULALO recognizes 2 key challenges: the lack of in-house expertise in blockchain development and the difficulty of integrating legacy systems with blockchain solutions.

## SOLUTION

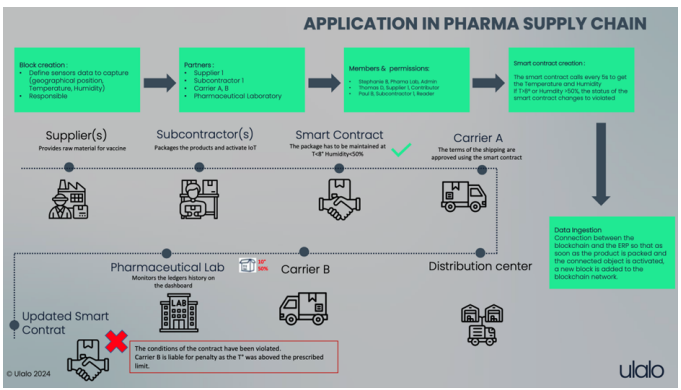
ULALO breaks down these technical barriers and eliminates hurdles with a NoCode platform powered by AI and blockchain, enabling businesses of all sizes to streamline complex processes, improving efficiency, transparency, and collaboration. The NoCode platform allows businesses to connect, process, and share data.

ULALO addresses the two key challenges mentioned above by making blockchain accessible and practical for any organization, helping them thrive in today's fast-paced digital landscape.



Through the power of AI and blockchain, ULALO empowers businesses across various sectors to optimize operations, foster collaboration, and gain a competitive edge in the digital era. ULALO empowers businesses across various sectors to optimize operations, foster collaboration, and gain a competitive edge in the digital era.

For example, in the pharmaceutical industry, maintaining the integrity of the cold chain remains a significant challenge. ULALO enhances supply chain management by leveraging blockchain to create a transparent, collaborative ecosystem for refrigerated product delivery. Seamlessly integrating with legacy systems and IoT hubs, ULALO provides an end-to-end view of the supply chain, enabling businesses to prevent costly disruptions, resolve disputes efficiently, and achieve unparalleled operational visibility.



SECTION III

# ENTERTAINMENT & SPORTS

## KADENA

# USER ENGAGEMENT TOOLS: COLLABORATION WITH THE CROATIAN FOOTBALL FEDERATION'S SPORTS FAN ENGAGEMENT PLATFORM

In February 2025, Kadena joined forces with the Croatian Football Federation (HNS) to pioneer a blockchain-powered fan engagement experience. Leveraging Kadena's secure, scalable Proof-of-Work (PoW) infrastructure, they are building an interactive platform that deepens the connection between sports fans and organizations, with plans to roll it out this year and subsequent major pushes into the 2026 FIFA World Cup and the 2028 UEFA European Championship.

## BUILDING A CONNECTION THROUGH PARTICIPATION

Fan engagement in sports often stalls—stuck on repetitive updates or limited events that don't scale or deliver lasting benefits. Kadena and HNS are tackling this head-on. By merging blockchain's robustness with AI-driven innovation, they are creating a scalable platform that drives real value to fans and organizations through a system that rewards participation and builds a genuine connection.

## WHAT'S IN THE WORKS

Central to this effort is the VATRENI fan token, currently shifting from Ethereum's ERC-20 on Polygon to Kadena's ecosystem. This migration sets the stage for a more secure, scalable token that fans can use to unlock meaningful rewards and exclusive perks tied to their support. The focus is on tangible benefits that deepen the fan experience, from VIP experiences and priority access to special discounts.

They will also deploy custom AI-enabled tools (agents) to bring this all to life. Fans will be able to log in, activate a non-custodial wallet, and tap into rewards systems linked to real-time moments—think game-changing plays or team milestones—all the while fully maintaining Web2 UX familiarity.

The rewards, unique to this platform, keep fans engaged beyond generic, random giveaways.

This fully scalable platform not only drives real value to fans, but also revenue to organizations through a platform as well.

## BUILDING FOR THE FUTURE

The platform will evolve, using AI to tailor experiences and rewards to individual fans, scaling beyond just Croatian football fans or native crypto users. The goal is to deliver measurable value to the sports world by amplifying engagement, and to fans by offering them a real stake in the action. This project aims to redefine how blockchain and AI can team up to drive scalable, impactful fandom beyond traditional methods.

## PROOF OF ART (POA) STUDIOS
# BRAJ ART AND CULTURE



The Braj region, renowned as the birthplace of Lord Krishna and Radha Rani, holds a sacred and culturally rich place in India's heart. Beyond its historical and religious significance, Braj is a repository of cultural treasures and artistic heritage. The profound teachings of Lord Krishna, conveyed through his divine "leelas" or cosmic actions, serve as a guiding light for those seeking wisdom and understanding.

Braj's cultural identity faces formidable challenges, leading to neglect, erosion, and the absence of supporting resources. The exploitation and appropriation of natural resources, unchecked growth in tourism with disregard for the sanctity of certain locations, and the absence of commercial opportunities for those practicing traditional art forms are some of the hurdles being addressed by the Braj Art and Culture Foundation. The organization's focus has been on preserving, promoting and rejuvenating the cultural richness of Braj and placing it in the context of the national heritage. The foundation works with traditional artists to encourage a viable model of pursuing their talent in musical instruments, such as "Pakhavaj, Morsing, Sarangi," and in dance forms such as charkula and bam rasiya.

The Braj Art and Culture Foundation recognizes that climate change poses a significant threat to the region's cultural heritage. The loss of trees, animals, traditional attire, and local folk food due to changing climates emphasizes the urgency of the foundation's mission. The urgency of the work provided the impetus to turn towards Web 3.0 technologies.

Notably, NFTs on the Proof of Art (PoA) platform reach out to a global audience, raise awareness, and generate resources and affiliation with the need to sustain and grow an essential part of our heritage.

The Braj Art and Culture Foundation stands as a guardian of Braj's cultural legacy, embodying the spiritual teachings and artistic expressions of Lord Krishna. Modern approaches such as YouTube, Web 3.0 technology, and social media platforms are essential for the foundation to ensure that the enchanting tales of Braj continue to inspire and resonate with generations to come. By unraveling the hidden facets of Braj's cultural heritage, the foundation remains dedicated to preserving these treasures for posterity.

- *YouTube - youtube.com/@brajartandculturefoundation*
- *Facebook - facebook.com/BAACFoundation/*
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SECTION IV

# FINANCE



## CHAINALYSIS
# BLOCKCHAIN ANALYTICS FOR ON-CHAIN SECURITY

Blockchain analytics—the field pioneered by Chainalysis—is evolving from reactive to proactive, increasingly focused on the need not only to respond to illicit activity on-chain, but to prevent it altogether. Chainalysis's recent acquisitions of two cutting-edge web3 security companies exemplifies this paradigm shift in order to address critical on-chain security and compliance challenges.

### HEXAGATE: ENHANCING THREAT INTELLIGENCE

Hexagate is the leading provider of web3 security solutions that detect and mitigate real-time threats including cyber exploits, hacks, and governance and financial risks. As the top choice for chains, protocols, asset managers, and exchanges to help secure their funds, Hexagate leverages machine learning models to identify suspicious patterns and unusual transactions across blockchains in real-time — a critical factor given how quickly stolen funds on-chain can move. Hexagate's customers have already saved more than $1B in customer funds by taking actions based on real-time notifications and automated responses. By integrating Hexagate's capabilities, Chainalysis is strengthening the ecosystem through proactive monitoring and threat detection, enabling the private sector to anticipate and mitigate potential security breaches before they occur. This acquisition addresses the growing need for real-time threat intelligence.

### ALTERYA: ENHANCING THE PREVENTION OF FRAUD AND SCAMS

Alterya is the AI-powered fraud detection solution that identifies scammers before they meet their victims. Alterya is working with top cryptocurrency exchanges and fintechs, as well as top financial institutions, to monitor more than $8B in transactions per month across crypto and fiat rails to protect 100M end users from the growing threat of authorized fraud. In 2024 alone, Alterya detected $10B sent to scams, and worked with customers to proactively prevent fraud, minimize losses, and build customer trust.

Given the explosive growth worldwide of on-chain fraud and scams, Chainalysis is proactively addressing the growing need for aggressive compliance measures as crypto adoption continues apace.

## ADDRESSING KEY CHALLENGES

Chainalysis's integration of Hexagate and Alterya into its platform addresses several critical challenges by providing:

- **Proactive Threat Detection:** By leveraging Hexagate's threat intelligence, private sector partners can identify and respond to potential security threats before they escalate, reducing the risk of cyberattacks and financial crimes.
- **Enhanced Compliance Monitoring:** Alterya's solutions enable more effective, continuous monitoring of blockchain transactions, ensuring adherence to current and emerging regulatory requirements and facilitating the detection of suspicious activities.
- **Comprehensive Data Analysis:** The capabilities of Hexagate and Alterya, combined with the Chainalysis data platform, provide a more comprehensive analysis of blockchain data, offering deeper insights into transaction patterns and potential vulnerabilities.

## IMPLICATIONS FOR THE ECOSYSTEM

Beyond their current primary use for the private sector, these tools are also likely to have great utility for an array of public sector partners. For example, government stakeholders—from consumer protection to law enforcement to national security—can leverage Hexagate to monitor smart contracts associated with state-backed threat actors and transnational criminal organizations. Similarly, government agencies could also leverage Alterya's insights for lead generation into pig butchering and scams, and to shed light on other emerging fraud trends.

The strategic acquisitions of Hexagate and Alterya position Chainalysis to lead in the proactive prevention of illicit on-chain activity. This evolution signifies a shift from reactive measures to a more anticipatory approach in managing blockchain-related risks. By adopting these advanced solutions, the broader ecosystem can enhance its security posture, ensure regulatory compliance, and foster a safer environment for blockchain innovation.

## CRYSTAL INTELLIGENCE

# EMPOWERING LAW ENFORCEMENT WITH BLOCKCHAIN INTELLIGENCE - A SCALABLE MODEL FROM UKRAINE

In 2023, Crystal Intelligence partnered with the Counter Narcotics Department of the National Police of Ukraine to strengthen national capabilities in combating crypto-enabled crime. This initiative aimed to build practical tools and expertise for tracing illicit transactions linked to drug trafficking and other serious offenses, even amid the disruptions of an ongoing conflict.

## THE CHALLENGE

The rise of cryptocurrencies has created powerful new channels for crime, from ransomware to illicit drug sales. Yet law enforcement agencies often lack the tools and knowledge to track and interpret blockchain transactions. In Ukraine, the ongoing war compounded these challenges by straining institutional capacity and accelerating criminal innovation.

## THE RESPONSE

Crystal Intelligence implemented a multi-layered support model designed to produce rapid, operational impact:

- *Blockchain Forensics Support:* Delivering targeted intelligence to uncover illicit financial flows and identify actors behind pseudonymous crypto transactions.
- *Specialist Training:* Equipping Ukrainian officers with the skills to use blockchain analytics platforms, interpret on-chain behavior, and convert findings into legal evidence.
- *Embedded Expertise:* Deploying regional virtual activity specialists to local police units, creating sustained in-house capacity to ensure localized, sustainable knowledge transfer.

This integrated approach enabled law enforcement to turn blockchain complexity into clear investigative leads, supporting the detection of drug labs, tracing cross-border networks, and disrupting criminal infrastructure.

## IMPACT AND RECOGNITION

The National Police of Ukraine formally recognized Crystal Intelligence's Investigations Team for outstanding contributions to ongoing casework. More importantly, the initiative laid the groundwork for lasting institutional capability—empowering Ukrainian cybercrime units to take proactive control of blockchain-based investigations.

## GLOBAL RELEVANCE

This model is both scalable and transferable. Agencies in diverse regions—from Latin America and Southeast Asia to Eastern Europe and Sub-Saharan Africa—face similar challenges in tackling crypto-related crime.

This initiative demonstrates how structured collaboration between public institutions and private intelligence firms can rapidly close these gaps. It complements international regulatory frameworks such as the Financial Action Task Force (FATF) Travel Rule and the EU's Markets in Crypto-Assets (MiCA) regulation by translating policy goals into actionable law enforcement capacity.

## NEXT STEPS

- *International Replication:* Deploying similar programs in jurisdictions facing rising crypto crime or operating in post-conflict, high-risk, or under-resourced environments.

- *Institutional Training Models:* Supporting national police academies through instructor-led programs and curriculum design.

- *Cross-Border Collaboration:* Sharing methodologies and intelligence through multinational coalitions and law enforcement networks.

This case is not just a national success — it is a repeatable model for how blockchain intelligence can strengthen public safety and justice systems worldwide.

*For more information contact info@crystalintelligence.com*

# ELLIPTIC
# REDEFINING VASP RISK MANAGEMENT

Elliptic and Moody's have revolutionized virtual asset service provider (VASP) screening by seamlessly integrating on-chain blockchain data with traditional off-chain data sources. This groundbreaking solution addresses the complex challenges financial institutions, crypto businesses, and governments face in their respective anti-money laundering (AML) efforts.

At the core of this innovative offering is a sophisticated risk engine that leverages Elliptic's real-time on-chain data to categorize digital asset transactions' exposure to illicit activities. This data is then integrated with Moody's extensive off-chain data, providing a comprehensive overview of a VASP's risk profile. The solution is underpinned by Elliptic's proprietary holistic technology, which simultaneously assesses VASP risk across multiple blockchains.

This integrated approach is a game changer for banks and financial institutions, enabling them to bridge the gap between traditional financial services and digital asset compliance. By offering a unified view of risk, the solution also empowers these organizations to understand their business partners and associated risks more thoroughly, which is crucial as the regulatory landscape continues to evolve.

On-chain data includes transaction details, wallet addresses, and smart contract interactions directly recorded on the blockchain. For example, this could include the number of tokens transferred between addresses, or the execution of decentralized finance (DeFi) protocols.

On the other hand, off-chain data includes traditional sources of information such as financial records, regulatory databases, and know-your-customer (KYC) submissions. This data is typically stored outside the blockchain and includes elements such as company registration details, ownership structures, negative news, and compliance history.

This collaborative effort sets a new global benchmark for managing AML compliance between fiat and cryptocurrency by combining Elliptic's best-in-class on-chain risk analytics with Moody's market-leading off-chain analytics. As the digital asset ecosystem grows and matures, this solution represents a significant step forward in enhancing transparency, security, and regulatory compliance in the crypto space.

## GLOBAL LEDGER

# TRACKING SANCTION EVASION VIA BLOCKCHAIN FORENSICS: THE CASE OF GARANTEX AND GRINEX

This project investigates the emergence of ***Grinex*** as a successor to the sanctioned Russian crypto exchange ***Garantex***, leveraging blockchain analytics and off-chain intelligence to trace illicit liquidity migration and reveal continuity in operations under a new name.

***Garantex*** was sanctioned by OFAC in April 2022 for laundering funds linked to darknet markets, ransomware groups, and North Korean hacking networks. Despite these sanctions, the exchange remained operational until March 2025, using obfuscation techniques to process deposits and withdrawals. On March 7, 2025, ***Garantex***'s infrastructure was dismantled by international law enforcement. Remarkably, just three days later, ***Grinex*** emerged with a strikingly similar user interface, operational model, and liquidity sources—signalling a strategic rebranding to evade sanctions.

The core of this investigation is a blockchain-based attribution model that traces how ***Garantex*** assets were moved into ***Grinex*** using a newly launched Kyrgyz ruble-backed stablecoin, A7A5. Our analysis shows that nearly all A7A5 supply (96%) was reminted after a burn process, likely designed to 'clean' tainted funds. Funds were then moved through a complex web of one-time-use wallets before appearing in ***Grinex***'s deposit wallet. This provides on-chain proof of continuity between the two exchanges.

In parallel, off-chain indicators—such as promotional materials, public social media posts, and domain design—reinforce this conclusion. Notably, ***Grinex*** was openly described by its founders as a response to ***Garantex*** sanctions. User reports confirm that frozen ***Garantex*** funds are being reimbursed via ***Grinex***, subject to identity verification tied to previous ***Garantex*** accounts.

## KEY OUTCOMES

- Exposure of stablecoin laundering through a burn-and-remint process
- Real-time identification of ***Grinex***'s operational replication of ***Garantex***'s infrastructure
- Public attribution model combining on-chain and open-source data

## NEXT STEPS

Global Ledger will continue monitoring ***Grinex***'s evolving infrastructure, including its liquidity sources and stablecoin usage. We aim to communicate the findings to regulators and virtual asset service providers (VASPs) to detect similar rebranding and evasion tactics in the future.

## SIGNIFICANCE

This case demonstrates how blockchain forensics, when integrated with public domain intelligence, can expose sanction evasion and reinforce the accountability of virtual asset ecosystems. It also underscores the importance of monitoring non-traditional stablecoins—such as those backed by geopolitically exposed institutions—as vehicles for cross-border illicit finance.

## NOTABENE

# SAFETRANSACT: EMPOWERING COMPLIANCE

Notabene is the crypto industry's leading compliance platform, helping companies navigate complex regulatory requirements such as the EU's Transfer of Funds Regulation (TFR) and global Travel Rule standards. As the regulatory landscape evolves, "check-the-box" compliance is no longer sufficient. Businesses must adopt comprehensive solutions that ensure not only adherence but also operational efficiency and trust.

The TFR mandates rigorous obligations for Crypto Asset Service Providers (CASPs), including the collection, transmission, and verification of originator and beneficiary information for all crypto-asset transfers.

Non-compliance can result in significant financial penalties, loss of licenses, reputational harm, and disrupted business relationships. Notabene equips CASPs with tools to address these challenges head-on, ensuring full compliance while reducing operational friction.

At the core of our offering is **SafeTransact**, a platform that empowers companies to stay compliant at every stage of the transaction lifecycle. With advanced **pre-transaction decision-making** capabilities, Notabene allows businesses to identify and prevent high-risk activities before they occur. Key features include:

- **Expanded Self-Hosted Wallet (SHW) Capabilities:** Notabene simplifies compliance for transactions involving self-hosted wallets by providing robust verification and monitoring tools to meet TFR's stringent requirements.
- **Handling Missing or Incomplete Information:** We offer solutions that flag incomplete transaction data and enable CASPs to fulfill their reporting obligations while maintaining operational continuity.

- **Counterparty Due Diligence and Sanction Screening:** Notabene's tools ensure that all counterparties are vetted against global sanctions lists, mitigating risks of transacting with non-compliant entities.

- **Global Compliance Network:** Trusted by over 200 companies, Notabene connects CASPs to the largest VASP network, facilitating seamless data exchange and interoperability.

Beyond technical capabilities, our platform is designed with SOC-2 certification, ISO27001 compliance, and a strong focus on privacy and user experience. These foundational principles not only ensure security but also position CASPs to thrive in a highly regulated market.

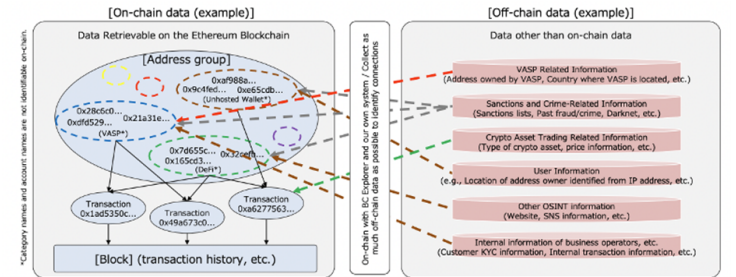
By adopting Notabene, companies can move beyond minimal compliance and embrace a proactive, transparent approach to regulatory adherence. Whether it's managing missing information, mitigating counterparty risks, or ensuring compliance with the TFR, Notabene delivers the tools and expertise to navigate today's regulatory challenges with confidence.

*Connect with us to build trust and compliance into every transaction: notabene.id*

## SOLIDUS LABS

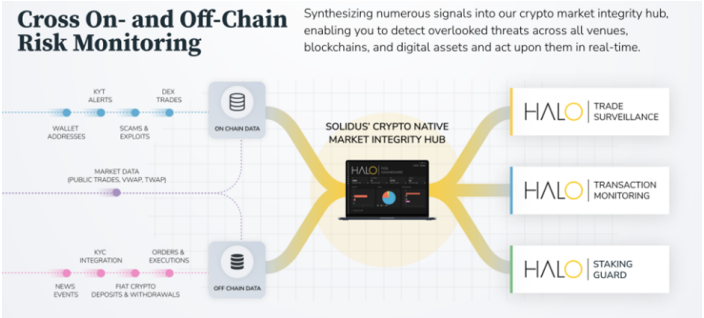
# ADDRESSING THE CROSS ON- AND OFF-CHAIN RISK MONITORING CHALLENGE

In 2024, many in the crypto industry came to realize what's always been clear to us at Solidus: The future of finance isn't on-chain — it's a blend of on- and off-chain networks. While blockchain provides invaluable transparency, 90% of digital asset activity (mostly trading) happens off-chain on platforms like Binance or Coinbase. Monitoring risks and fighting crime in this space requires tracking both on- and off-chain data throughout a digital asset's lifecycle, as highlighted in a 2023 study by the Japan Financial Services Authority (JFSA).




**ABOVE: EXCERPT FROM JFSA CROSS ON- AND OFF-CHAIN STUDY PUBLISHED ON JULY 2023**

This hybrid model extends beyond crypto. BlackRock's Larry Fink predicts "every stock, every bond…on one general ledger," making cross on- and off-chain monitoring indispensable for financial institutions and regulators alike. Solidus Labs, as the category-definer in crypto-native market surveillance, built its technology from the ground-up to address this challenge. Our solutions unify on- and off-chain private and public data across trading, transactions, Know Your Customer (KYC), Anti-Money Laundering (AML), market sentiment, and more, creating a comprehensive market integrity hub. This approach is critical for detecting digital asset market abuse, which often spans both on- and off-chain activity.




**ABOVE: ILLUSTRATION, SOLIDUS' CROSS ON- AND OFF-CHAIN DATA UNIFICATION APPROACH**

Take insider trading, for example. Research from Solidus shows that crypto tokens' dual trading environments contribute to insider trading in 56% of listing announcements. Insider trading is still a major issue in traditional markets, despite illegality and intense enforcement efforts. In crypto, however, insider trading is further complicated as it almost always involves both on-chain and off-chain elements. Solidus' tailored solution, developed alongside regulators, screens decentralized exchange (DEX) trades against centralized exchange (CEX) listings to automatically detect insider trading with precision. This ability to identify insider trading in ways that have long eluded traditional markets holds enormous promise for law enforcement as more financial activity transitions to blockchain.

Decentralization isn't binary; it's a spectrum. Blockchain won't replace off-chain finance but rather expand it, offering new ways to manage assets. In a decade, you might access your blockchain wallet through a bank or your bank account via a blockchain protocol. Ensuring safety and integrity as assets flow seamlessly between on- and off-chain environments is the key to this financial evolution.

## SUMSUB

# TEAMING UP TO TACKLE CRYPTO FINANCIAL CRIME

Sumsub has announced an integration with Elliptic, the global leader in cryptoasset risk management. This partnership enhances Sumsub's Crypto Transaction Monitoring and Travel Rule solutions, offering global clients enhanced capabilities to screen cryptocurrency wallets, detect fraud, and assess transaction risks.

Blockchain-related crime, including money laundering and fraud, continues to be a growing concern. According to Sumsub's Identity Fraud Report 2024, crypto was among the top-5 industries with the highest fraud rates in 2024. Recently, the United States Federal Bureau of Investigation (FBI) created its own crypto token to take down criminals. In light of this, integrating Elliptic's market-leading analytics into Sumsub's platform enables firms to protect users, providing a comprehensive view of blockchain transactions to mitigate financial crime.

The integration allows clients, including firms in the blockchain, fintech, and payments sectors, to seamlessly connect existing Elliptic subscriptions to Sumsub's system via the Bring Your Own Key (BYOK) model. This enables clients to use their own encryption keys to manage and secure their data, ensuring full control over sensitive information while using Sumsub's compliance and monitoring services. Customers can connect their existing functionality from Elliptic's platform with Sumsub's, unifying their workflows around cryptocurrency wallet screenings on one dashboard. Now, Sumsub's clients can ensure alignment with stringent regulatory requirements, with Elliptic providing the broadest coverage of cryptoassets and blockchains available on the market.

Key benefits of the integration include:

- Automated workflows for screening crypto wallets and transactions
- Real-time risk assessments powered by Elliptic's extensive blockchain data
- Deeper investigation capabilities, accessible directly through the Elliptic dashboard when required
- Seamless integration for new and existing clients, eliminating the need for separate workflows or additional systems

## TAXBIT

# DARTS: BRIDGING THE GAP BETWEEN CRYPTO AND FIAT FOR INVESTIGATIONS AT SCALE

Taxbit's Data Aggregation, Reconciliation, and Tracking Solution (DARTS) is transforming how government agencies and law enforcement investigate financial crimes and meet evolving compliance mandates. By bridging on-chain and off-chain datasets, DARTS automates the aggregation and analysis of crypto and fiat transactions in a unified platform, significantly improving efficiency, accuracy, and scalability.

## THE PROBLEM: MANUAL DATA RECONCILIATION IN COMPLEX INVESTIGATIONS

Currently, throughout digital asset investigations, law enforcement agencies rely heavily on manual reconciliation using spreadsheets and fragmented datasets and consequently, face challenges in:

- Aggregating subpoenaed data (e.g., CSVs) from exchanges and banks.
- Tracing asset movements across multiple wallets and (off-chain) accounts.
- Generating court-admissible reports with accurate transactions-flows and valuations for crypto-assets to determine profit and loss, fraud, and money laundering.

## THE SOLUTION: END-TO-END INVESTIGATIVE AUTOMATION

DARTS provides a unified, easy-to-use platform to ingest, normalize, and analyze blockchain and fiat data, including:

- **On- and Off-Chain Data Aggregation:** DARTS integrates blockchain analytics with subpoenaed off-chain records, including bank or credit card statements, enabling comprehensive money movement analysis.
- **Holistic Data Management:** Synchronized blockchain and fiat transactions with timestamped pricing ensure precise transfer

matching and valuation, which is critical for legal proceedings.
- **Automated Investigation Reporting:** DARTS generates fully auditable, court-admissible reports with transaction-level details, meeting evidential standards for law enforcement globally.

## KEY OUTCOMES:

- **Expand Investigative Scale:** Tackle investigations with millions of transactions—even if cases are too large for Excel or blockchain analytics.
- **Multiply Case Throughput:** Significantly reduce case cycle time and improve case throughput by over 3x.
- **Time and Labour Reduction:** Automate processes of data aggregation and processing across on- and off-chain sources, allowing faster reallocation of resources.
- **Future Steps:** Driving smarter, faster investigations worldwide.

As digital assets become integral to global finance, the complexity and volume of investigations continue to rise. DARTS ensures agencies can scale their efforts to meet these demands, automating reconciliation, labeling crypto transactions with accurate values, and delivering court-admissible reports with unmatched efficiency. With frameworks like CARF, DAC8, and 1099-DA imposing new reporting requirements on Virtual Asset Service Providers (VASPs), agencies face an urgent need to process and analyze vast volumes of complex transactional data. Taxbit DARTS provides the critical infrastructure to transform fragmented datasets into a single source of truth—empowering investigators to uncover illicit activity faster, enforce compliance at scale, and uphold trust in an increasingly digitized global financial system.

## TOKEN RECOVERY

# COMBATING CRIME IN THE DIGITAL ASSET ECOSYSTEM

In the rapidly evolving world of digital assets, fraud, hacks, and scams pose significant challenges. Token Recovery stands at the forefront of combating these threats, providing end-to-end solutions for investigating and recovering lost or stolen assets. We are a team of blockchain investigators, former law enforcement and legal professionals with a deep understanding of blockchain technology and digital assets. By combining advanced blockchain analytics, legal enforcement, and close collaboration with industry partners, we assist victims to reclaim what's actually theirs.

Drawing on years of expertise, we utilize advanced investigative techniques, such as:

- **Digital Asset Tracing** across blockchain networks to uncover the flow of funds, identify involved parties, and gather actionable evidence
- **Destination of Funds Reports,** pinpointing the likely recipients of suspicious funds, providing insights critical for asset recovery or legal action
- **Source of Funds Reports**, distinguishing legitimate sources from illicit activities to assess transaction histories and risk levels
- **Wallet Monitoring**, to provide timely insights and collaborate with law enforcement to freeze assets
- **Expert Witness Services** for legal proceedings through expert testimony
- **OSINT (Open-Source Intelligence) Analyses** to link individuals or entities involved in crypto fraud

Beyond investigative efforts, we coordinate with law enforcement, legal teams, and asset service providers across jurisdictions to support broader efforts in holding perpetrators accountable.

Through partnerships with industry stakeholders, Token Recovery provides critical intelligence by identifying scam wallet addresses, which our partners integrate into global monitoring systems. This integration delivers near real-time alerts across the ecosystem, fostering a robust network to combat fraudulent activities. As a result, victims benefit from faster recovery processes, and exchanges and virtual asset service providers (VASPs) are better equipped to protect customer funds.

As the adoption of digital assets continues to grow, Token Recovery remains committed to fostering a safer and more transparent crypto ecosystem. Our partnerships, expertise, and dedication to our mission position us as a trusted ally in the fight against financial crime in the blockchain space.

*Learn more about our recovery services: tokenrecovery.com*

## VERIFYVASP

# BUILDING A COMPLIANT AND RESPONSIBLE WEB3.0 ECOSYSTEM

VerifyVASP is a decentralised messaging protocol for Travel Rule compliance supported by regulated VASPs. VerifyVASP provides comprehensive Travel Rule solutions that include counterparty due diligence, messaging protocol, on-chain risk analysis and consultation on Travel Rule/personal data protection requirements.

2024 saw the acceleration of Virtual Asset Service Provider (VASP) licensing around the world in a quest to build a compliant and responsible Web 3.0 ecosystem with broadened regulatory requirements, against a backdrop of increased adoption and expansion.

Correspondingly, VerifyVASP reached significant milestones, demonstrating that the Financial Action Task Force's (FATF) R16 on requirements for funds transfer transparency, or "travel rule", can be achieved at scale. Surpassing 10 million verifications worth over US$300bn earlier in the year, VerifyVASP maintained an industry-leading success rate of around 90% successful verifications, in an immediate and secure manner. Our network also saw an increase in VASPs spanning more than 25 jurisdictions despite widespread market consolidation.

We remain active in multiple public-private partnerships with regulators and law enforcement agencies, continue to run travel rule working groups in several continents and encourage regulatory engagement around the world, responding to consultations and providing thought leadership in public and private sector meetings and forums.

## BENEFITS TO VASPS

VerifyVASP's comprehensive approach to Travel Rule compliance is industry proven and has been independently audited to meet the standards prescribed by the FATF and industry best practices such as SOC 2.

As a result, VerifyVASP is a trusted partner of many of the largest exchanges globally, including those with licensed entities spanning multiple jurisdictions. By engaging on the ground where Travel Rule enforcement is active, VerifyVASP ensures an in-depth knowledge of a jurisdiction's regulations and nuances are taken into account for international connectivity while satisfying local requirements.

In addition to supporting seamless compliance with Travel Rule regulations globally, VerifyVASP has become instrumental in assisting members of the VerifyVASP Alliance during recent high-profile hacks and thefts that have left the industry reeling. As a featured partner in Crypto's Defense Alliance, VerifyVASP's Verified Network has proven to be highly effective in enhancing security and response capabilities.

## FUTURE OUTLOOK

Looking ahead, we anticipate further expansion of Travel Rule adoption as VASPs look to start implementing compliant flows and early adopter jurisdictions begin to reap the benefits of successful travel rule implementation as was intended by regulation.

VerifyVASP's product roadmap will include innovative enhancements to our existing suite of industry proven tools to build an inclusive technology stack that extends beyond Travel Rule compliance. We will provide opportunities for public and private sector collaboration in the combat against illicit blockchain activity, at times occurring beyond the scope of sanctions programs. We will also be welcoming several new partnerships that will benefit our members and look forward to contributing to the excellent work that Global Blockchain Business Council (GBBC) has undertaken to advance the industry.

## WAVE DIGITAL ASSETS TECHNOLOGY ACADEMY LLC ("WAVE DATA")

# CHALLENGES AND OPPORTUNITIES IN SUPPORTING DISTRESSED DIGITAL ASSETS PROCEEDINGS

Digital assets of every type, complexity, and liquidity are increasingly part of global bankruptcy, insolvency, and receivership cases. Their inherently nuanced nature presents unique challenges for those responsible for safeguarding, preserving, and distributing assets, such as bankruptcy trustees and insolvency practitioners, until creditors or victims receive distributions. Case law and regulatory guidance on these responsibilities, as applied to digital assets, remain limited.

Wave DATA's affiliated investment adviser — Wave Digital Assets LLC — provides examples of a framework for supporting stakeholders in these endeavors, both as service providers and as counterparties.

## MANAGING DIGITAL ASSETS

Investment advisers, as legal fiduciaries, can be essential partners in managing digital assets with required care and expertise. Assets may face unexpected conditions, such as delisting by major exchanges, or be subject to forks or airdops, impacting their value and requiring additional guidance to safeguard and preserve value. Additionally, relying solely on an asset's public market value can significantly misrepresent its true worth, making specialized knowledge vital.

One of our affiliates acts as investment adviser to a large European bankruptcy estate, overseeing asset management, managing counterparty risks, and executing liquidation strategies in compliance with legal requirements and estate goals. This approach seeks to minimize market impact and explores alternative disposal avenues if needed.

## RECOVERING VALUE

Beyond management, investment advisers can play a crucial role as counterparties in the sale of digital assets, as stakeholders seek to maximize recovery value for creditors and victims.

Our affiliate engaged with multiple major digital asset bankruptcies to purchase illiquid assets, providing capital to creditors and victims in a legally compliant manner, while also aiming to minimize market impact. Not only can this approach lead to faster recovery for creditors and/or victims than the estate trying to liquidate the assets directly, but the estate may recover additional value with respect to assets for which the public market value does not provide a full picture of its recovery value. This strategy can accelerate recovery compared to direct estate liquidation and may reveal additional value not reflected by the public market.

## TAKEAWAY

Stakeholders in digital asset bankruptcy, insolvency, and receivership proceedings should consider partnering with investment advisers to ensure that asset values are accurately assessed and maximized during recovery.

*Disclaimer: Case study provided through Wave Digital Assets Technology Academy LLC for illustrative purposes only. Investment advisory services provided through Wave Digital Assets LLC*

## 1INCH

# 1INCH SECURITY: SETTING THE STANDARD FOR DEFI RISK MANAGEMENT

Decentralized Finance (DeFi) is reshaping global finance access by empowering users with self-custody, 24/7 borderless transactions, and freedom from traditional intermediaries. However, these very attributes—permissionless access, self-custody, and privacy—can be exploited for illicit purposes. Without custodians, account structures, and transaction reversibility, DeFi challenges the traditional application of anti-money laundering (AML) controls. Yet, DeFi's foundational transparency offers a path forward for real-time, innovative, decentralized approaches to security and risk management. 1inch Security is a pioneering solution designed to meet this challenge—integrating on-chain intelligence, off-chain detection, and backend efforts to help protect users, prevent abuse, and advance responsible innovation in Web3.

## 1INCH SECURITY KEY FEATURES

1inch Security is a multi-layered system of toolings that combines third-party on-chain intelligence with off-chain defenses to protect users from threats at both the protocol and interface levels.

**(1) Wallet Screening & Risk Engine.** All wallets interacting with the 1inch platform, including destination addresses, are screened in real time using a composite database that integrates internal intelligence with third-party data sources, including TRM Labs, Etherscan Pro, Hypernative, and ZeroShadow. Market makers also undergo pre-screening and wallet integrity checks. Suspicious wallets are automatically blocked, and any active orders from flagged addresses are removed immediately.

Each wallet is evaluated through a security-driven Risk Engine, designed to assess the risk level of the wallet.

This assessment is based on (i) transaction history (identifying unusual patterns or behaviors); (ii) wallet behavior (detecting anomalies that indicate potential threats); and (iii) external data (cross-referencing blacklists, sanctions, and other compliance data).

**(2) Custom Blacklist.** To further strengthen security, 1inch continuously refines its internal blacklisting processes. Newly-identified threats are promptly addressed and incorporated into a custom internal blacklist, ensuring an adaptive and proactive security framework. Trusted third parties can also submit addresses for immediate blacklisting.

**(3) Calldata Validation.** To prevent spoofing and manipulation, the wallet address initiating a transaction is verified to be consistent with the executing address.

**(4) Transaction Simulation & Malicious Token Detection.** Using Blockaid, the 1inch Wallet simulates each transaction in real time, alerting users to risks such as unauthorized withdrawals, unexpected token behavior, or hidden contract logic—before a transaction is signed. Malicious or spam tokens are automatically flagged or hidden from the interface.

**(5) Phishing & Brand Protection.** 1inch partners with Phishfort to proactively detect and remove scam websites, impersonation campaigns, and other types of brand abuse across Web3 environments.

**(6) VPN & Traffic Filtering.** System protocols monitor and block access from obfuscated or manipulated IPs, including known VPN traffic. This prevents bad actors from circumventing geographic or jurisdictional restrictions.

All of these and many other toolings are detailed in the 1inch Security White Paper. They are also available for integration as part of a SaaS offering called the 1inch Shield API, accessible through the 1inch Developer Portal, enabling the creation of a defensible line against bad actors in the DeFi space.

## EVOLVING SECURITY FRAMEWORK

1inch continuously explores new third-party database integrations and refines its systems to enhance risk management and detection capabilities. Further developments will include:

- The 1inch AI Agent, a personal security assistant that lives within the wallet, learns user behavior, and proactively flags suspicious interactions.

- 1inch Profiles & Pass, an optional identity layer for advanced user controls, risk visibility, and tailored education.

## COOPERATION AND INTELLIGENCE SHARING

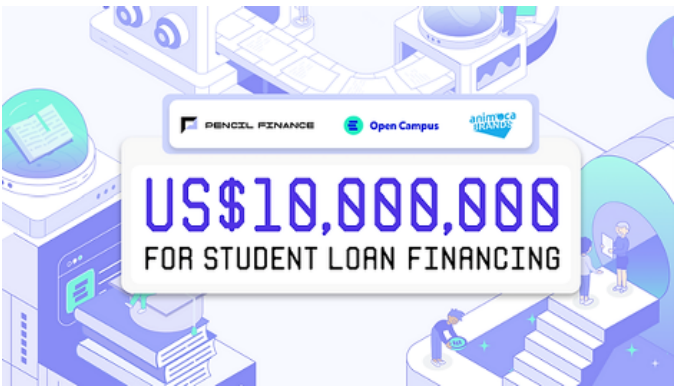
Security in DeFi is not achieved in isolation. The transparent nature of blockchain has fostered a decentralized network of investigators—analysts, developers, and researchers—who monitor on-chain activity and publicly report suspicious behavior. 1inch leverages these community-sourced insights as an early warning system. 1inch also works directly with law enforcement and regulatory bodies to strengthen its blocklist infrastructure and support global compliance efforts. Together, these efforts strengthen 1inch's ability to detect and prevent threats in real time.

*Learn more here: 1inch.io/assets/1inch-security-white-paper.pdf*

## ANIMOCA BRANDS

# BLOCKCHAIN SOLUTIONS FOR STUDENT LOANS

Pencil Finance, the student loan real-world-asset (RWA) protocol on EDU Chain that is co-incubated by Animoca Brands and HackQuest, announced in April 2025 that Open Campus and Animoca Brands have deployed US$10 million in liquidity as loan collateral to facilitate DeFi student loans on the Pencil Finance platform.




Pencil Finance is a decentralized lending protocol designed to bring student loan financing on-chain, transforming how student debt is serviced. It connects global investors with trusted student loan originators through tokenized loan bundles.

EDU Chain is a Layer 3 blockchain on Arbitrum Orbit that is designed for consumer-facing education apps and on-chain education finance (EduFi). EDU Chain is powered by the EDU token (EDU) which is listed on Binance, KuCoin, Gate.io, Bithumb, MEXC, Bitmart, and various other exchanges.

Open Campus, which is the foundation behind EDU Chain, and Animoca Brands have contributed US$10 million as liquidity to Pencil Finance to be used as loan collateral.

The goal is to expand access to education financing through blockchain technology.

Recent policy changes in the U.S. could put millions of borrowers at risk of defaulting on their student loans, highlighting the urgent need for accessible, transparent, and efficient financing solutions for the student loan market, which is estimated to be worth around US$3 trillion globally (Market Research Future, May 2025).

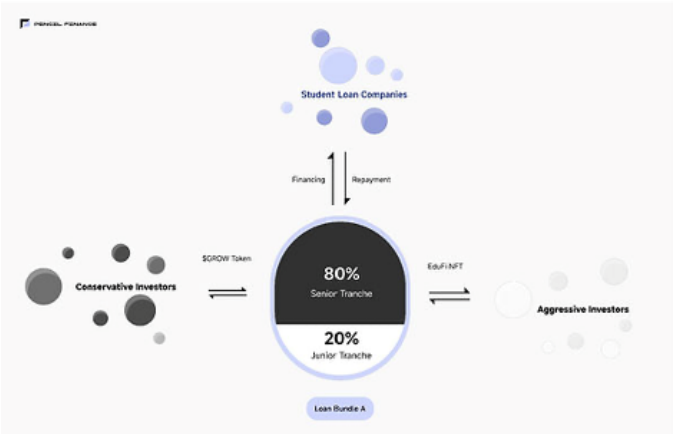
Yat Siu, co-founder and executive chairman of Animoca Brands, said: "Blockchain is redefining how education is funded and developed. By bringing student loans on-chain, this initiative seeks to boost transparency, efficiency, and Web3 adoption for potentially hundreds of millions of students globally, while also increasing financial literacy. We believe this will have very significant implications for the US$3 trillion student loan market."

*Frank Li, co-founder of Pencil Finance, said: "Blockchain technology allows us to reimagine student lending from the ground up. By bringing loans on-chain, we deliver transparency, efficiency, and access at a global scale, helping students everywhere unlock new educational opportunities."*

*Harry Zhang, co-founder and CMO of HackQuest, said: "This milestone demonstrates the real-world impact of blockchain in education. On-chain loans empower students and open new opportunities for investors."*

Through Pencil Finance's student loan RWA protocol, whitelisted users can provide liquidity to loan pools. Whitelisted users can choose to deploy capital to a Senior Tranche or a Junior Tranche for higher returns with first-loss risk. Pencil Finance enables loans to be deployed, and repayments to be managed, transparently on-chain.

## HOW THE PENCIL FINANCE MODEL WORKS




Pencil Finance issued its first loan this week; the recipient is HackQuest, which will use the loan proceeds to incentivize student developers learning about EDU Chain on the HackQuest platform.

For more information visit:

- *Open Campus website: opencampus.xyz*
- *Animoca Brands website: animocabrands.com*
- *HackQuest website: hackquest.io*
- *Pencil Finance website: pencilfinance.io*

## RFS CONSULTING

# REAL-TIME COMPLIANCE AND RISK INTELLIGENCE FOR DEFI

The RFS DeFi Risk Management Platform is a real-world, compliance-integrated solution being developed by RFS Consulting in collaboration with leading DeFi protocols. This platform is designed to provide real-time risk scoring, smart contract compliance monitoring, and liquidity risk analytics for decentralized finance (DeFi) markets.

As regulatory scrutiny increases, DeFi protocols, institutional investors, and public-sector stakeholders face mounting challenges in understanding and managing risk across rapidly evolving blockchain ecosystems. The RFS platform addresses this by combining AI-powered risk intelligence with smart contract analytics, enabling stakeholders to make informed, compliant decisions.

The platform's core features include:

- *Depeg Risk Index:* Tracks and scores the stability risk of stablecoins and liquid staking tokens (LSTs).
- *Smart Contract Compliance Module:* Flags high-risk behaviors and evaluates contract-level security and regulatory alignment.
- *Liquidity Density Functions (LDFs):* Custom analytics for assessing liquidity fragmentation and systemic risk in DeFi protocols.
- *Partner Integrations:* Gemach DAO provides AI-driven behavioral risk tools, while Cork Protocol contributes on-chain hedging instruments for stablecoin and LST volatility.

This use case is already in motion. RFS Consulting has completed early-stage development, secured ecosystem partners, and is currently piloting the platform with testnet data from Avalanche and Ethereum. The next phase includes onboarding additional DeFi protocols and institutional users through strategic partnerships and a go-to-market pilot.

This real-world platform offers a blueprint for embedded supervision and risk-aware DeFi growth, aligning with regulatory goals and GBBC's mission of responsible blockchain innovation.

## W3 SAAS
# WEB3 TOOLS FOR EVERY BUSINESS

W3 SaaS Tokenization-as-a-Service provides a platform to issue, manage, distribute, and custody tokenized assets.

The Decentralized Real Estate (DeRE) platform is designed to make real estate investing secure, transparent, and accessible to everyone. By leveraging blockchain technology and advanced integrations, our application allows users to invest in tokenized real estate assets across the United States with ease. Below, we highlight the key features that make our platform unique.

The XRP Ledger (XRPL) is the backbone of our platform, enabling the tokenization of real estate assets. Each property is represented by a unique token on the XRPL, allowing for:

- *Secure and Transparent Transactions:* All transactions are recorded on the blockchain, ensuring transparency and immutability.

- *Instant Buying and Selling:* Investors can buy and sell real estate tokens instantly, without the delays of traditional real estate transactions.

To ensure regulatory compliance and protect the DeRE platform from bad financial actors, DeRE uses Veriff, a trusted third-party to conduct Know Your Customer (KYC) and Anti-Money Laundering (AML) checks. This process verifies the identity of all investors, ensuring a safe and secure environment for transactions. DeRE platform offers seamless MPC wallets to provide users with secure built-in XRPL account for managing their funds.

The DeRE platform empowers token holders to participate in property-related decisions through blockchain-based voting. Using NFTs on the XRPL, token holders can record their votes that reflect their ownership percentage. These NFTs contain metadata about ownership and voting decisions, which are programmatically queried on the XRPL to determine the outcome of each vote. This ensures a transparent and democratic decision-making process.

This transparency allows investors to make informed decisions about their investments.

Investors can access detailed information about each property, including:

- *Property Photos:* High-quality images showcasing the property's condition and features.
- *Financial Metrics:* Key data such as projected returns, monthly cash flow, and expenses.
- *Management Plans:* Insights into the property's management strategy, including rental plans and operational details.

The DeRE platform makes it easy to buy and sell real estate tokens using a variety of payment methods:

- *XRPL Tokens:* Instantly trade real estate tokens or any other token through our integration with RLUSD.
- *Fiat Currency:* Use traditional payment methods like PayPal and bank deposits to invest in real estate.

This flexibility ensures that users can participate in the market using the payment method that works best for them. The DeRE platform is designed with simplicity and usability in mind. From exploring available properties to managing your investments, our intuitive interface ensures a seamless experience for all users.

## CONSENSYS

# METAMASK CARD: SPEND CRYPTO EASILY AND SECURELY

At Consensys, we are committed to building products that make web3 accessible to everyone. MetaMask, Mastercard, and Baanx have launched MetaMask Card, letting users make everyday purchases with your crypto anywhere Mastercard is accepted. MetaMask Card functions like a crypto debit card, so users can spend directly from their MetaMask wallet.

## SOLVING THE CHALLENGE OF REAL-WORLD CRYPTO PAYMENTS

In the past, off-ramping crypto to cash was clunky, and required many steps. This tedious process hindered mainstream adoption of crypto as a practical, real-world payment method. MetaMask Card removes the need to transfer your funds to a centralized exchange or a bank in order to spend your crypto. This not only paves the way for increased adoption; it also aligns with the MetaMask vision of empowering people with self-custody. Most traditional crypto cards operate similarly to prepaid cards, where users need to transfer funds to a third party before spending them. MetaMask Card is different, because it functions like a debit card. This means users can directly use the crypto in their MetaMask wallet for everyday purchases, while maintaining control over their assets until the exact moment of payment.

## HOW IT WORKS

Users can easily sign up for the MetaMask Card via the MetaMask portfolio. Once activated, the card allows them to pay directly from their wallet's balances, with real-time conversion at the point of sale and earn 1% USDC cash back on purchases made in USDC. MetaMask Card utilizes Mastercard's global merchant network, combined with the security of MetaMask and the efficiency of Linea secured by the Ethereum network. This enables a swift, cost-effective, and secure experience for online and in person purchases.

## LOOKING AHEAD

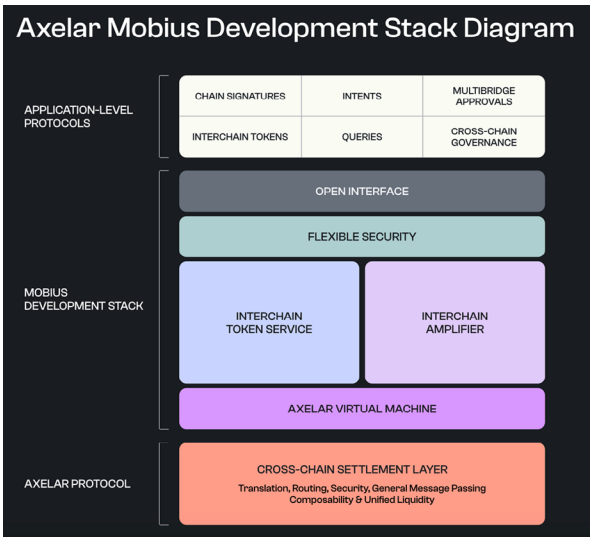
MetaMask Card early access is available in Argentina, Brazil, Colombia, the EEA, Mexico, Switzerland, the UK, and the US (excluding New York and Vermont)—with global roll-out on the way. Sign-up for your MetaMask Card today, and start using it immediately via Apple Pay or Google Pay.




If you're outside these areas, join our waitlist and we'll let you know when MetaMask Card is available in your region.

## INTEROP LABS
# STABLECOIN INTEROPERABILITY

Blockchains can be purpose-built to meet many use cases: payments, file storage and compliant issuance of tokenized assets, to name a few. In this brief article, we will introduce a kind of meta-use case: stablecoin interoperability. A blockchain can be used to connect other blockchains, improving security, user experience and developer capabilities. Such an interoperability chain can support software that manages stablecoin supply and translates features across various blockchain environments. For example, a non-custodial middleware called Interchain Token Service (ITS) is part of a development stack (called Mobius), built on the Axelar blockchain developed by Interop Labs.




The Mobius stack diagram shows how interoperability middleware like Axelar ITS can be built using a virtual machine on a blockchain-based interoperability protocol.

## PURPOSE-BUILT STABLECOIN ISSUANCE ENVIRONMENTS

Stablecoin regulation is now pending in both U.S. legislative chambers, and financial institutions have already begun charting paths for compliant issuance. In many cases, these paths involve purpose-built, private blockchain environments: Kinexys (formerly Onyx) by J.P. Morgan and Deutsche Bank are both exploring this approach, demonstrating improved compliance and risk mitigation. In both cases, Axelar Network connects the issuance environment with other blockchains.

## THE IMPORTANCE OF INTEROPERABILITY FOR STABLECOINS

Stablecoins and other tokenized assets deliver improved liquidity and access to financial products. They cannot deliver these advantages without interoperability. Circle's USDC, the second largest stablecoin by issuance, is a case in point: it now is used on several blockchains and Circle has taken the unusual (and costly) step of building its own interoperability infrastructure to facilitate this distribution.

## ITS: PERMISSIONLESS, OPEN-SOURCE MIDDLEWARE FOR TOKEN ISSUANCE

New blockchain platforms continue to proliferate; managing token supply across this fragmented landscape is too much for most issuers. Even Circle, a pioneer in this area, has begun to work with established interoperability protocols to expand the reach of USDC. Developers of the Axelar protocol built Interchain Token Service (ITS) with exactly this pain point in mind.

Blockchain-based interoperability protocols like Axelar can support smart contracts: they are programmable via an open-source and distributed paradigm that improves security, liveness and transparency. Axelar ITS is a suite of such smart contracts, designed to simplify token supply management and translate encoded functions across many integrated blockchains. Built on a decentralized blockchain, ITS is permissionless, open-source and transparent, end to end.

*Learn more: axelar.network/its*

## PAYPAL

# OPPORTUNITIES WITH PAYPAL'S PYUSD STABLECOIN

In 2023, PayPal unveiled PayPal USD (PYUSD) – a fully backed, regulated stablecoin issued by Paxos and developed for commerce and payments. PYUSD fuels the company's mission of revolutionizing commerce globally by helping move commerce from online to onchain efficiently and cost-effectively.

2024 was a landmark year for PayPal as the company enabled new use cases for cryptocurrency to revolutionize commerce. On its own platform in the United States, PayPal enabled business accounts to buy, sell, hold and transfer cryptocurrency—no longer limiting the capability to consumer accounts.

With regard to PYUSD, the stablecoin is now available on a second blockchain (Solana)—available through more than 25 partners to increase adoption for both consumers and institutions—and is used by PayPal Ventures to fund portfolio companies and pay invoices by PayPal to some of its vendors. It continues to experience growth that significantly outpaces the market.

Finally, PayPal now allows Xoom consumers in the United States to fund international transfers with PYUSD, while also allowing its business partners to settle using PYUSD—eliminating challenges that exist in the current financial system.

Beyond commercial aspects, PayPal has also researched ways to enable more sustainable bitcoin mining by using renewable energy and providing incentives to miners who do so. All of this supports PayPal's mission to revolutionize commerce globally – utilizing the speed and cost efficiencies of cryptocurrency and the blockchain fueled by PayPal's commerce and payments expertise.

*For more information, access: paypal.com/us/digital-wallet/manage-money/crypto/pyusd.*

## STANDARD CHARTERED

# STABLECOINS RISING AS THE KILLER APP OF DIGITAL FINANCE

Stablecoins have emerged as the first true "killer app" in digital finance, transforming how businesses manage financial operations. For treasurers and CEOs, they can optimize cross-border payments, enhance liquidity management, and reduce inefficiencies in traditional systems.

Designed to maintain a stable value, with the majority pegged to fiat currencies like the U.S. dollar, stablecoins combine the stability of traditional finance with blockchain's speed and transparency. Their appeal lies in their potential to streamline complex, multi-currency operations.

Stablecoins allow for near-instant, low-cost cross-border transactions, bypassing traditional intermediaries. This capability accelerates payments, enhances cash flow management, and minimizes transaction fees—critical for multinational corporations operating globally.

Stablecoins facilitate access to underserved markets by overcoming limitations of the traditional banking infrastructure. For businesses, this means greater opportunities in emerging markets, enabling payments and operations where financial barriers previously existed.

DeFi platforms offer treasurers opportunities to optimize returns on corporate funds. By using stablecoins, companies can access innovative yield-generating products while maintaining liquidity, reshaping traditional investment strategies.

Adopting stablecoins isn't without obstacles. Regulatory compliance remains a priority, requiring engagement with evolving standards. Treasurers must evaluate the transparency of issuers, ensuring reserves are adequately backed. Integration into existing systems demands collaboration with fintech partners to overcome technical barriers.

For treasurers and CEOs, stablecoins represent a strategic shift rather than a mere technological advancement. Piloting use cases such as cross-border payments can help companies assess their value while managing risks like cybersecurity and counterparty exposure.

By embracing stablecoins, forward-thinking companies position themselves as leaders in digital finance. This "killer app" of blockchain technology is not just a tool for efficiency—it's a cornerstone for future-ready financial strategies in a rapidly evolving landscape.

## JOINT VENTURE TO ISSUE HKD-BACKED STABLECOIN

Standard Chartered Bank (Hong Kong) Limited ("SCBHK"), Animoca Brands, and Hong Kong Telecom (HKT) have entered into agreements to establish a joint venture ("JV") with the intention to apply for a license from the Hong Kong Monetary Authority ("HKMA") in the new regulatory regime in order to issue a Hong Kong dollar (HKD)-backed stablecoin.

Standard Chartered has a track record of working with stablecoin issuers globally, allowing the JV to fully utilise its bank-grade infrastructure and rigorous governance. Having participated in all of the HKMA's tokenised money projects over the past few years, SCBHK is excited to contribute to the growing digital asset ecosystem in Hong Kong by being a key anchor to the JV.

Animoca Brands, a global Web3 leader headquartered in Hong Kong, will leverage its industry expertise and extensive network in the Web3 space to enable the JV to tap into crypto-native opportunities, and will explore innovative use cases across the Web3 ecosystem conducive to the JV's long-term growth.

HKT, a technology, media, and telecommunication pioneer, will leverage its mobile wallet expertise to enable the JV to develop innovative stablecoin use cases, aiming to enhance both domestic and cross-border payments and provide greater benefits to consumers and merchants alike.

- *Read the full report: sc.com/en/corporate-investment-banking/stablecoins/*
- *Read the press release: sc.com/en/press-release/standard-chartered-animoca-brands-and-hkt-establish-joint-venture-to-issue-hkd-backed-stablecoin*

# UN WORLD FOOD PROGRAMME (WFP) INNOVATION ACCELERATOR

# HESABPAY: TRACEABLE CASH-BASED TRANSFERS IN AFGHANISTAN

## WORLD FOOD PROGRAMME (WFP)

The World Food Programme is the world's largest humanitarian organization saving lives in emergencies and using food assistance to build a pathway to peace, stability, and prosperity for people recovering from conflict, disasters, and the impact of climate change.

## WORLD FOOD PROGRAMME INNOVATION ACCELERATOR

The WFP Innovation Accelerator was launched in 2015 to source new innovations, sprint pilot projects, and scale high-impact solutions by connecting them with WFP's global network in more than 120 countries and territories.

## HESABPAY PROJECT OVERVIEW

HesabPay provides digital cash-based transfers to vulnerable communities, enabling them to have their own digital accounts to cash out directly or do cashless transactions with hundreds of merchants.

## THE CHALLENGE

Growing security, access, and liquidity concerns require new solutions for delivering humanitarian assistance, especially to women. The solutions for digital cash in Afghanistan exist, but the consumer culture does not, yet.

## THE SOLUTION

HesabPay is an Afghanistan fintech solution providing secure digital cash transfers to vulnerable communities in Afghanistan. With HesabPay, WFP recipients, particularly women, can access aid through digital wallets, SMS-based phones, or debit cards. They no longer have to wait in long queues, providing dignity of access, and with their own financial accounts they are empowered to withdraw cash or make

purchases at 1,000 local merchants. Operationally, HesabPay's blockchain-backed reporting ensures real-time transparency, enhancing WFP's operational accountability.

## RESULTS

Since partnering with WFP in 2023, HesabPay in Afghanistan has helped 26,000 people open digital accounts, increasing access to cash assistance while fostering financial inclusion, reaching a total of 182,000 people. The solution is now expanding as part of WFP's social safety net programme, reaching 140,000 more people under the Mother and Child Benefit Programme.

- *Read more about HesabPay: innovation.wfp.org/project/hesabpay*
- *Read more about World Food Programme: wfp.org/who-we-are*
- *Read more about World Food Programme Innovation Accelerator: innovation.wfp.org*

## B2C2
# REDUCING FRICTIONS AND OPENING BOND MARKETS TO A BROADER INVESTOR BASE WITH ON-CHAIN BOND ISSUANCE

A global leader in the institutional trading of digital assets, B2C2 provides deep, reliable prices across all market conditions. B2C2 is committed to driving progress in blockchain-based finance and delivering trusted solutions to its clients.

In November 2024, B2C2 and PV01, a pioneer in digital debt capital markets, announced the breakthrough issuance of B2C2's first on-chain corporate bond. This world-first bond was represented by a transferable bearer token on the Ethereum blockchain and governed by English law. Denominated in the USDC stablecoin, its entire lifecycle—issuance, trading, and redemption—takes place on-chain.

The partnership with PV01 marks a significant milestone in the evolution of debt capital markets, showcasing how blockchain technology can streamline bond issuance while reducing reliance on intermediaries and lowering costs. This paves the way for traditional companies to issue debt on-chain in turn.

For crypto-native firms like B2C2, the ability to issue bonds directly on-chain offers a new, scalable way to diversify funding sources with greater speed, transparency, and control. Unlike traditional bonds, PV01's on-chain bonds are designed to be more efficient, transferable, and accessible to a broader range of investors—from large institutions to smaller players.

The significant advantages of on-chain bond issuance include:

**Efficiency**

- Automates core processes such as underwriting, clearing, and settlement, reducing time-to-market.
- Minimises the need for intermediaries, significantly lowering costs for issuers.

**Transparency**

- Ensures all parties have real-time access to the same immutable data, improving trust and reducing disputes.
- Provides a clear audit trail, enhancing visibility across the bond lifecycle.

**Accessibility**

- Enables fractional ownership, making bonds more tradable and opening markets to new types of investors.
- Increases liquidity by reducing friction in secondary market transfers.

**Security and Compliance**

- Cryptographic security ensures data integrity and protects against unauthorized access.
- Smart contracts can incorporate rules to enforce compliance with regulations, such as Know Your Customer (KYC) and Anti-Money Laundering (AML).

As financial markets grow more familiar with digital assets, on-chain bonds are poised to become a cornerstone of future bond markets, enabling secure, efficient, and global debt financing on a scale previously unimaginable.

*For more information on B2C2, please visit[b2c2.com](b2c2.com) or [linkedin.com/company/b2c2-ltd-](linkedin.com/company/b2c2-ltd-)*

## CANTON NETWORK

# CANTON GLOBAL COLLATERAL NETWORK BRINGS 24/7 GLOBAL LIQUIDITY TO TRADFI AND CRYPTO CAPITAL MARKETS

Canton Global Collateral Network (GCN) is transforming capital markets by tokenizing real world assets (RWAs) for use as collateral, for margin or in financing transactions. GCN supports multiple asset and transaction types and enables seamless asset utility and settlement across borders. This gives tradfi and crypto markets real-time 24/7 collateral mobility across CSDs and markets.

## USE CASE: UNLOCK COLLATERAL FROM LEGACY TECHNOLOGY AND OPERATIONAL RESTRICTIONS

- **Collateral availability is limited.** Although more transactions require collateral, in greater volumes than ever before, only about $28T of the $255T (~10%) available assets are mobilized as collateral.

- **Restrictive settlement times and market cut-offs.** When using traditional systems, collateral must be delivered across markets. Different, increasingly shorter, settlement times and market cutoffs prevent movement across time zones and geographies.

- **Collateral concentration requirements.** Prior industry and provider attempts at global mobility solutions require the client to concentrate assets at a single custodian/central securities depository (CSD), which is impractical and risky from an assets under custody (AUC) concentration perspective.

- **Lack of real-time asset and inventory data.** Accurate, timely data is needed to optimize collateral against regulatory requirements and address capital and balance sheet scarcity.

- **Manual processes, risk and cost.** Current processes are inefficient and operationally intensive, requiring layers of revalidation and market movements.

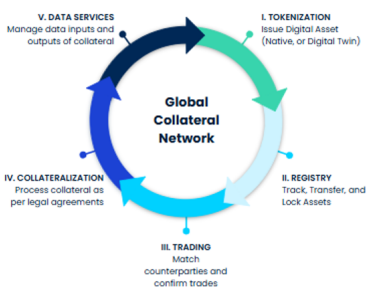
## CANTON GCN CREATES DEEPER, MORE MOBILE COLLATERAL POOLS

Tokenizing RWAs improves collateral accessibility by creating a broader pool of high quality liquid assets, including previously inaccessible assets such as commodities. More inventory allows more types of transactions to be collateralized (such as OTC, re-use and locates).

Assets can be mobilized to meet market demands, even outside of market hours, since tokenized collateral is available for use 24/7 across time zones and markets. No AUC transfers or market movements are required, as collateral is locked at location at existing custodians and CSDs. Locking collateral and atomic settlement removes settlement risk.

As assets become more mobile, they can be used more efficiently. This improves liquidity and capital efficiency and makes it easier to meet regulatory requirements (i.e., Basel III LCR, NSFR, and UST clearing). Trading capacity increases, particularly in volatile markets.

Finally, synchronized ledgers, multi-party workflows and atomic settlement improve transparency, decrease operating costs, reduce the need for capital, eliminate delays, and mitigate risk. Canton GCN is a network of sovereign, interoperable services. Each provider (CSD, Custodian, FinTech) offers separate and independent collateral services. Their apps connect via Canton Network, interoperating to mobilize collateral across client and provider nodes while preserving privacy and the provider's unique client relationships.




*Learn more about Canton Global Collateral Network: canton.network*

# CHAINLINK
# BRINGING THE GLOBAL FINANCIAL SYSTEM ONCHAIN

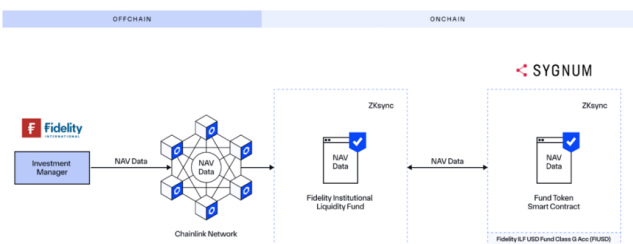
2024 marked a turning point in the adoption of onchain finance for traditional markets, with Chainlink enabling financial institutions to develop customized, compliant, and future-proof blockchain applications and tokenized assets. Below is a list of major use cases Chainlink enabled last year to help bring the global financial system onchain.

## TRANSFORMING ASSET SERVICING WITH AI, ORACLES, AND BLOCKCHAINS

Chainlink, Euroclear, Swift, UBS, Franklin Templeton, Wellington Management, CACEIS, Vontobel, and Sygnum Bank successfully demonstrated how LLMs can be used in combination with Chainlink for near real-time data distribution of corporate actions events across various blockchain networks. According to Forbes, this could solve a 3.1 trillion dollar unstructured data problem for global markets. Phase 2 is expected to begin this year.

## DELIVERING KEY FUND DATA ONCHAIN

Fidelity International and Sygnum partnered with Chainlink to bring NAV data onchain for Fidelity International's $6.9 billion Institutional Liquidity Fund. In this landmark production use case for tokenized assets, Chainlink helps provide transparency and accessibility around key asset data for the fund.



## BRIDGING TOKENIZED ASSETS WITH EXISTING PAYMENT SYSTEMS

Swift, UBS Asset Management, and Chainlink successfully settled tokenized fund subscriptions and redemptions using the Swift network. This initiative enables digital asset transactions to settle offchain in fiat, using an established payment system already widely adopted by more than 11,500 financial institutions, across over 200 countries and territories.

*"Our work with UBS Asset Management and Chainlink in MAS' Project Guardian leverages the global Swift network to bridge digital assets with established systems."—Jonathan Ehrenfeld, Head of Strategy at Swift*

## UNLOCKING AUTOMATED FUND ADMINISTRATION AND TRANSFER AGENCY

SBI Digital Markets, UBS Asset Management, and Chainlink successfully showcased how tokenization, smart contracts, and Chainlink infrastructure can automate the fund management process for traditional fund administrators and transfer agents. This unlocks a fundamental shift in how the industry's $132T global assets under management can begin to operate using blockchains.

# CLEARSTREAM
# D7: DIGITAL POST TRADE

The world of finance is going digital, driven by the growth of digital asset securities. Market participants are witnessing a surge in innovation, with established financial market infrastructures playing a crucial role in supporting the industry transition.

## DIGITISING THE CORE: D7 DIGITAL

In this context, Clearstream has developed its digital post trade platform D7, in collaboration with Google Cloud. D7 is a scalable and digital system looking to handle digital security issuance and lifecycle processing for Germany, Luxembourg and the international market. D7 leads the industry in terms of transactions and value issued in euros in the digital securities space. It has already reached key milestones, having issued more than 700,000 digital securities, worth in excess of €22 billion.

## TOKENISING SECURITIES: D7 DLT

The digital proposition of D7 is complemented by a Distributed Ledger Technology (DLT)-based architecture to enable seamless tokenisation of securities. Launched as part of the European Central Bank (ECB) trials in 2024, D7 DLT demonstrated its ability to issue securities on a blockchain, handling both securities and central bank digital currencies (CBDC), with a vision to scale these capabilities further.

The ECB trials on wholesale central bank digital currency were a major catalyst for accelerating securities tokenisation.

In our role as DLT market operator, we provided seamless processing of digital assets and high-quality cash on-chain. Our participation in the different payment solutions offered in the context of the ECB trials underscores our commitment to driving this evolution.




## DRIVING MARKET COORDINATION TOWARDS INDUSTRY STANDARDIZATION

The rise of DLT presents opportunities and challenges. Widespread adoption in the financial industry requires coordinated efforts. Major hurdles include the lack of standards in the blockchain ecosystem, interoperability issues and mobility of asset tokens. Together with the Depository Trust and Clearing Corporation (DTCC) and Euroclear, we published a blueprint for an industry-wide digital asset ecosystem. The proposed whitepaper outlines six key principles—the "Digital Asset Securities Control Principles" (DASCP)—to guide successful tokenisation adoption in the financial industry with the aim to deliver market participants greater options, flexibility, speed, transparency and efficiencies.

## DEPOSITORY TRUST AND CLEARING CORPORATION (DTCC)

# DIGITAL COLLATERAL MANAGEMENT PLATFORM

DTCC Digital Assets is at the forefront of driving institutional adoption of digital technology with a steadfast commitment to innovation anchored in security and soundness. As the financial services industry's trusted technology partner, we pride ourselves on empowering a globally interconnected and efficient ecosystem.

## PROBLEM

Collateral management used to be bogged down by paperwork and manual processes. Financial institutions struggled with inefficiencies, delays, and risks that cost billions each year. Market volatility and liquidity challenges underscore the critical nature of resilience in global financial markets.

Collateral is a multifaceted ecosystem whose complexity grows each year. Major challenges include a fragmented market infrastructure, inventory trapped by region and product, lengthy settlement cycle, a growing regulatory burden, and an ever-growing cost base. Operational technology inefficiencies, from siloed to stale data, to unscalable duplicative processes, create delays and a direct profit impact.

## SOLUTION

With the rise of digital technology, the landscape has changed. Today's platforms offer real time visibility across global markets. With AI-powered analytics that once took teams of specialists days to compile, blockchain and smart contracts have revolutionized transaction security and speed, cutting settlement times from days to minutes. Regulatory compliance, which once required mountains of documentation, now flows through streamlined automated reporting systems.

Cloud infrastructure connects counterparties globally, creating efficient low risk collateral pools.

All this results in reduced risks, lower costs, and efficiency at levels not seen before. In collateral management, digital isn't just the future–it's already here.

## THE GREAT COLLATERAL EXPERIMENT

In April 2025, DTCC and industry leaders held a live demo titled "The Great Collateral Experiment" to showcase DTCC's new digital collateral management platform and how it can be utilized across a diverse cross-section of financial market assets and participants. This was also the first industry demonstration developed on DTCC's digital ecosystem that launched in October 2024 – DTCC Digital Launchpad.

Collateral is an essential risk mitigation tool that helps support overall financial stability. But as the markets grow more complex and cost pressures rise, the demand for high quality collateral increases. Blockchains present a significant opportunity to streamline the flow of collateral across siloed infrastructure, unlocking major capital and operational efficiencies.

The new AppChain-based approach demonstrates the power of tokenized collateral management to:

- Increase the mobility and velocity of collateral movement globally,
- Increase capital efficiencies and liquidity for all participants,
- Facilitate the convergence of traditional and digital assets, and
- Enable an open digital liquidity ecosystem for market participants to deploy digital applications that enhance collateral operations.

The collateral management platform is an application on the DTCC AppChain, built atop LF Decentralized Trust's Besu blockchain. The DTCC AppChain, which uses DTC ComposerX, offers greater control over privacy, security, and data. DTCC is giving participants a robust digital financial infrastructure to help navigate a fragmented data landscape that spans traditional and digital networks. The platform leverages a scalable, industry-driven framework rooted in open architecture and common standards.

*"Our goal is to highlight how we can enable real-world, institutional-grade digital collateral market infrastructure," said Nadine Chakar, Global Head of DTCC Digital Assets.*

*"This platform is unique in that we've created something that's more open, flexible, dynamic, and comprehensive than any previous digital collateral initiative."*

*"Our work does not stop today," added Chakar. "We plan to continue building on this collateral model, engaging with the industry and our regulators to develop the standard for tokenized collateral across global jurisdictions, working with the buy-side to give them more direct market access, and laying out the regulatory and legal path to implementation."*

*"Collateral mobility is the 'killer app' for institutional use of blockchain – we've pulled together a coalition of technologists and market participants to successfully showcase how the speed and openness of this technology can safely and reliably unlock liquidity in traditional markets at scale," said Dan Doney, Chief Technology Officer of DTCC Digital Assets. "By using smart contracts to automate the full range of collateral operations, we enable complex trade execution across markets in real-time at any time, even in volatile conditions."*

Moving to digital collateral has never been more relevant, playing a critical role in enhancing liquidity, strengthening resilience and soundness in financial markets. Distributed ledger technologies have changed the game for settlement speed and security, reducing timing from days to minutes. A revolutionary approach to data and smart contracts enables seamless connectivity across continents and products, creating truly holistic global collateral pools. DTCC's collateral AppChain enables financial institutions to tokenize assets using any tokenization capability, and issue assets onto any network, private or public, while remaining seamlessly integrated with tradfi market infrastructure. This can enable global collateral movement via a digital operating model, and financing real world and cryptoassets with various types of collaterals, via tokeinzed assets, DLT solutions and smart contracts.

## OBJECTIVES

DTCC hopes to break digital barriers by bringing the industry together to accelerate the adoption of digital technologies. DTCC chose to lead with collateral infrastructure by making it the first application in its institutional financial AppChain. Collateral management is for DTCC the perfect application for blockchain technology.

DTCC aims to find common ground for a unified digital collateral infrastructure for the entire industry. An open interoperable approach to this new infrastructure is considered the best path forward as both the technology and global regulations continue to evolve.

## FOLKS FINANCE

# BRINGING REAL-WORLD PRECIOUS METALS INTO DEFI LENDING

Real-world assets (RWAs) are rapidly gaining traction in decentralized finance, providing a critical bridge between traditional markets and blockchain ecosystems. Leading this evolution, Folks Finance has introduced tokenized gold and silver into their platform, enabling users to permissionlessly engage in operations such as lending, borrowing, and trading with asset-backed commodities.

GOLD and SILVER tokens represent one gram of physical gold and silver, respectively. Backed by Meld's infrastructure, these tokens bring the stability and value of precious metals to the fast-evolving world of DeFi. By integrating RWAs, Folks Finance expands financial opportunities beyond cryptocurrencies, offering users a new way to diversify portfolios and manage risk.

Gold and silver were listed on Folks Finance in late 2023, marking over a year of successful usage in DeFi. This milestone highlights the increasing demand for tokenized commodities in decentralized markets. Notably, Folks Finance was the first lending protocol to list tokenized precious metals as collateral, making it the first instance of commodities being collateralized in permissionless markets. Unlike traditional fintech apps, where users can only buy gold and silver without leveraging them for loans, Folks Finance enables users to utilize these assets as collateral to borrow against them.

This innovation has generated significant interest from the community, as it offers a unique opportunity to leverage gold and silver holdings in a decentralized and permissionless manner. Without the need for KYC on Folks Finance, users can borrow against their assets in just a few clicks, unlocking liquidity without selling their metals. This breakthrough underscores the power of DeFi in expanding financial accessibility and efficiency compared to conventional financial systems.

Tokenized commodities on Folks Finance eliminate the inefficiencies of traditional gold and silver markets. Unlike conventional methods that require physical storage and complex settlement processes, GOLD and SILVER tokens provide instant liquidity, enabling frictionless lending and borrowing. Users can now leverage these assets as collateral, borrow against them, or collect yields by supplying them to the protocol's lending pools.

This development aligns with the broader trend of RWA adoption in DeFi, as both institutional and retail investors seek blockchain-based exposure to tangible assets. By integrating precious metals, Folks Finance strengthens its position as a leader in financial innovation while appealing to users from both DeFi and traditional finance.

Infrastructure like Folks Finance is set to become a cornerstone of the next generation of fintech applications, bridging traditional and decentralized finance in meaningful ways.

**HASHED**

# REALIZING A SHARING ECONOMY AND DEMOCRATIZATION OF REAL ESTATE OWNERSHIP THROUGH SECURITY TOKENS

## COMPARING REAL ESTATE SECURITY TOKENS AND TRADITIONAL INVESTMENTS

***CURRENT CHALLENGES***

According to the Korea Association for REITs, there are currently 24 listed REITs in the Korean market, managing approximately KRW 23 trillion (~16.7bn) of assets. This represents only about 0.15% of Korea's total real estate value of KRW 15 quadrillion, underscoring the limited scope of domestic real estate covered by listed REITs. Additionally, while multiple real estate funds are established each year, only around 1% of new real estate funds were publicly offered, with the rest only provided to select individuals and/or organizations.

In other words, indirect real estate investments opportunities for retail investors remain underdeveloped, and structural constraints significantly limit investment options for retail investors. Overall, the Korean market for indirect real estate investments has yet to reach the level of activity and accessibility seen in other developed countries.

**TABLE 1: CURRENT STATUS OF TRADITIONAL INDIRECT REAL ESTATE INVESTMENT VEHICLES (FUNDS AND REITS)**

**Public real estate funds (REFs) account for only 1% of the total net assets of newly established real estate funds.**

| Year | Publicly Offered | Privately Offered | Net Asset of REFs (public+private; 100mn Won) | Portion of public REFs within REFs |
|---|---|---|---|---|
| 2024 | 324 | 43,510 | 43,834 | **0.7%** |
| 2023 | 3 | 83,724 | 83,727 | **< 0.1%** |
| 2022 | 1,507 | 140,537 | 142,044 | **1.1%** |
| 2021 | 551 | 150,402 | 150,953 | **0.4%** |
| 2020 | 2,321 | 161,273 | 163,594 | **1.4%** |

**Comparison of Major REIT Markets**

| Category | US | Japan | Singapore | Korea |
|---|---|---|---|---|
| Introduced | 1960 | 2000 | 2002 | **2001** |
| # of listed REITs | 204 | 60 | 39 | **23** |
| MC(tn Won) | 1,604 | 152 | 93 | **8** |
| MC/GDP(%) | 6 | 3 | 20 | **0.3** |

Source: Joint Effort by Relevant Ministries (2024), Korea Financial Investment Association(Status of Newly Established Funds), Reorganized by Hashed Open Research

***SOLUTION***

Real estate security tokens (ST) have the potential to address such limitations of existing investment products. Unlike traditional investment products, Real estate ST can be bought and sold on a distribution platform, making them easy to liquidate, allow investors to select individual properties, and provide non-monetary benefits associated with the investment property.

**TABLE 2: ADVANTAGES AND CHARACTERISTICS OF REAL ESTATE STS COMPARED TO TRADITIONAL INDIRECT REAL ESTATE INVESTMENT PRODUCTS**

| Category | Real Estate STs | Traditional Indirect Real Estate Investment Products | |
|---|---|---|---|
| | | REITs | Real Estate Funds |
| **Investment Target** | Individual Real Estate | Real Estate and Related Securities | Investment of More Than 50% of Fund Assets in Real Estate and Related Rights/Assets |
| **Loan Ratio** | X (100% equity by default) | O (Max 10x if agreed upon by shareholders) | O (Public 200% ; Private 400%) |
| **Legal Structure** | Beneficiary Certificates + others | Stocks(Equity Securities) | Funds(Beneficiary Certificates) |
| **Investor Status** | Owner | Shareholder | Beneficiary |
| **Early Redemption** | O (Through the issuer's trading platform) | O (Varies by REIT type) | X (typically closed for 3~5yrs) |
| **Ability to select individual real estate** | O | X (Investment in Companies, Not Real Estate) | O |
| **Investor Profits** | Monetary + **Non-monetary** | Monetary | Monetary |

Source: Hashed Open Research

Here, security tokens refer to the digitized form of securities such as non-monetary trust beneficiary certificates or investment contract securities under the Financial Investment Services and Capital Markets Act recorded on a distributed ledger (in narrower terms, blockchain). However, due to regulatory limitations on current securities trading methods, issuance and trading of security tokens are not permitted by law. Thus, real estate security token companies are temporarily operating under limited conditions through the Financial Regulatory Sandbox program.

Security tokens are gaining interest among both customers and companies due to their effectiveness in securitizing a wide range of rights and enabling investment in individual properties, projects, and assets that operate independently of a company's overall value. Security tokens are classified into tokenized forms of (1) non-monetary trust beneficiary certificates and (2) investment contract securities.

Real estate security tokens fall under non-monetary trust beneficiary certificates. Thus, secondary trading is allowed, but as the regulatory framework is still incomplete, companies may only be operated under the Financial Regulatory Sandbox.

**TABLE 3: COMPARISON OF NON-MONETARY TRUST BENEFICIARY CERTIFICATES AND INVESTMENT CONTRACT SECURITIES**

**Table 3. Comparison of Non-Monetary Trust-Beneficiary Certificates and Investment Contract Securities**

| | Non-Monetary Trust-Beneficiary Certificates | Investment Contract Securities |
|---|---|---|
| **Securities Use** | Key vehicles used for fractional investment in non-monetary assets | |
| **Legislation Status** | X | O (In 2009) |
| **Secondary Trading Availability** | O | X |
| **Investor Profit Structure** | (1) Periodic Dividend Income + (2-1) Sale Proceeds or (2-2) Pre-Sale Profit Realization | (1) Periodic Dividend Income + (2-1) Sale Proceeds |
| **Platform Profit Structure** | (1) Public Offering Profit and Fees + (2) Dividend Fees + (3) Sale Compensation + (4) Transaction Fees (approximately 0.2%) | (1) Public Offering Profit and Fees + (2) Dividend Fees + (3) Sale Compensation |
| **Face Value** | Relatively Small (Typically several thousand KRW) | Relatively Big (Up to Hundreds of Thousands of Won) |
| **Cases** | Real Estate, Intellectual Propety(IP), etc. | Art, Livestock, etc. |

Sources: FSC(2023), Samsung Securities (2024), Kiwoom Securities (2024), Reorganized by Hashed Open Research

## HEDERA FOUNDATION

# DRIVING THE WEB3 REVOLUTION THROUGH TOKENIZATION

Hedera - the leading enterprise-grade distributed network governed by a Council of some of the world's largest institutions including Google, Dell, Abrdn, and Shinhan Bank - stands at the technological and regulatory forefront of tokenization and the emerging digital economy.

### ACCELERATING DIGITAL TRANSFORMATION WITH THE ASSET TOKENIZATION STUDIO

The Hedera Asset Tokenization Studio (ATS) is a groundbreaking open-source toolkit that simplifies the technical and regulatory process of bringing traditional financial assets into the digital age. This end-to-end solution enables financial institutions, enterprises, and platforms to tokenize real-world assets (RWAs) including bonds and equities - enabling cost efficiencies and improved transferability while maintaining regulatory compliance.

Hedera Asset Tokenization Studio represents a breakthrough in unlocking cost efficiencies with the tokenization of traditional assets. While generally making tokenization more accessible, the Studio also allows for the management of the entire tokenization process on-chain, eliminating risks associated with handling essential asset metadata offline as is currently the industry norm.

This platform offers essential features for the issuance and management of tokenized RWAs, including, but not limited to:

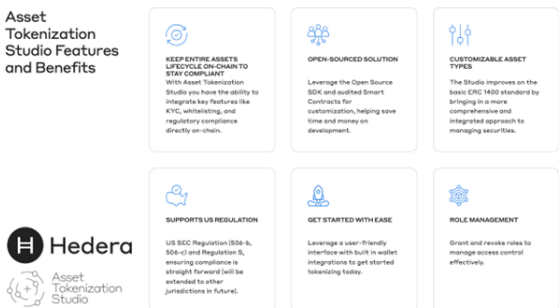
- Automated bond payments and dividends
- Built-in compliance tools for investor verification and whitelisting
- Essential issuer safeguards for pausing transactions or updating terms

Critically, the Studio supports key U.S. securities regulations, including SEC **Regulation D (Rules 506(b) and 506-c)** and **Regulation S**.

These regulations are crucial as they govern private placement exemptions: 506(b) allows raising unlimited capital from accredited investors without general solicitation, while 506(c) permits public marketing but requires strict verification of accredited investor status. Regulation S provides safe harbor for offshore securities offerings.

## WHY CHOOSE ASSET TOKENIZATION STUDIO

- **Security and Performance:** Hedera's underlying technology provides rapid settlement, cost-predictability, and enterprise-grade security.
- **Regulatory Focus:** The platform prioritizes compliance, with built-in support for key regulations and the ability to adapt to evolving requirements.
- **On-Chain Management:** Unlike other platforms that require off-chain management of critical metadata, Hedera's solution keeps all asset details secure and transparent on-chain.




The Asset Tokenization Studio represents a significant step forward in modernizing capital markets, making traditionally illiquid assets more accessible while maintaining security and compliance. With this offering, Hedera is providing the world of traditional finance with the tools needed to participate in the growing tokenized economy, which is increasingly attractive to individual and institutional investors alike. With Asset Tokenization Studio, Hedera is creating a more accessible and equitable market for all.

*Explore Asset Tokenization Studio: hedera.com/ats*

## IOBUILDERS

# REDEFINING LOAN MARKETS AND SECURITIZATION WITH TOKENIZATION

2024 has been a pivotal year for ioBuilders' Syndicated Loans Platform, created in partnership with two financial industry leaders. This innovative platform harnesses DLT to address key inefficiencies in syndicated loans, including fragmented data, manual processes, lack of transparency, and limited liquidity.

The platform's evolution reflects an ambition to revolutionize loan liquidity management by providing a fully digital syndicated loan solution. It enables the on-chain tokenization of newly originated syndicated loans, as well as the tokenization of existing loans held on balance sheets that were initially structured off-chain. Furthermore, it provides the tools to efficiently offload these tokenized assets, facilitating their removal from balance sheets and enhancing capital optimization.

The journey began with the implementation of **front-book tokenization**, where newly originated loans are represented on-chain after the contractual phase. By leveraging smart contracts, the platform automates lifecycle management, ensuring seamless interaction between stakeholders, reducing administrative overhead, and significantly improving execution times. This phase has transformed the syndicated loan origination process, enabling a more transparent and efficient system for both borrowers and lenders.

Building on this foundation, ioBuilders introduced **back-book tokenization**. This innovation allows financial institutions to tokenize existing off-chain loans, bringing legacy portfolios into the digital ecosystem, which bridges the gap between traditional systems and modern digital infrastructure, simplifying the transition to a fully digitized future.

The platform's latest evolution focuses on **securitization**, enabling financial institutions to issue tokenized securities representing entire loan portfolios.

These tokenized assets offer options for on-chain or off-chain lifecycle management, providing institutions with the ability to optimize risk allocation and unlock new liquidity opportunities. By transforming portfolios into tokenized securities, the platform creates transparency and flexibility while addressing the complexities of managing large-scale financial assets.

With each phase of development, ioBuilders' Syndicated Loans Platform has advanced the financial industry toward a fully tokenized ecosystem. By integrating real-time synchronization and automated workflows, the platform not only modernizes loan management but also sets a new standard for efficiency, transparency, and innovation. As ioBuilders continues to enhance its platform, it reaffirms its role as a leader in the digital transformation of financial markets.

## KINEXYS BY J.P. MORGAN

# ENABLING PRIVACY AND IDENTITY FOR TOKENIZATION

Kinexys (formerly known as Onyx) by J.P. Morgan is the firm's blockchain business unit. Rebranded in November 2024, the name Kinexys is inspired by the words "kinetic" and "connection" and reflects the way we move money, assets and financial information with speed, ease and efficiency, and our ongoing commitment to connecting the global financial services landscape.

Kinexys Digital Assets is the firm's digital assets platform that enables cross-asset settlement use-cases using tokenization. Having processed over $1.7T in transaction volume to date, Kinexys Digital Assets has a strong track record of delivering real-world utility. Clients already use our platform to conduct repos with tokenized US Treasuries, post collateral margin with tokenized money market fund units, and issue/transact in/settle tokenized bonds whilst seeing benefits in transaction precision, transparency, efficiency and control.

In November 2024, through Project EPIC, Kinexys by J.P. Morgan demonstrated how financial institutions can maintain on-chain transaction privacy while enabling reusable identity credentials for potentially streamlined compliance checks. Our technical proof-of-concept implemented three key capabilities: confidential transaction execution, privacy-preserving identity verification, and composability for secondary markets, while preserving the efficiency benefits of blockchain technology.

## EXISTING MARKET CHALLENGES

- Financial institutions need to protect trading strategies and client relationships
- Identity verification processes create operational overhead and friction
- Blockchain's inherent transparency makes sensitive transaction details vulnerable to exposure
- Manual reconciliation required across fragmented identity systems

## PROJECT EPIC PROPOSED SOLUTIONS

- Transaction privacy through zero-knowledge proofs and homomorphic encryption
- Reusable privacy-preserving identity credentials for compliance checks
- Integration with existing workflows through privacy-preserving frameworks

We believe that tokenization and blockchain technology have the potential to unlock a $400 billion revenue opportunity in alternative investment funds. To achieve this vision, several key factors are essential, with institutional-grade privacy and identity solutions being critical to unlock scale. Our work on Project EPIC builds on our previous initiatives, such as Project Guardian in 2023, where Kinexys collaborated with Apollo, WisdomTree, and other partners to demonstrate automated portfolio rebalancing across multiple tokenized funds. These experiments showcase the value we can unlock for clients in an ideal state by utilizing tokenization in funds.

By leveraging core capabilities on the Kinexys Digital Assets platform, we continue to progressively deliver benefits of tokenization across different use-cases. Building on our already live applications, our immediate focus is to parlay these benefits to the investment funds ecosystem through solutions aimed at enhancing fund distribution and lifecycle operations.

*Contact the Kinexys team to learn more: jpmorgan.com/kinexys/contact*

## KALYP TECHNOLOGIES
# REDEFINING SECURITIES SERVICES THROUGH DIGITAL INFRASTRUCTURE

As tokenized securities gain momentum, UK-based KALYP Technologies is leading the deployment of next-generation Distributed Financial Market Infrastructure (DFMI). KALYP's advanced processing environment reimagines how securities services are delivered for regulated capital market assets.

KALYP's DFMI is designed for interoperability with traditionally centralized, revenue-generating services of financial institutions, while enabling decentralized automation of cost centers - particularly in areas such as compliance. It connects a growing network of providers and streamlines inter-firm processing through three core components:

- Open marketplace of securities services from regulated providers
- Inter-firm workflows for processing with end-to-end audit trails
- Shared register and jointly managed securities master data

An early adopter of this infrastructure, the US-based Digital Securities Depositary Corporation (DSDC) has already demonstrated significant efficiencies in the end-to-end processing of American Depositary Receipts (ADRs). Financial institutions that join DSDC as member firms can future-proof their service offerings and tap into new revenue streams in the emerging digital securities landscape. Within DSDC's institutional network, participating providers jointly deliver up to 80% cost and process efficiencies in multiple operational areas. On the strength of this success, the expansion of the model is being worked on to upgrade further regulated securities classes.

## MARKETPLACE FOR FINANCIAL INSTITUTIONS

By connecting to the DFMI marketplace, regulated financial institutions can access new servicing business and overcome traditional barriers to entry - especially in historically closed markets like the ADR segment. When a securities service is required, the marketplace dynamically identifies the most suitable provider and allocates the servicing business.

This creates a transparent, performance-based model for service delivery. Providers gain new ways to grow revenues with their existing core services, while investors benefit from faster processing, lower servicing costs, and stronger regulatory oversight and auditability.

## WORKFLOWS, OPTIMIZED AND AUTOMATED

Once selected via the marketplace, providers are involved in inter-firm workflow processing with clear responsibilities. Essential, non-revenue-generating activities - such as compliance checks - can be automated through KALYP's distributed and trusted codebase. All process steps, whether automated or executed by centralized institutions, are recorded on immutable audit trails, ensuring end-to-end transparency, enhanced operational risk management, and legal certainty in the multi-party environment. This reduces the execution time for complex processes like corporate actions, in many cases from several weeks to just days or less.

## SHARED REGISTER AND GOLDEN DATA

KALYP's infrastructure is a permissioned distributed ledger architecture, initially built on Hyperledger. Each member firm acts via its own node, configured to align with its regulatory status and service offering. The shared ledger reduces the need for inter-firm reconciliations by consolidating securities registers and master data. All data is shared on a need-to-know basis, combining confidentiality with inter-firm transparency. Clear accountability for each data record across participating financial institutions provides the legal certainty required for operating in a distributed service environment.

## DSDC'S DIGITAL ADR INITIATIVE: A REAL-WORLD USE CASE

The Digital Securities Depositary Corporation (DSDC), powered by KALYP, is positioned to deliver the first fully fungible, trading venue–agnostic cross-border public equity via a regulated DLT network - redefining the issuance, cancellation, and servicing of ADRs.

Between 2019 and 2025, DSDC worked closely with U.S. regulators and received guidance that DFMI activity must fall under regulated oversight by a bank or broker.

DSDC responded by embedding a dedicated compliance function into the network and partnering with Financial Industry Regulatory

Authority (FINRA) licensed broker-dealers to meet all regulatory expectations.

Importantly, DSDC integrates seamlessly with existing legacy U.S. settlement environments, removing adoption barriers of digitally serviced securities for investors who are not yet equipped to handle fully digital securities. This unlocks new value and liquidity in the digital asset space and sets a new benchmark for operational efficiency in securities services.




DSDC's decentralized governance model gives member institutions a direct voice in the evolution of the infrastructure. Each member holds a seat in the governance body, contributing to strategic decisions on:

- Market expansion (e.g., connecting UK equities like FTSE 350 listings to the U.S.)
- Onboarding new asset classes
- Introducing new service categories
- Improving inter-firm workflows

With expansion into additional jurisdictions already underway, DSDC and KALYP's infrastructure is designed to scale far beyond ADRs — offering a future-proof foundation for servicing any public or private security in digital format.

*For more information, visit: dsdc.net or kalyp.com*

## MOODY'S RATINGS

# AS DIGITAL BOND ISSUANCES ACCELERATE, NEW RISKS SHOULD BE MONITORED

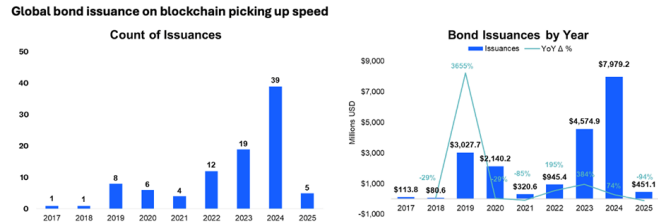
In the coming years, digital finance is expected to gain further traction among financial institutions that seek operational and cost efficiencies through blockchain and want to expand into new asset classes. These heavily regulated firms will likely need to focus on quantifying and managing risks associated with blockchain-based platforms. Digital bonds – bonds issued and managed on distributed ledger technology (DLT) such as blockchain – are one of DLT's most promising applications.

Moody's Ratings (MR) is developing capabilities to enhance digital asset risk evaluation and seamlessly share MR credit rating information between on-chain and off-chain environments. On the risk evaluation side, MR is advancing proof-of-concepts and developing capabilities to evaluate key risk indicators (KRIs) for digital bonds and other digital assets, issued across multiple blockchains, with a focus on operational challenges such as network health, governance breakdowns, smart contract security, on-chain activity, and operational resilience.

The initiative explores how risks in digital finance can be systematically measured and integrated into traditional evaluation processes. Through real-time monitoring and data-driven approaches, MR aims to enhance transparency, support institutional decision-making, and provide independent insights as tokenization and institutional adoption of the technology continue to grow. Additionally, MR is developing capabilities to integrate its credit rating information into blockchain-based infrastructure to disseminate ratings data directly on-chain. With these new digital channels, MR aims to enhance transparency, efficiency and security in digital finance, while enabling the secure issuance, update and withdrawal of ratings on blockchain platforms.

Although there has been only $16.7 billion in digital bonds issued since 2017, compared to $140.7 trillion in conventional fixed income bonds outstanding as of July 2024 (Reference: SIFMA – Capital Markets Fact Book, 2024), the number of transactions is growing. There were 33 digital bond issuances over the 12-month period ending 23 May 2025, up from 19 in all of 2023. Most transactions still appear to be proofs-of-concept, with small amounts issued and a limited number of investors. However, some are beginning to resemble more traditional transactions.

**GLOBAL BOND ISSUANCE ON BLOCKCHAIN PICKING UP SPEED**




Source: Moody's Ratings

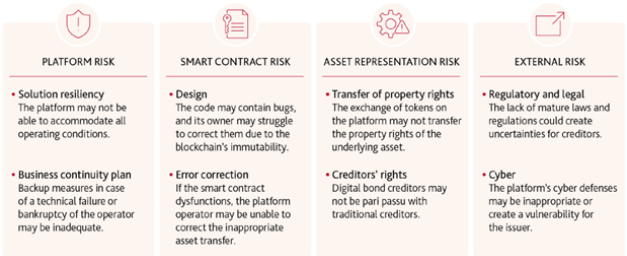
Most digital bond issuances have occurred in developed markets, especially in Europe and Southeast Asia, where intermediaries have invested heavily in developing and testing solutions. There have been only a few digital bond issuances so far in the US because of the uncertain regulatory environment. Moody's expects the US to catch up if Congress passes legislation that offers more regulatory clarity to DLT infrastructure operators.

Digitization of assets could enhance market liquidity over time. For example, blockchain technology allows bonds to be split into smaller portions, a process known as fractionalization. Under appropriate legal and regulatory frameworks, this technology would lower investment minimums and enable smaller investors to buy bonds. With a mature market infrastructure, transactions would be highly automated, reducing costs and shortening settlement periods. Automation could enable investors to trade around the clock, year-round.

Although conventional bond infrastructure has a multi-decade track record, digital bond platforms are relatively new and untested, and therefore require greater scrutiny.

As the digital bond ecosystem matures, we expect risks to converge with those of conventional bonds over time. The table below summarizes the key risks associated with digital bonds.

**KEY RISKS OF DIGITAL BONDS**




*Source: Moody's Ratings*

Digital bonds' features are not yet standardized. Additionally, some digital bonds are issued on private blockchains, which are controlled by a single entity, while others are processed by public blockchains, which are entirely decentralized.

Platform operators also need to implement identity checks to ensure that unauthorized third parties cannot connect to platforms. Therefore, the risk exposure of digital bond platforms can vary substantially.

Quantifying and mitigating risks associated with blockchain-based systems has grown in importance for both market participants and regulators, as highlighted by a recent report published by the Bank for International Settlements (BIS). As blockchain adoption accelerates within traditional financial systems, it has become more complex and difficult for institutions to balance innovation and risk management.

One increasingly popular solution is a hybrid approach that integrates private permissioned networks with public permissionless blockchains. Hybrid blockchains let institutions benefit from public blockchains' size, decentralization, and participation of multiple validators.

However, combining public and permissioned networks has prompted heightened regulatory scrutiny because of the inherent risks in permissionless networks, including cyberattacks, market manipulation, and the absence of a central authority for recourse.

Mitigating risks associated with tokenized assets such as digital bonds currently comes with high costs that could reduce the assets' appeal to investors. As technological solutions evolve, they could reduce the need to use certain common types of backup measures, which could help lower the cost of creating and owning tokenized assets on a hybrid network. Furthermore, improvements in the security and reliability of the technology could prompt regulators to adopt a more favorable stance toward tokenized assets issued on permissionless networks, further facilitating the integration of these assets into mainstream financial systems.

Over the next year, regulators and standard-setting bodies are set to continue working to promote best practices and harmonize industry standards and to continue to work with market participants on frameworks like the Regulated Liability Network (RLN) and Regulated Settlement Network (RSN) to create regulated interoperable infrastructure for tokenized assets.

## POLYMESH

# POWERING REGULATORY-COMPLIANT REAL WORLD ASSET TOKENIZATION

Tokenized RWAs require infrastructure that prioritizes meeting complex regulatory requirements around converting and transferring ownership rights to assets. Most blockchains, built to be multi-purpose, cannot provide the tools to manage compliance while simplifying workflows. As a result, less than 1/8$^{th}$ of Boston Consulting Group's estimated $16T in tokenized assets by 2030 are onchain in the year 2025.

Narrowing this gap is Polymesh, the institutional-grade purpose-built permissioned blockchain specifically for real world assets. Polymesh's partnership with South Korean licensed digital asset custodian BDACS Inc. demonstrates how purpose-built technology can establish the foundation for regulatory-compliant RWAs.

Proposed as a potential RWA technology model for BDAN (Busan Digital Asset Nexus), Polymesh is helping shape the future of regulated digital asset trading. The partnership with BDACS focuses on developing technical infrastructure that enables the listing, trading, and custody of tokenized RWA products, while maintaining high regulatory standards and technological excellence.

Distinguishing Polymesh is its native-first approach to capital markets requirements, particularly governance and compliance. Rather than forcing participants to seek out complex third-party solutions, the platform provides built-in functionality for identity verification, regulatory compliance, and settlement finality. This architecture significantly reduces operational complexity while enhancing security and trust in tokenized assets.

The Polymesh-BDACS collaboration supports promising RWA projects through standardized, transparent workflows that simplify implementation while facilitating regulatory compliance. By incorporating compliance at the protocol level, the platform enables institutions to tokenize and trade various assets – from real estate to commodities – with confidence in their regulatory adherence.

Looking ahead, this partnership establishes a model for regulated digital asset markets globally. As traditional financial markets increasingly embrace digital assets, Polymesh's collaboration with BDACS demonstrates how purpose-built infrastructure can bridge the gap between conventional finance and blockchain technology, while maintaining regulatory compliance.

The success of this initiative extends beyond Busan. It provides a blueprint for other jurisdictions seeking to develop compliant real world asset markets, showing how technological innovation can coexist with regulatory requirements. This approach could accelerate the adoption of digital assets in traditional finance while ensuring market integrity and investor protection.

# SORAMITSU
# BOND ISSUANCE, CBDCS, AND FRAUD INTELLIGENCE

Soramitsu (soramitsu.co.jp) is an award-winning global fintech company specializing in blockchain-based digital asset management, identity solutions, and financial infrastructure. Our extensive track record includes developing central bank digital currencies (CBDCs), secure payment platforms, identity verification systems, and multi-currency settlement tools. Through blockchain technology, we tackle societal challenges and drive innovation. Notably, our Bakong CBDC in Cambodia has attracted over 10 million registered users, and handles more than $300 million in daily transactions.

As core developers of Hyperledger Iroha 2, part of the Linux Foundation's Decentralized Trust framework, we have championed cutting-edge use cases that reach beyond traditional finance—encompassing areas such as fraud prevention and financial inclusion.

## PALAU INVEST: TRANSFORMING SOVEREIGN BOND ISSUANCE

In collaboration with the Government of Palau and Japan's Ministry of Economy, Trade and Industry, Soramitsu developed **Palau Invest**, a blockchain-based savings bonds platform built on the SORA v3 Hub Chain and powered by Hyperledger Iroha 2. By addressing the absence of a domestic bond market, Palau Invest offers citizens a secure investment vehicle while enabling the government to raise funds for essential infrastructure projects.

## PAPUA NEW GUINEA DIGITAL KINA CBDC POC

Following the success of Palau Invest, Soramitsu launched the **Papua New Guinea CBDC Proof of Concept**—the second major project on the SORA v3 Hub Chain.

Completed in January 2025, the PoC marked the first step toward a Digital Kina, demonstrating how blockchain technology can support the Bank of Papua New Guinea's goal of financial inclusion through robust payment systems.

The user-friendly mobile application facilitated real-time payments and remittances, and active development continues with significant updates expected in 2025.

## FRAUD INTELLIGENCE BLOCKCHAIN

Soramitsu's joint venture with Orillion, **Fraud Intelligence Limited (FIL)**, harnesses Hyperledger Iroha to enable real-time, industry-wide data sharing on fraud activities. Key telecommunications players—such as Vodafone, Telia, and MTN—use this platform to strengthen their anti-fraud initiatives. As it scales globally, FIL aims to become an indispensable resource in combating telecommunications fraud worldwide.

## INNOVATING THE FUTURE

These initiatives showcase Soramitsu's commitment to delivering real-world impact through Hyperledger Iroha 2 technology. By advancing financial inclusion, safeguarding against fraud, and fostering sustainable development, we continue to pioneer the transformative potential of blockchain across industries and around the world.

# THE WORLD BANK
# TOKENIZING PROMISSORY NOTES FOR MULTILATERAL DEVELOPMENT

## USE OF PROMISSORY NOTES AND OPPORTUNITY FOR DIGITAL TRANSFORMATION

Promissory notes play a vital role in channeling financial commitments from member countries to Multilateral Development Banks (MDBs), supporting their ability to deliver long-term development programs. Traditionally issued and managed in paper form since the 1940s, these instruments to this day are handled with care and diligence by Central Banks, Ministries of Finance, and MDBs alike.

As global financial systems evolve, there is growing interest in how technology can enhance efficiency, transparency, and coordination across institutions. Project Promissa was launched to explore and assess such potential — specifically how Distributed Ledger Technology (DLT) could support the tokenization of promissory notes by creating a secure, digital platform to manage their full lifecycle.

## PROJECT OBJECTIVES AND ENVISIONED SOLUTION

Developed in collaboration among the World Bank, the Bank for International Settlements (BIS) Innovation Hub, and the Swiss National Bank, the project aims to demonstrate how innovations in financial technology can complement existing processes while unlocking opportunities for scale, speed, and cooperation.

By creating a tokenized alternative to the paper promissory notes, this joint project showcased the potential of how digitization can enhance efficiency, data transparency and integrity, plus cross-border collaboration — it also signals a bold step toward the future of development finance.

- **Streamline promissory note lifecycle** by first dematerializing the note and enhancing efficiency in its issuance, updates, and archiving.

- **Ensure operational and data sovereignty** for Ministries of Finance (MoF) and custodians, maintaining confidentiality from non-involved parties.

- **Increase transparency** by creating a unified data platform and tracking real-time data for all parties.

- **Provide MDBs with a comprehensive overview** of activities across contributing member countries, while MoF and custodians retain full control and oversight.

Project Promissa highlights how technology can be leveraged to transform MDB processes—reimagining traditional paper-based instruments with secure, digital alternatives that enhance efficiency, transparency, and coordination. By demonstrating a scalable solution for digitizing and streamlining the promissory note process, the project also establishes a potential pathway to enhance transparency, strengthens institutional coordination, and lays the groundwork for scalable, future-ready solutions across the multilateral system.

## PROOF-OF-CONCEPT

Project Promissa developed a proof-of-concept (PoC) platform using DLT to tokenize promissory notes and manage their full lifecycle — from issuance and updates to encashment and archiving. The platform was designed to support multiple parties, enabling real-time collaboration while preserving data sovereignty and confidentiality.

Key features included a single source of truth accessible to authorized parties, multiparty digital signatures to streamline approvals, and full lifecycle visibility for MDBs and their contributing member countries.




Tested with participation from two MDBs and seven member countries, the PoC platform demonstrated that the promissory notes, once dematerialized and tokenized, could reduce reconciliations, improve coordination, and enhance transparency without disrupting the roles or responsibilities of existing parties.

## POTENTIAL BENEFITS

The MDBs and member countries who participated in the testing phase concluded that such a tokenized platform for promissory notes could potentially deliver tangible improvements across the instrument's ecosystem, such as:

- ***Operational Efficiency:*** Automates key lifecycle events, such as issuance, encashment and archiving, thus reducing processing time from days to simply a few minutes.

- ***Transparency:*** Enables real-time visibility of actions for all authorized parties, which can further improve coordination and accountability.

- ***Data Sovereignty & Confidentiality:*** Each party retains full control over its data with access restricted to only those involved in the handling of their own promissory notes.

- ***Single Source of Truth:*** Eliminates the need for manual reconciliation by providing a shared, trusted view of each processing workflow during the instrument's lifecycle.
- 
- ***Scalability:*** Offers a replicable, modular solution that can be tailored to meet diverse legal and operational requirements across each member country's jurisdiction.

## THE WAY FORWARD

Project Promissa has successfully demonstrated the potential of tokenized promissory notes to streamline and secure the management of financial commitments to the MDBs. The PoC showcased that emerging technology can further increase the note's transparency, confidentiality, and operational efficiency. In order to operationalize:

- Additional work is needed to meet functional and non-functional requirements, including access controls, error handling, and integration with legacy systems.

- Each jurisdiction's legal framework for tokenized promissory notes requires further examination.

- A sustainable governance and operating model must be defined, addressing platform management and funding among the participating parties

This prototype lays the foundation for future development, inviting continued collaboration to turn potential into practice.

- *Project Promissa: treasury.worldbank.org/en/about/unit/treasury/impact/project-promissa*
- *Project Report Link: bis.org/publ/othp93.htm*
- *Project Video Link: youtube.com/watch?v=cRtWZZ-fQk4*
- *Press Release: bis.org/press/p250423.htm*

WB Project Website

WB Case Study

# 21X
# ATOMIC SETTLEMENT AND THE 21X REVOLUTION IN CAPITAL MARKET EFFICIENCY

21X is fundamentally reshaping capital markets by utilizing atomic settlement, a process that executes the exchange of tokenized money and securities instantaneously on the blockchain. This eliminates the traditional, multi-day settlement window, a relic of traditional systems and processes that introduces significant counterparty risk and capital inefficiency. A cornerstone of atomic settlement on the 21X exchange is the use of Markets in Crypto-Assets Regulation (MiCAR)-regulated stablecoins for the cash leg of the trading and settlement of financial instruments.

## ATOMIC SETTLEMENT WITH STABLECOINS

Stablecoins—digital representations of fiat currencies—provide the crucial stability necessary for financial transactions within the tokenized asset landscape. 21X facilitates seamless, on-chain transactions via smart-contracts, so when a buyer places an order using stablecoins, once the order is matched, the simultaneous transfer of funds and securities is ensured. This atomic process, executed within a single blockchain transaction, guarantees that if a match takes place the settlement of assets cannot fail—and vice versa. In the unlikely event that a settlement transfer fails—for example, if one side of the trade is not allowed to hold the asset, the entire transaction is reverted, protecting both parties from potential losses.

## RISK REDUCTION

The traditional settlement process exposes participants to prolonged counterparty risk. During the multi-day settlement period, assets are not available immediately, and therefore cannot be converted, reducing the ability to limit losses or maximise gains.

21X's atomic settlement eliminates counterparty risk by ensuring the exchange is finalized within a single, immutable transaction. This immediacy drastically reduces systemic risk, eliminates errors and the need for reconciliation processes, fosters market confidence, and unlocks liquidity.

## REDUCED COSTS

Beyond risk mitigation, 21X's exchange significantly enhances capital efficiency. The ability to utilize stablecoins as collateral enables traders to swiftly enter and exit positions, optimizing capital allocation and reducing opportunity costs. The reduced settlement time accelerates capital turnover, enhancing liquidity and market dynamism. Furthermore, the inherent transparency of blockchain transactions provides real-time visibility into the settlement process, increasing trust and accountability among participants.

## AN EFFICIENT ECOSYSTEM

21X intends to offer a broad range of tokenized assets available on its exchange, including equities, bonds, derivatives and funds. This will create a comprehensive ecosystem for trading diverse asset classes, fostering broad market participation. Moreover, 21X is committed to enhancing interoperability with other blockchain networks, enabling seamless asset transfers and cross-chain transactions. This will foster a more interconnected and efficient global financial system, breaking down traditional barriers and enabling frictionless capital flows.

By leveraging the unique properties of blockchain technology, 21X is driving the evolution of capital markets towards a more secure, transparent and efficient future, where atomic settlement becomes the standard, not the exception.

## 677 FINANCIAL GROUP

# COUNTERPARTY-CENTRIC PROPRIETARY LIQUIDITY PROVISION

### OTC LIQUIDITY PROVISION (SPOT, OPTIONS, FORWARDS AND CONTRACTUAL MARKET MAKING)

We offer global principal-based liquidity in spot, options, and forwards cryptocurrency markets to the most sophisticated institutional counterparties in the industry. Our team is comprised of intellectually cutting-edge professionals with decades of experience. We are experts at risk management who put counterparty confidentiality, pricing and service first, so we are trusted to consistently manage large-scale flows. Our unique mix of sales, trading, and middle office specialists enables us to provide high-quality counterparty experience in the industry.

We enter into specialized liquidity provision agreements for nascent tokens and protocols, actively partnering with management as a resource to evolve use cases and enable growth in underlying businesses. We advise and assist management teams on market-related topics such as exchange listings and negotiations, treasury management and funding.

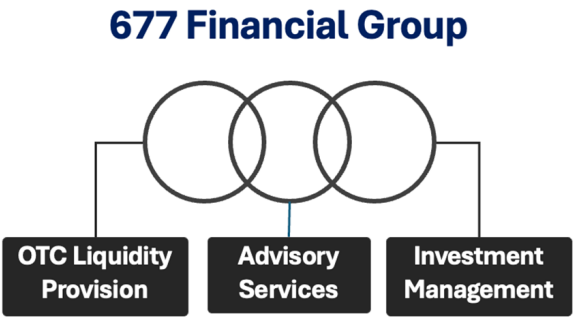
### INVESTMENT MANAGEMENT

Our market position and experience provide us a unique vantage point to investment opportunities in digital asset markets. We invest proprietary and third-party capital to take advantage of these opportunities.

Given that many of our potential investors have investable assets in token form, we advise them on optimal ways to source the USD denominated funds necessary to invest in our investment management strategies.

## BUSINESS MODEL

Our hybrid business model combines sophisticated algorithmic trading with a principal-based Global Macro style that focuses on complex portfolio risk management and internalization. This model is ideal as the crypto markets evolve in maturity, size, and complexity of offerings.



## ARCHIP BY MAERKI BAUMANN
# YOUR BANKING SOLUTION FOR CRYPTO AND BLOCKCHAIN SERVICES

Maerki Baumann Private Bank is a regulated, family-owned financial institution and one of Switzerland's leading private banks, established in 1932.

The bank's early decision in 2019 to enter the digital assets sector marked a pioneering move. Under the **ARCHIP** brand, all services in the blockchain and crypto space have been consolidated. These services cater to both private clients with a technological focus and specialised corporate clients in the tech sector:

- **ARCHIP Corporate** supports blockchain and crypto companies with a comprehensive suite of business services, including payment transactions, liquidity management, investment advice in both traditional and digital assets, and financing guidance.
    - Maerki Baumann recognises the significant potential of tech companies and start-ups. Early-stage companies thrive on dynamism and innovation but often need financial stability and trusted guidance. With its long-standing experience and deep expertise, Maerki Baumann has established itself as a bridge between the traditional financial system and the digital economy.
- **ARCHIP Private** offers trading, secure custody, staking, lending, asset management, and expert investment advice on digital assets — a comprehensive package from a single source.
    - ARCHIP Private makes it easier for private clients to access the digital asset space — an increasingly vital component of a well-diversified portfolio. Maerki Baumann's award-winning advisory process ensures clients receive tailored investment guidance, all in compliance with current legal and regulatory standards.

## CUSTODY, TRADING & STAKING — ALL IN ONE

Through e-banking and the mobile banking app, clients can view their portfolios and manage digital assets in general anytime. They can trade crypto or convert it into fiat currencies (CHF, EUR, GBP, USD) at their convenience. Assets are securely held in segregated wallets in Switzerland.

## TRADE WITH CONFIDENCE

Despite the digital shift, Maerki Baumann applies the same rigorous standards to crypto transactions as to traditional ones. Orders are executed via leading partners and reputable crypto exchanges, ensuring liquidity and reliability.

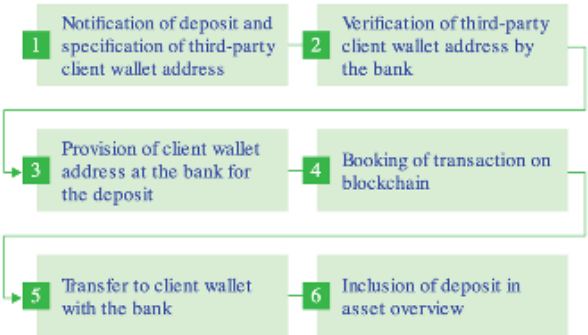
## PREFER NOT TO INVEST DIRECTLY IN DIGITAL ASSETS?

No problem. Maerki Baumann enables indirect crypto exposure through funds, certificates, and structured products offered by specialised third-party providers. Alternatively, you may invest in the ARCHIP Crypto Certificate, an actively managed product overseen by Maerki Baumann's in-house experts.

## SECURE CUSTODY IN SWITZERLAND

Clients' wallets are set up according to their individual needs and stored using the most advanced security standards. Maerki Baumann's partners deploy multi-layered security architecture to protect against cyber threats and unauthorised access. All data is securely hosted in Swiss facilities. Just like securities, digital assets are treated as special assets — held separately from the bank's balance sheet or bankruptcy estate, offering an added layer of protection.

**HOW THE DEPOSITING OF DIGITAL ASSETS WORKS:**




## STAKING

Maerki Baumann & Co. AG is one of the first Swiss private banks to offer the staking of digital assets.

Staking is part of the proof-of-stake consensus mechanism in which digital assets are locked for a certain period of time. The locked assets are used to achieve the consensus necessary to secure the network and validate each new transaction. With the validation of the transaction, it is subsequently inscribed in the blockchain. The customer benefits from staking rewards for the deposited coins, similar to a dividend on shares.

Find out more about ARCHIP by Maerki Baumann on the website. The Maerki Baumann team will be happy to assist you.

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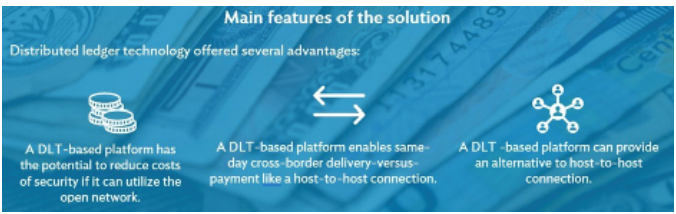
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## ASIAN DEVELOPMENT BANK (ADB)

# PROJECT TRIDECAGON - DIGITAL REGIONAL SETTLEMENT INTERMEDIARY PLATFORM IN ASEAN+3 REGION

ADB's Project Tridecagon developed a proof-of-concept that distributed ledger technology (DLT) with blockchain can execute cross-border delivery-versus-payment of cash and securities transactions.




- **Countries:** Southeast Asia countries, Japan, People's Republic of China (PRC), Republic of Korea (ROK) (ASEAN+3)
- **Year of implementation:** 2021-2022
- **Technology:** Distributed ledger technology
- **ITD Partner ADB Department:** Economic Research and Development Impact Department
- **ADB Partners:** Consensys (technology service provider); R3 (technology service provider); Soramitsu (technology service provider); Fujitsu (technology service provider)

The Asian Bond Markets Initiative (ABMI) was launched in 2003 by the finance ministers of ASEAN+3 countries to boost the development of local currency bond markets, with ADB acting as ABMI secretariat since its inception. The Cross-Border Settlement Infrastructure Forum (CSIF), whose members are central securities depositories (CSDs) and central banks in the ASEAN+3 region, was created to enhance dialogues among policymakers and bond operators. Ways to improve cross-border bond and cash settlement infrastructure in the region are covered in these discussions.

## PROBLEM

One of the topics of these discussions was on establishing regional settlement intermediary options (RSIs) to address regional market impediments to link key market settlement infrastructures of the ASEAN+3 more effectively and efficiently. This would also support the efficient utilization of local currency bonds as collateral, which, in turn, would increase local currency liquidity in times of market stress in the region. However, Asian economies require at least one trade day plus two working days for these cross-border transactions to be processed under the current market practices through correspondent banking networks, although they are located in the same or similar time zone. The time lag between a trade agreement and the settlement of securities and money cannot eliminate settlement risks. In addition, developing a centralized regional infrastructure consisting of national financial market infrastructures was deemed costly and could not escape from the issue of geopolitical hegemony.

The idea of CSD-RTGS linkages proposed by CSIF can avoid the issue of hegemony and ensure sovereignty; thus, the Bank of Japan and Hong Kong Monetary Authority established the link in 2021, along with the CSIF discussion. However, a host-to-host linkage is too costly to implement in developing markets.

## SOLUTION

Against this backdrop, ADB explored whether innovative decentralized technologies with blockchain could be used to make processing transactions more efficient for developing markets even with the current legal and regulatory systems in place.

As early as 2014, many ASEAN+3 members saw the CSD-Real-Time Gross Settlement (RTGS) Linkage model as the model that best addresses their requirements for a regional settlement intermediary. It uses a flexible implementation approach that enables cross-border/cross-currency bond settlement in delivery-versus payment (DVP) using central bank money to mitigate settlement risks and encourage cross-border transactions and investments. This model assumes that only CSDs and central banks interact in cases of cross-border settlements, and this premise was carried over in this initiative, dubbed Project Tridecagon.

Project Tridecagon was borne from this: the proof of concept (POC) tested whether key market infrastructures across the ASEAN+3 region—central banks' RTGS and central securities depositories' book-entry systems—could be connected using innovative technology. It sought to connect three economic models to reflect the financial environment in the ASEAN+3 region, which is composed of countries with different frameworks, systems, and policies.

## PROJECT TRIDECAGON OPERATIONS

The POC sought to show if it was possible to connect three different distributed ledger technology (DLT)-based blockchain platforms to perform an atomic swap of three tokens (foreign currency, local currency, and security tokens) to simulate the real-world environment wherein heterogeneity of DLT/blockchain-based platforms and economic models are expected across countries. The intent was not to show that DLT/blockchain could replace the existing legacy systems but rather to show that it could co-exist with these, as the technology was seen to have a huge potential to streamline the process of cross-border financial transactions.

Cross-border DVP was executed by dividing the transaction into cross-border and cross-currency payment-versus-payment (PVP), where cash tokens were exchanged, and domestic DVP, where cash and securities tokens were exchanged. This setup was intended to comply with the current regulatory framework wherein currency exchange and fund transfers between two economies are done through a banking system, while securities and cash are exchanged in a domestic payment and settlement system. The simultaneous exchanges of three different tokens was a novel attempt under this initiative; previous POCs only tested two token exchanges. The transaction flow was designed to follow the path of a typical securities settlement in regional markets so that the process could be realistically compared with the existing environment.

ADB specified the entities of each simulated transaction and provided the same instructions in the form of input files to the service providers acting as DVP and PVP facilitators.

Some of these instructions deliberately contained non-matching or missing data to test whether these transaction attempts would be successfully stopped, and the failure was reported. The input files contained either one or multiple instructions depending on the service provider's preference. The service providers extracted the data from the input files and checked the consistency of information. They then exported the data to their respective DLT/blockchain and created ledger entries or transaction records in preparation for the cross-border DVP. Meanwhile, Fujitsu acted as a bridge in the market where the buyer (or seller) was located and made the local currency amount available to a simulated nostro account in the RTGS system of the domestic DVP environment. The service providers acting as the DVP facilitator simulated the minting of an equivalent amount of local currency cash tokens into the account of the buyer's custodian based on the local currency amount funded by Fujitsu. The domestic DVP was carried out once the expected amount of local currency cash tokens and security tokens were recorded in the DVP solution and detected and assessed using smart contracts. Fujitsu, once provided with the status update, released the foreign currency. All transactions, including those that failed, were documented through console logs or transaction history files, which were aggregated by Fujitsu in a common journal.

## PROJECT TRIDECAGON RESULTS

The POC showed that DLT/blockchain was workable and fit for purpose for cross-border cross-currency DVP even with the current regulatory environment. DLT/blockchain was seen to be more resilient and tamper-resistant compared to existing payment and settlement systems. The decentralized nature of these platforms reduces the likelihood of data manipulation if properly managed. Thus, a well-designed system that uses DLT/blockchain has strong potential to increase efficiency and security. Project Tridecagon showed strong potential for using DLT/blockchain for the cross-border cross-currency DVP.

The three different types of DLT-based platforms—Corda, Ethereum, and Hyperledger Iroha—were successfully connected.

The POC proved to execute the simultaneous exchange of three different kinds of tokens, which was the technical highlight of the POC. The processing of cross-border cross-currency DVP transactions (including the blocking of the balance in one economy during cross-border PVP and transferring the money after the transfer was completed in the other economy) was carried out immediately. The "failure" cases (missing/incomplete data) were also successfully handled by the systems.

The result of the POC showed the potential benefit of DLT/blockchain, especially for the case of programmability and expandability, while cost-efficiency would depend on the preference and choice of the consortium for the data and network governance, which remains a challenge to develop the regional system.

- *Access ADB's article on Project Tridecagon: digital.adb.org/home/2025/2/18/distributed-ledger-technology-based-digital-regional-settlement-intermediary-platform-in-asean3-region*
- *Access the full report on Project Tridecagon: adb.org/publications/market-infrastructures-asean3-project-tridecagon?showiframe=true*

# CALASTONE
# DIGITAL INVESTMENT PLATFORM

Calastone Digital Investments revolutionises the issuance, administration and distribution of investment products at scale. Using the concept of tokenisation Digital Investments supports the next generation of collective investments.

## WHY CALASTONE DIGITAL INVESTMENTS

Today's investors are increasingly demanding greater choice, transparency, efficiency and flexibility in making and managing their investments.

- *Enhanced liquidity and accessibility:* Enabling fractionalisation of assets and more accessible and liquid trading.
- *Meeting modern investor demands:* Bringing greater choice, transparency and control.
- *Efficiency at scale:* Lower cost and simplified investment process bringing opportunity for managers and investors.

## UNLOCKING THE BENEFITS

Calastone Digital Investments will enable the future of asset management with a fully digital, end-to-end solution. By leveraging tokenisation and automation, together with new technologies including distributed ledger technology (DLT) to connect all participants together and streamline the investment process, reducing cost, and eliminating manual processing and errors.

- *Natively digital:* End-to-end asset management, streamlining the investment process.
- *Enhanced transparency and trust:* Real-time processing and an immutable ledger drives transparency and trust throughout the investment lifecycle.

- *Unparalleled distribution opportunities:* Connect and distribute via the Calastone Network to traditional distribution and new digital distribution venues including public blockchains.

## CALASTONE TOKENISED DISTRIBUTION

Calastone Tokenised Distribution is a fully digital, blockchain-enabled solution that allows any fund on Calastone's global network to be tokenised and distributed to new Web3 distribution and investor venues. This uniquely positions asset managers to unlock the benefits of tokenisation without needing to change existing fund structures or infrastructure, making it instantly scalable and commercially practical.

By bridging the traditional and decentralised finance worlds, Calastone's solution opens entirely new possibilities for fund distribution. It allows asset managers to create investor-centric, digitally native products and offer them directly to new segments of investors, particularly digital-first and next-generation investors who expect greater accessibility, transparency, and control.

- *Seamless tokenisation:* Instantly convert any fund on our network into a digital token, ready for distribution via public or permissioned blockchains

- *Frictionless integration:* No changes needed to existing fund structures or operations; blockchain orders are auto-translated and routed

- *Expanded market reach:* Connects traditional funds to digital-native investors

## HOW DOES CALASTONE DIGITAL INVESTMENTS WORK?

Unlock the ability to seamlessly establish digitised contractual agreements with counterparties and create tokenised investment vehicles, selecting assets for the tokens, setting portfolio weightings, and choosing custodians within a single automated system.

As tokens are traded into a tokenised vehicle, trades are aggregated and netted in real time to the underlying asset level, providing full visibility.

Tokens can be distributed through traditional channels or new blockchain venues via the expansive Calastone Network. Throughout, fund accountancy and NAV calculations are automated in real time, secured by an immutable book of record, ensuring transparency, efficiency, and enhanced outcomes for all stakeholders.



## DIGITAL ASSET
# HKEX SYNAPSE SETTLEMENT ACCELERATION PLATFORM

## BACKGROUND
Investor demand for Northbound trades into China continues to surge, with average daily turnover up more than 870% in the last four years. However, the rapid growth has started to strain operational workflows for international market participants, who must overcome difficult time zone challenges to complete same-day settlement.

Time zone challenges mean that, for European and US-based investors, operations teams work through the night to support settlement with the Hong Kong Stock Exchange. Current industry processes are organized sequentially, limiting visibility of settlement issues for players downstream, compounding costs from trade breaks and creating time pressure. Counterparties cannot see what is happening in previous process steps and must therefore wait to see if a problem occurs in the transaction chain. Asset managers, brokers, global custodians, local custodians, and clearing brokers all struggle to process trades in time, and sequential communication lines add additional complexities for exception management.

## CHALLENGE
The disparity between Hong Kong's T+2 settlement cycle and mainland China's T+0 cycle gives investors only four hours to complete settlement. For European- and US-based investors, time zone challenges mean that operations teams are working through the night to support settlement.

A complicated, multi-party workflow between buy- and sell-side firms, each using different internal data models and technology stacks, creates an immense challenge for operational teams managing the surge in settlements. Identifying and troubleshooting breaks is difficult, manual, and time-consuming – adding cost and risk for all participants.

The core issue is that today, all information is processed sequentially, with each party only gaining visibility once they are instructed by the party before them in the chain. This inevitably creates a crunch for clearing members and local custodians who are responsible for submitting and matching final settlement instructions in the market.

Today, each participant in a transaction must enter, communicate, check, and enrich data about the trade to match and reconcile it with counterparties before sending it to the next participant in the chain. With multiple entities — asset managers, brokers, custodians, clearinghouses, exchanges, and other intermediaries — this sequential process is cumbersome and ripe for errors.

## STRATEGY

HKEX Synapse delivers a solution: an integrated settlement-acceleration platform designed to improve post-trade efficiencies for Northbound Stock Connect participants. Leveraging Daml, Digital Asset's smart contract development framework, and through links to the Depository Trust & Clearing Corporation (DTCC)'s Institutional Trade Processing services, international investors will access an automated, expedited process that lays the foundation for the future.

The new integrated platform, powered by Daml smart contracts, eliminates sequential processes and offers a single source of truth for the settlement of securities. It produces accurate and timely status updates.

With Synapse, once a broker executes the asset manager's order and the block trade allocation is completed, the matched allocation will be passed to Synapse, where cross-border trades are centrally matched. Direct, simultaneous instruction to all participants speeds settlement and limits exception management, as questions or disputes can be identified and resolved more quickly.

HKEX Synapse will use Daml smart contracts to automate, update, and synchronize information for all participants in real time:

- Settlement instructions and status updates are created simultaneously and shared with all parties along the settlement chain. Individual participants no longer need to send instructions bilaterally.

- Concurrent processing significantly reduces settlement time.
- Greater transparency and current-state data allow errors to be identified and exceptions managed more quickly.
- Simplified integration with APIs, databases, networks, and ledgers facilitates broad adoption.

## OUTCOME

For managers and investors, improved market access via Synapse not only opens investment options, but also allows them to scale by delivering more efficient operations.

With Daml, HKEX Synapse will be able to simultaneously create settlement instructions and provide status updates to all parties along the settlement chain, facilitating concurrent processing and greatly improving transparency for market participants.

HKEX Synapse will extend Northbound Stock Connect's global reach via DTCC's Institutional Trade Processing (ITP) services, currently used by more than 6,000 clients across 52 markets globally, further realising the potential of Stock Connect for China's A-share market.

Central Trade Matching (CTM) centrally matches cross-border and domestic transactions, allowing for:

- Automation of the trade confirmation process.
- Standardization, to streamline transaction flows.
- Seamless connectivity from trade execution to settlement.
- Direct connectivity via FIX and SWIFT to front and middle offices and custodian banks.

## DROIT FINTECH

# DROIT ADEPT PLATFORM: DIGITIZING COMPLEX REGULATORY REQUIREMENTS

Droit is a technology firm at the forefront of computational law and regulation within financial services. Founded in 2012 in response to the wave of regulation following the 2008 financial crisis, including Dodd-Frank and MiFID, Droit brings complete transparency to decision-making for compliance with key regulatory requirements. Droit's patented Adept platform provides traditional buy- and sell-side financial institutions with solutions for pre- and post-trade controls, evaluating the permissibility of transactions, compliant regulatory reporting, and more.

The Droit Adept platform generates decisions directly from digitized rules, regulations, and internal policies, visually represented in intuitive logic diagrams with a traceable pathway to the source text. Its unique ability to codify complex regulatory requirements into intelligent, actionable decisions enables financial institutions to respond efficiently to their regulatory obligations in a completely auditable manner. The application of blockchain technology to real-world assets and to trading and settlement constructs brings new efficiencies to investors and market participants.

Most recently, Droit announced the launch of its Exchange Traded Derivatives (ETD) Reporting product—designed to enhance regulatory transparency and ensure compliance with global reporting requirements for listed derivatives. Recent scrutiny of position-based reporting obligations to clearing agencies and exchanges has increased pressure on clearing firms to upgrade their reporting infrastructure.

Droit's ETD Reporting delivers a comprehensive quality assurance platform to provide a consistent approach to regulatory compliance.

With complete insight into each decision made and the ability to trace the logic through to the underlying source text, the product ensures clarity and accuracy in complex regulatory interpretations.

Clearing firms seek stricter controls to ensure completeness and accuracy, akin to OTC transaction reporting standards. ETD Reporting from Droit provides precise identification and management of reporting obligations for seamless quality assurance of reports pre- or post-submission. Initially focusing on high-risk clearing, collateral, and margin reports, the ETD Reporting product is set to expand beyond futures and options to support a broader range of listed instruments.

As the exchange-traded digital assets sector grows, so will the need for accurate and auditable compliance with diverse regulatory reporting demands.

# KAIKO
# SMART DATA FOR SMART CONTRACTS

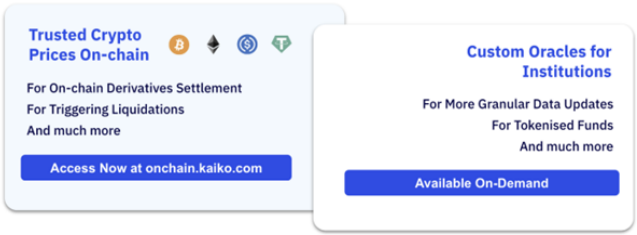
In 2024, the tokenization of financial products emerged as a key highlight in the crypto space, experiencing significant growth. This shift allows traditional assets to be represented on the blockchain, offering benefits such as increased liquidity, fractional ownership, and automated transactions. As both institutional tokenization and decentralized finance (DeFi) protocols gain traction, the need for reliable, on-chain data delivery has become crucial.

Kaiko, with a decade of experience in data provision and trusted by institutions worldwide, has launched its on-chain delivery service to meet this demand. This service provides high-quality, real-time data directly on the blockchain, catering to both traditional financial institutions exploring tokenization and DeFi protocols.

For instance, accurate indices and fair crypto asset prices are essential for on-chain derivatives settlement and calculating a fund's Net Asset Value (NAV). Tokenization brings numerous advantages, including reducing intermediaries and enhancing market efficiency. However, these benefits can only be fully realized if the underlying data is accurate, reliable, and delivered on-chain. Kaiko's service addresses this need, supporting the growth and success of both tokenized financial products and DeFi applications.

Kaiko's on-chain delivery service operates through two main offerings. The standard platform, available at onchain.kaiko.com, offers free access to on-chain delivery of prices for the largest cryptocurrencies, which can be directly integrated into smart contracts. This mainly targets DeFi protocols seeking a standard but high-quality and quick integration.

For more specific needs, Kaiko's enterprise solution works with clients to build dedicated on-chain data pipelines, tailored to their smart contract requirements. This enables the delivery of any data type on-chain, not just the largest cryptocurrencies' USD prices.




Our inverted data infrastructure gathers and disseminates both on-chain and off-chain data across platforms, ensuring market data remains a cornerstone of both institutional tokenization efforts and decentralized finance. This infrastructure supports the seamless triggering of execution and settlement on-chain in an automated and disintermediated manner.

Kaiko's on-chain delivery service makes high-quality data accessible on the blockchain and drives the future of both institutional tokenization and decentralized finance. By supporting these developments, Kaiko is at the forefront of this financial evolution, enabling a more efficient and transparent financial ecosystem.

## MME LEGAL

# PROUDLY SUPPORTING BX DIGITAL IN SECURING SWITZERLAND'S FIRST DLT TRADING FACILITY LICENSE

At MME, we are proud to have played a pivotal role in advising BX Digital AG on its successful journey to becoming Switzerland's first licensed DLT trading facility (fully regulated on-chain security token exchange). This landmark achievement, granted by FINMA, is a testament to Switzerland's progressive approach to digital asset regulation and our commitment to supporting pioneering FinTech projects.

## SHAPING THE FUTURE OF DIGITAL TRADING

As a sister company of BX Swiss AG and part of the Boerse Stuttgart Group, BX Digital AG had the ambition to establish a regulated platform for DLT securities (tokenized financial instruments) trading. With the introduction of the DLT Act in Switzerland, a new legal framework emerged – one that we at MME have been actively shaping and interpreting. Securing this first-ever DLT trading facility license was a complex and highly innovative process, requiring a deep understanding of financial market regulations, blockchain technology, and smart contract applications. We are particularly pleased that our work contributed to bringing clarity and legal certainty to this evolving market.

## OVERCOMING REGULATORY CHALLENGES

The licensing process under the Financial Market Infrastructure Act (FinMIA) required a meticulous legal strategy to align BX Digital's business model with regulatory expectations. Our work included:

- Structuring the regulatory application strategy and engaging in detailed discussions with FINMA.
- Developing a legally robust framework for trading DLT securities (tokenized financial instruments).

- Ensuring compliance with business continuity (BCM) and risk management requirements, particularly regarding public blockchain-based settlement.

- Facilitating the necessary technical audits of the Ethereum-based smart contracts used in BX Digital's settlement infrastructure.

A key milestone in this process was integrating traditional financial infrastructure with blockchain technology. The platform's connection to Swiss Interbank Clearing (SIC) ensures that Delivery-versus-Payment (DvP) settlement occurs seamlessly, an achievement requiring a sophisticated legal and technical framework. Because the requirements for the license had never been applied in practice, MME has provided a lot of thought leadership.

## A PROUD MOMENT FOR THE SWISS FINTECH SECTOR

The success of BX Digital underscores Switzerland's position as a global leader in blockchain regulation, and we are excited to see how this development will drive innovation and efficiency in financial markets. We congratulate BX Digital AG on this achievement and look forward to continuing our work at the intersection of law, technology, and finance – helping more clients navigate the future of digital assets with confidence.

# MYNT
# BTG PACTUAL'S CRYPTO PLATFORM

Brazilian-based bank BTG Pactual, the largest investment bank in Latin America and the Caribbean, launched crypto trading platform Mynt. This places BTG Pactual, which holds $300 billion in assets under custody, as the first Brazilian investment giant to launch its own platform.

BTG initiated its institutional involvement in the Digital Assets sector by establishing a dedicated trading desk. Building on this foundation, in 2019, the bank launched ReitBZ, the world's first security token backed by real estate assets and issued by a regulated financial institution. This token allowed international investors to participate in Brazil's real estate market through blockchain technology, democratizing access to such investments. Continuing its innovation, BTG introduced BTG Dol in April 2023 – a stablecoin pegged 1:1 to the U.S. dollar. BTG DOL enables investors to easily dollarize portions of their portfolios, combining the stability of traditional finance with the efficiency of blockchain technology.

Mynt provides users with a wallet feature and direct access to bitcoin (BTC) and other cryptos including ether (ETH), solana (SOL), polkadot (DOT), and cardano (ADA). The minimum contribution starts from R$10. In a simple, user friendly and secure platform, Mynt offers direct access to investments in the major cryptos on the market, including enhanced crypto deposit and withdrawal solutions and taking into account market capitalization and development stage. Mynt's full service application is designed for users who need to invest in crypto easily and safely, to take advantage of the best opportunities in the crypto world.

The platform is meant to be very intuitive and comprehensive for users, who not only have easy access to digital assets investments, but also automated crypto baskets, educational materials through Mynt Academy, relevant news and personalized customer service including a 24/7 chat function.

## WHY USE MYNT?

- *Easy access:* Intuitive platform for users to invest
- *Didactic:* Users can track results in easy-to-interpret charts
- *Secure:* Provides the legitimacy of a BTG Pactual company
- *Multiplatform:* Users can purchase assets through the Mynt application or a desktop computer

## FUTURE OUTLOOK

Mynt has a continuous product development roadmap and plans to offer a wider range of products and features, remaining at the pace of the blockchain technology's evolution.

*For more information: mynt.com.br*

## SBI DIGITAL ASSET HOLDINGS

# ASIANEXT: AN INSTITUTION-ONLY GLOBAL EXCHANGE

AsiaNext, a joint venture between SBI Digital Asset Holdings and SIX Digital Exchange (SDX), as an institution-only digital asset exchange, designed a collateralization and portfolio margining platform—the AsiaNext orchestration layer ("AXOL"). An industry-leading solution, AXOL offers an efficient and user-friendly trading experience by streamlining cash and collateral management workflows. Combined with the inaugural listing of a USD-denominated money market fund (MMF) on AsiaNext, it enhances capital efficiency for its members while supporting the optimization of their complex trading strategies.

AXOL seamlessly integrates AsiaNext's three trading venues (and its multiple products): Crypto Derivatives, Securities, and Crypto Spot. By allowing members to pledge various eligible collateral types across its venues, AXOL optimizes capital utilization, reduces trading costs, and enables advanced portfolio management. The MMF listing provides members with a yield-generating investment option for resting cash balances. AsiaNext is actively expanding its fund offerings and collaborating with partners like Valour and SovFi to further enhance its securities exchange. Upon successful approval of its pending application to the Monetary Authority of Singapore for a crypto spot trading license, members can also benefit from basis trading between their spot and derivatives positions, further enhancing capital efficiency and unlocking new trading opportunities.

As a young exchange that began in 2022, AsiaNext has achieved ground-breaking milestones in 2024:

***PRODUCT LAUNCHES***

- Calendar futures
- Perpetual futures
- AsiaNext Securities Exchange go-live
- Listing of its first USD-denominated money market fund
- AXOL (AsiaNext Orchestration Layer)

***STRATEGIC PARTNERSHIPS:***

- Collaboration with SIX to create crypto reference and real-time indices
- Hidden Road partnership
- MOU signed for cross-exchange collaboration with Malaysian digital exchange KLDX
- MOU signed with Valour to expand access to European crypto ETFs to Asia
- Circle Account set up for the delivery of USDC

***INDUSTRY RECOGNITION:***

- Nominated for "Best Exchange - Innovation" at Hedgeweek Global Digital Assets Awards 2024

SECTION V

# GOVERNMENT

## AVA LABS

# CALIFORNIA DMV DIGITIZES CAR TITLES ON AVALANCHE

The California Department of Motor Vehicles (DMV), responsible for managing over 42 million vehicle titles, faced significant challenges with its traditional paper-based system. These challenges included fraud, inefficiencies, and a lack of transparency. In a groundbreaking move, the California DMV partnered with Avalanche to digitize its vehicle title management system using blockchain technology. This case study explores the challenges, the solution implemented, and the significance of this innovative approach.

## CHALLENGE

The California DMV's paper-based title management system was plagued by several issues:

- **Fraud:** Paper titles were susceptible to forgery and counterfeiting, leading to fraudulent activities, like title washing and odometer rollback.
- **Inefficiency:** Processing paper titles was time-consuming and labor-intensive, resulting in long processing times and administrative burdens.
- **Lack of Transparency:** The paper-based system lacked transparency, making it difficult to track ownership history and verify title authenticity.
- **Environmental Impact:** The reliance on paper documents contributed to significant paper waste and environmental concerns.

## SOLUTION

The California DMV partnered with Avalanche to develop a digital title management system leveraging the Avalanche blockchain. This solution addressed the challenges as follows:

- **Enhanced Security:** Blockchain's immutability and cryptographic security features prevent unauthorized alterations and ensure the integrity of vehicle title records.

- **Increased Efficiency:** Digitization streamlines the title transfer process, reducing processing times and administrative overhead.
- **Improved Transparency:** The blockchain provides a transparent and auditable record of title ownership history, enhancing trust and accountability.
- **Reduced Environmental Impact:** Digital titles eliminate the need for paper documents, minimizing paper waste and promoting environmental sustainability.

## WHY IT IS IMPORTANT

The California DMV's adoption of Avalanche for digital title management is significant for several reasons:

- **Fraud Prevention:** The blockchain-based solution significantly reduces the risk of title fraud, protecting consumers and the DMV.
- **Efficiency Gains:** Streamlined processes and reduced administrative burdens benefit both the DMV and vehicle owners.
- **Transparency and Trust:** The transparent and auditable nature of the blockchain fosters trust and confidence in the title management system.
- **Innovation in Government:** This initiative showcases the potential of blockchain technology to improve government services and efficiency.
- **Environmental Sustainability:** Digital titles contribute to reducing paper waste and promoting environmental responsibility.

## CONCLUSION

The California DMV's collaboration with Avalanche to digitize vehicle titles demonstrates the transformative potential of blockchain technology in the public sector. By addressing critical challenges related to fraud, efficiency, transparency, and environmental impact, this initiative sets a precedent for other government agencies to explore blockchain-based solutions for modernizing their services and enhancing public trust.

## NEVADA SECRETARY OF STATE

# ENHANCING ELECTION CERTIFICATION SECURITY WITH BLOCKCHAIN TECHNOLOGY

In December 2024, Nevada Secretary of State Francisco Aguilar announced the integration of cutting-edge blockchain technology into its election certification process, adding an extra layer of security to the Certificate of Ascertainment, certifying election results for the Presidential Election. This development further solidifies the state's commitment to being at the forefront of election innovation and security.

"At the Nevada Secretary of State's office, we are committed to running the most secure elections in the country, and by incorporating blockchain technology into the certification process, we are taking this commitment to the next level," said Secretary of State Francisco Aguilar. "Blockchain adds important protection by making it much more difficult to alter or counterfeit these vital documents, ensuring that our certification process is both transparent and trustworthy. We are proud to lead the nation in utilizing emerging technology to protect the integrity of our elections."

The Certificate of Ascertainment (access here) is signed by the Governor and Secretary of State to certify the Electors for the President of the United States of America. The Electors cast their votes for the Presidential and Vice Presidential candidates who received the most votes in the State of Nevada during a meeting of the Electoral College on December 17th, 2024.

Utilizing blockchain technology ensures that the Certificate of Ascertainment's authenticity is verifiable at any time and that it remains protected from unauthorized changes or fraud. This process involves creating a unique, fixed-length "fingerprint" to the document using a cryptographic hash function, protecting the document from tampering.

The document was then submitted for final review by the Archivist of the United States and the U.S. National Archives and Records Administration (NARA), ensuring that it meets all legal and regulatory requirements.

The move towards blockchain technology is part of the Secretary of State Office's ongoing effort to innovate and improve the security and transparency of its election processes. The Secretary of State's office remains dedicated to ensuring that all election-related processes are as secure and trustworthy as possible for the people of Nevada.

## BERGEN COUNTY, NEW JERSEY
# BLOCKCHAIN LAND RECORDS INITIATIVE: POWERED BY BALCONY TECHNOLOGY GROUP

Bergen County, NJ, home to nearly one million residents and New Jersey's most populous county, has taken a bold step toward modernizing its land records system through the largest government-backed blockchain deed initiative in U.S. history. In partnership with Balcony Technology Group, the Bergen County Clerk's Office is leveraging distributed ledger technology to authenticate, secure, and future-proof its public records infrastructure by minting real estate deeds on-chain.

## THE PROBLEM

Traditional land record systems rely on fragmented, outdated databases vulnerable to tampering, fraud, and ransomware attacks. Deed fraud in particular has been a growing concern, where criminals file forged documents to illegally claim property ownership. Moreover, proving the authenticity of any given deed often requires significant manual verification, slowing down real estate transactions and increasing risk for buyers, lenders, and title professionals. Now, with the rise in generative AI, fraudulent documents can be fabricated in seconds, indistinguishable from the real thing.

## THE SOLUTION

Bergen County will now issue tokenized deeds directly from the Clerk's Office, cryptographically sealed with the county's official insignia and permanently recorded on a blockchain. This ensures every deed is provably authentic, immutable, and traceable to the original government source, eliminating forgery and ambiguity around document origin. Additionally, the title history is transparently preserved on-chain, creating a tamper-proof chain of custody.

This initiative marks a foundational step in tokenizing the entire property lifecycle through a novel NFT-based real estate wrapper known as the RWAT (Real World Asset Token).

Each RWAT serves as the digital replica of a unique property, linking the deed, mortgage, and supporting documents in a nested, hierarchical NFT structure. The deed, issued directly from the government recorder's office, is the heart and soul of the RWAT, anchoring its authenticity. With county-level validation as the source of truth, RWATs become the official on-chain representation of real estate assets, enabling future integrations with digital settlements, stablecoin payments, and DeFi lending protocols.

## IMPACT

By modernizing the deed process, Bergen County is not just enhancing security and efficiency. It is positioning itself as a leader in digital government infrastructure. This blockchain-based approach brings real trust, transparency, and interoperability to real estate transactions. Most critically, it establishes the County Clerk's Office as the cornerstone of digital property trust for the decades to come.

# BANK OF ENGLAND
# DIGITAL SECURITIES SANDBOX

The Digital Securities Sandbox (DSS) facilitates the use of developing technology, such as distributed ledgers, in the issuance, trading and settlement of securities in the UK.

## WHAT IS THE DIGITAL SECURITIES SANDBOX?

The DSS is a regulated live environment that has been created to explore how **developing technologies** could be used by firms to undertake the activities of **notary, maintenance and settlement for financial securities** either alone, or together with the operation of a **trading venue**. For example, the DSS will facilitate the issuance, trading and settlement of digital securities in the UK on distributed, programmable ledgers. These activities will need to comply with regulation by the Financial Conduct Authority (FCA) and the Bank of England (Bank).

## WHAT ARE ITS AIMS?

The Bank and the FCA operate the DSS, pursuing three overarching aims:

- **Facilitate innovation:** promote a safe, sustainable and efficient financial system. We are enabling the application of new technology to the trading and settlement of securities.
- **Protect financial stability:** limits will facilitate safe scaling of business that mitigates risks to financial stability without undermining innovation.
- **Protect market integrity:** the regulatory approach will continue to provide for the integrity and cleanliness of UK financial markets.

When developing the DSS, a guiding principle has been to ensure the regulatory guardrails put in place are **proportionate** to the risks posed by business models. This is to ensure regulation does not inhibit **innovation** to protect **financial stability**.

There are three main examples of this:

***1. LIMITS***
These innovative technologies are untested in important financial markets at significant scale in the UK and globally. Consequently, live activity in the DSS will be subject to specific limits that have been carefully calibrated based on market analysis for the different asset types in scope of the DSS.

***2. MODIFIED AND FLEXIBLE LEGAL REGIME***
A modified legal regime, including a flexible set of rules introduced by the BankOpens, will be in place for the duration of the DSS. This allows the Bank and the FCA to remove legal obstacles and barriers that prevent the use of developing technologies and to adapt those in light of the activities in the Sandbox.

***3. GLIDEPATH DESIGN***
The DSS has been designed so that participants can scale their business with access to higher limits as they demonstrate their compliance with the regulatory requirements at each gate (see 'Stages and gates of the DSS for a sandbox entrant' table below). At the end of the DSS, the intention is that interested participants will have the opportunity to transition to a new permanent regime if the technology is successfully adopted. **The experience inside the DSS and feedback from the participants will help shape that regime.**

The DSS is due to run until 8 January 2029 but may be extended by HM Treasury through legislation if more time is necessary to transition to a new regulatory regime.

## HOW MIGHT IT BENEFIT THE WIDER FINANCIAL SYSTEM?

The DSS has been created to encourage innovation in financial market infrastructure, most notably through using new technologies such as Distributed Ledger Technology (DLT).

The application of such technology could improve the efficiency of 'post-trade' processes.

By making them faster and cheaper, the adoption of these technologies could, if successfully implemented, lead to material savings across financial market participants, such as pension funds, investment firms and banks. For example, companies that use capital markets to raise finance may benefit from more efficient and 'deeper' capital markets, where more investor participation could reduce the ease and costs of raising finance through them.

To realise these benefits, market participants will be able to interact with firms in the sandbox in the same way as with any regulated firm providing these services. Users of those services will, however, need to be mindful of the potential risks of doing so given sandbox entrants will not immediately be required to meet the same standards of resilience as a fully authorised financial market infrastructure.

## STAGES AND GATES OF THE DSS FOR A SANDBOX ENTRANT

| Stage | Purpose | Legal designation |
|---|---|---|
| Initial application stage | Identify firms eligible to join the DSS | None |
| **Gate 1** | | |
| Testing stage | Testing stage and engagement with regulators to operate a trading venue or to be a DSD | Sandbox entrant |
| **Gate 2** | | |
| Go-live stage | Ability to carry out live business under initial limits | DSD/ authorised operator of a trading venue |
| **Gate 3** | | |
| Scaling stage | Scaling the business with a glidepath to full authorisation of DSDs | DSD/ authorised operator of a trading venue |
| **Gate 4** | | |
| Possible new permanent regime | Full authorisation to operate outside the DSS for DSDs | To be decided/ new category of FMI |

## WHICH DIGITAL SECURITIES ARE IN ITS SCOPE?

Activities taking place in the DSS after Gate 2 will be 'live'. In other words, this will involve issuing, trading and settling real digital securities. Those securities can be used in the same way as traditional ones. For example, firms will be able to use the securities issued inside the sandbox in repurchase agreements or write derivative contracts based on securities in the DSS as they normally would any other.

The following financial instruments are examples of what could be issued and traded in the DSS:

- equities
- corporate and government bonds
- money market instruments such as commercial paper and certificates of deposits
- units in collective investment undertakings (fund units)
- emissions allowances

The trading and settlement of derivative contracts and of 'unbacked cryptocurrencies' such as Bitcoin are not in the scope of the DSS.

*For any enquiries, please contact DSSEnquiries@bankofengland.co.uk*

*For more information access: bankofengland.co.uk/financial-stability/digital-securities-sandbox*

## QATAR CENTRAL BANK (QCB)

# REGULATORY SANDBOX FOR BLOCKCHAIN AND DIGITAL ASSETS

The Qatar Central Bank (QCB) has established a Regulatory Sandbox and an Express Sandbox under its supervision, with a framework aimed at facilitating live testing of innovative solutions in financial technology under real-world conditions – with particular focus on blockchain and digital assets, alongside digital payments, cybersecurity, and AI. While the Regulatory Sandbox enables companies to test their innovative solutions within a regulated environment (up to 12 months), the Express Sandbox provides a faster path for certain startups testing fewer complex ideas. These innovations are pioneering locally relevant use cases including digital wallets and alternative financial services for unbanked workers.

These sandbox activities are unfolding in the context of Qatar's multi-pronged approach to incentivize and support innovation in blockchain and digital assets within the country's financial sector. Qatar's broader National Blockchain Blueprint has set an overarching strategy and vision for the country pertaining to adoption of blockchain technology across various sectors. This nationwide framework covers regulatory standards, infrastructure, and innovation strategies for the space, prioritizing locally relevant use cases.

In addition, the Qatar Financial Center (QFC)'s Digital Assets Lab, which operates in partnership with industry players including The Hashgraph Association and R3, is aimed to further foster innovations in the space such as tokenization of real estate and Sukuk – Sharia-compliant bonds.

Participants in the digital assets lab are subject to the QFC's Digital Assets Framework, which provides a tailored regulatory approach for digital assets and related activities, including tokenization (e.g., recognition of property rights in tokens). The Digital Assets Framework 2024 sets an approach to govern the issuance, custody, transfer, and exchange of digital assets.

*FAQs for the QCB's regulatory sandbox: qcb.gov.qa/Documents/SandBox_FAQ_Eng_Final%20_NS%20(002).pdf*

*QFC Digital Assets Framework:*

- *Investment Token Rules 2024*
- *Digital Asset Regulations 2024 | Rulebook*
- *User Guide*
- *QFC Token Service Provider Guidelines*

SECTION VI

# HEALTHCARE

## ALGORAND FOUNDATION

# LABTRACE: PROTECTING THE INTEGRITY OF MEDICAL RESEARCH DATA

The rise of AI is making it harder to authenticate information and to distinguish real from processed or fake data.

In the clinical research field, this problem is particularly evident. Each year, scientific journals retract thousands of papers due to unreliable data – whether manipulated by AI or simply by humans. This creates an environment where trust is at risk.

LabTrace saw blockchain as a way to address this issue, and to maintain data integrity. Founded by researchers at King's College London, the solution provides tools to instantly and transparently verify data, confirming its authenticity and ownership before there is any chance of manipulation. The tools can be used to create verifiable records useful for supporting patent applications, protecting sensitive patient data and scans, documenting research progress, confirming proper credit in academic publishing, and more.

LabTrace's blockchain-based data authentication system offers a unique and transparent solution to:

- Certify authorship and data provenance
- Establish and record a researcher's ownership rights to data and discoveries
- Securely timestamp and log trial data, original works, ideas, and inventions in an auditable fashion
- Support drug approvals and patent applications
- Protect against intellectual property and data theft

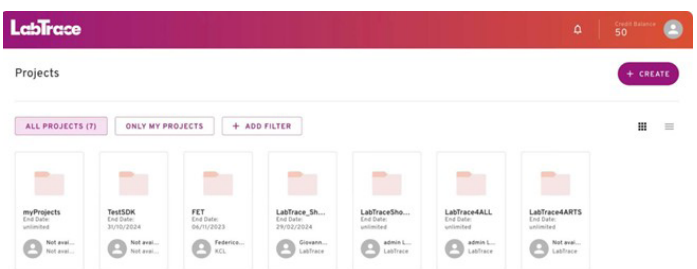
It achieves this by attaching unique Content IDs (CIDs), which follow InterPlanetary File System (IPFS) standards, to all recorded data. Each CID file receives on-chain notarization by authorized parties–with user permissions defined and controlled by an Algorand smart contract (e.g., Role-Based Access Control).

LabTrace is being utilized in the UNITY Project, a Bill & Melinda Gates Foundation-funded initiative using portable, low-magnetic-field MRI scanners to assess brain health and development in babies and young children in low-resource settings. The patient scans are verified on-chain at their time of creation, ensuring transparency and preventing manipulation.

LabTrace is also behind Integrity Lab, an open-source, on-chain notebook for universities, staff, and students to verifiably store their research, notes, data, and code. Improving upon traditional lab books (used to certify, and give professors access to, student research), this on-chain notebook enhances research tools like Overleaf, Dataled, and GitHub, making documentation easier, more transparent, and secure, while keeping strict verification standards.

After surveying the blockchain landscape, LabTrace determined that Algorand, a leading Layer-1 solution known for its high performance and reliability, was best suited to meet the rigorous requirements of the biotech and pharmaceutical industries. Specific advantages of Algorand include its Layer-1 smart contract programmability, which enables role-based access control; high processing throughput of 10,000 transactions per second; and instant transaction finality, which ensures records are reliably created at the time of data generation.

*Learn more: [labtrace.io](labtrace.io) and [algorand.co](algorand.co)*



## YALE UNIVERSITY

# BLOCKCHAIN FOR GENOMIC DATA SECURITY

Genomic data is highly sensitive, containing personal health insights and ancestry information. Traditionally, individuals who undergo genetic testing often relinquish control over their data to commercial entities. Yale researchers, led by Mark Gerstein, have developed SAMchain, a blockchain-based system designed to give individuals control over their genomic data.

## HOW SAMCHAIN WORKS

SAMchain operates as a private blockchain network that stores genomic variants and reference-aligned reads. Instead of storing entire genomes, which require vast amounts of data, SAMchain records only the differences between an individual's genome and a reference genome. This approach significantly reduces storage requirements while maintaining data accessibility.

## ADVANTAGES OF BLOCKCHAIN IN GENOMICS

- **Data Integrity:** Once genomic data is stored on a blockchain, it cannot be altered, ensuring accuracy for medical research and personalized medicine.
- **Privacy & Ownership:** Individuals retain control over their genetic information, deciding who can access or use their data.
- **Secure Sharing:** Patients can grant access to doctors or researchers without exposing their data to unauthorized parties.
- **Protection against Corruption:** Blockchain prevents accidental corruption or loss of genomic data stored in cloud-based systems.

## FUTURE APPLICATIONS

SAMchain can accelerate personalized medicine, allowing doctors to tailor treatments based on a patient's genetic profile. Additionally, researchers can use blockchain-based genomic databases to study genetic diseases while ensuring data security.

The Yale team envisions expanding SAMchain to include gene expression profiles, further enhancing its utility in biomedical research. Blockchain technology presents a promising solution for genomic data security, offering individuals control over their genetic information while enabling advancements in medical research. Yale's SAMchain is a significant step toward a future in which genomic data remains both accessible and protected.

*Learn more: mbb.yale.edu/news/mbb-professor-introduces-samchain-blockchain-technology-stores-and-protects-individual-genomic*

SECTION VII

# INFRASTRUCTURE, CUSTODY & WALLETS



## ACCENTURE
# UNIVERSAL WALLET INFRASTRUCTURE

The digital landscape is rapidly evolving, marked by the increasing convergence of digital identity, represented by verifiable credentials, and digital money, embodied by tokenized assets. This powerful confluence promises to reshape online interaction and transactions, particularly in use cases that **leverage identity credentials against financial transactions.** Universal Wallet Infrastructure (UWI) emerges as the crucial connective layer, providing the foundational services needed to overcome fragmentation and a lack of seamless interoperability across disparate systems, ultimately ushering in a user-centric digital future.

Imagine a world where your digital identity, financial assets, and other valuable digital items reside securely within a single, user-controlled wallet. This wallet acts as your central point of interaction, granting you the power to selectively share verified information and exchange value with trusted entities, all while maintaining control over access and usage. For businesses, this paradigm shift unlocks the potential to access authentic, zero-party data directly from users, fostering contextual insights and personalized experiences through a unified channel.

The financial services industry stands at the forefront of this transformation, driven by the tokenization of traditional assets and the emergence of decentralized finance. The connection between **digital identity, particularly government-issued credentials in a tokenized digital ID format, holds significant benefits and impact for the financial services industry.** Streamlined KYC/AML checks, facilitated by secure sharing of verified digital identity credentials directly from UWI-enabled wallets, reduce friction and enhance trust.

The current challenge lies in the siloed nature of these emerging digital ecosystems. Different wallets often cannot communicate, hindering the verification and exchange of tokens and verifiable credentials.

This fragmentation limits the network effect and scalability of innovative use cases leveraging both identity and financial data.

UWI directly addresses this critical interoperability gap. It provides the underlying infrastructure services that enable seamless communication between diverse wallets and facilitate the verification and exchange of digital assets across different networks. By offering standardized protocols and secure channels, UWI connects individuals, businesses, and technology providers, fostering an ecosystem where privacy-preserving data and value exchange can flourish, all centered around the user's digital wallet.

UWI achieves this through key infrastructure services: Wallet Solutions for building and connecting secure wallets; Token & Credential Management for creating and managing digital assets; Data Verification & Exchange for secure data and value transfer; and Network Orchestration for creating and managing trusted networks.

By providing this foundational infrastructure, UWI bridges the current fragmented landscape and a future where digital identity and money interact seamlessly. This unified approach unlocks the true network effect, enabling new forms of value exchange, powering digital transformation across industries, and establishing a digital ecosystem built on trust, privacy, and user empowerment. UWI acts as the essential enabling platform, allowing enterprises and technology providers to build and scale innovative solutions, confident in the underlying security, interoperability, and governance frameworks.

**ALEO**

# ALEO LAUNCHES MAINNET TO BRING PRIVACY TO WEB3

Aleo, a layer-one blockchain that combines general-purpose programmability with the power of **zero-knowledge proofs (ZKPs)**, announced its **mainnet launch in September 2024**. The network enables the next generation of decentralized applications that provide **data confidentiality** to users and scale to enterprises.

Using ZKPs, programs built on the **Aleo Network** can prove a statement is true without revealing the information itself. Unlike other ZK solutions, Aleo is **ZK by design**, with a **zkVM** fully integrated into every transaction on top of a vertically integrated platform created to preserve programmability, security, and permissionlessness.

## NETWORK ACTIVITY SURGES POST-MAINNET WITH 10.8M TRANSACTIONS

Since mainnet, **10.8 million transactions** have been completed on the network at an average rate of **86,000 transactions per day**. Users have created **1.8 million wallets**, and an average of **15,400 individuals** use the network daily.

More than **350 privacy-preserving dApps** have been built on the Aleo Network, helping developers protect users' personal information while ensuring regulatory compliance. From **privacy-preserving wallets** to identity solutions like **zPass**, users now have unparalleled control over their data while interacting online. Aleo is the **HTTPS for blockchain**, unlocking commerce, payments, and other enterprise use cases for institutions and developers.

## BUILDING THE NEXT GENERATION OF PRIVATE APPLICATIONS

Aleo empowers developers to build truly secure applications and products that address real-world problems, such as:

***SECURE IDENTITY VERIFICATION***

Robust digital identity solutions remain an unsolved problem. Aleo-powered solutions, like zPass and Bandio, allow individuals to verify attributes such as nationality or age without exposing other personal data and without relying on a centralized server.

***SCALABLE, COMPLIANT PAYMENTS***

Stablecoins are gaining increasing product-market fit in crypto, but for them to truly replace existing payments infrastructure, transactions must protect institutional and personal financial information. Aleo's privacy-preserving smart contract infrastructure ensures compliance while maintaining financial confidentiality. This is a crucial step in bringing cross-border business payments (e.g., merchants, governments, donations) on-chain.

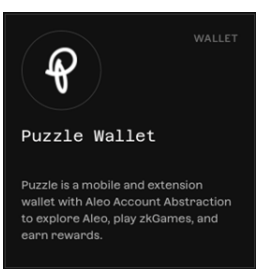
***TRUST-MINIMIZED ORACLE INFRASTRUCTURE***

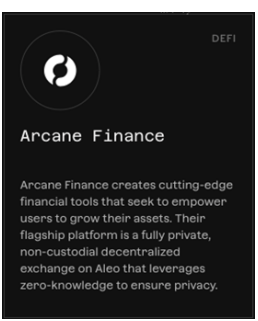
Recent innovations in zero-knowledge cryptography—such as zkTLS—help bridge real-world data on-chain while maintaining trust minimization through zero-knowledge cryptographic proofs.

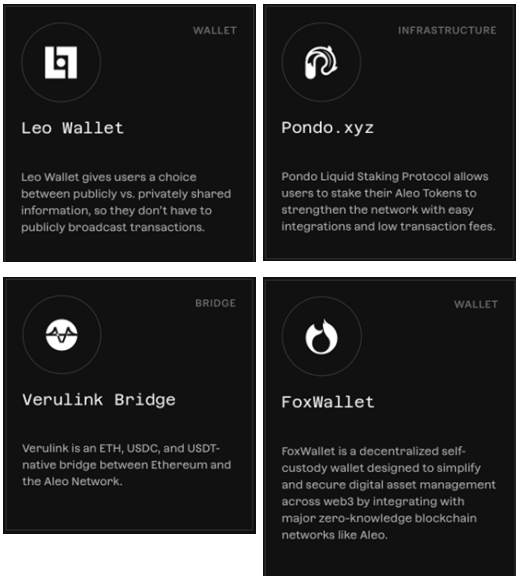
***HIDDEN-INFORMATION GAMES***

While traditional blockchain games offer ownership of in-game assets and interoperability, the transparency of networks like Ethereum prevents applications like poker or Battleship from working, as these games rely on hidden information. Aleo's public and private state model makes hidden-information games possible, demonstrated by Puzzle, a mobile and extension wallet for playing zkGames and earning rewards.

***CURRENT BUILDERS ON ALEO INCLUDE:***






## A COLLABORATIVE APPROACH TO GOVERNANCE

The **Aleo Network** is fully **community-driven**, with various organizations and individuals contributing to its growth. Anyone can submit an **Aleo Request for Comment (ARC)** to propose changes to the network. Aleo embraces a **collaborative governance model** and actively encourages contributions that drive innovation.

*Learn more about Aleo: aleo.org*

# CARDANO FOUNDATION
# VERIDIAN IDENTITY WALLET

In March 2024, Cardano Foundation announced the development of an identity wallet Veridian to enable the creation of a decentralized identity (DID). It will support new and existing identity standards, multiple ecosystems, and frameworks.

Veridian is the identity platform built for tomorrow: building trust, empowering identity, and securing the future with:

- Enterprise-grade scalability
- Secure private key storage
- Backup & disaster recovery mechanisms
- Decentralized public key infrastructure
- Open source protocol & software
- Quantum secure cryptography
- GDPR & privacy regulatory compliance
- Global interoperability
- W3C compliance

## KEY ADVANTAGES OF VERIDIAN WALLET

- *Decentralized Control:* Decentralized identifiers enable digital identity sovereignty, eliminating administrative control in trust silos. Represent individuals, organizations and machines.

- *Verifiable Data Provenance:* Protects business value chains at every step with tailored, privacy-preserving credentials. Securely control data provenance with powerful delegated authority.

- *Full Transparency:* Public, permissionless infrastructure and open-source protocols provide verifiable, auditable trust.

- *Post-Quantum Security:* Combine key management and cryptographically secure systems against evolving threats.

- *Global Interoperability:* Empower verifiable data across industries, frameworks, and environments without rebuilding production systems.

- *Cost-Effective:* Enterprise-grade encoding schemes deliver cost-effective, scalable infrastructure suitable for IoT and low-bandwidth environments.

## VERIDIAN WALLET PROVIDES THE BUILDING BLOCKS FOR USERS' DIGITAL IDENTITY

- *Identifiers:* Users can create and manage unique digital identifiers with Key Event Receipt Infrastructure (KERI)'s decentralized, open-source protocol for self-sovereign identity. This allows users to take back control from third parties with Veridian, enabling them to manage their digital identity, with their rules.

- *Credentials:* Credentials provided are secure, verifiable, and private. Users can issue and manage industry-compliant verifiable credentials, leveraging advanced chaining from Trust Over IP's Authentic Chained Data Container (ACDC). This allows users to protect their privacy with selective disclosure while ensuring cross-platform interoperability.

- *Connections:* Users can establish secure, encrypted connections with other entities in their digital ecosystem and enjoy verifiable communication across networks. These connections facilitate trusted relationships with seamless interactions.

## HOW THE VERIDIAN WALLET WORKS

- *Mobile Veridian Wallet:* Safeguard your cryptographic keys with local signing and an easy-to-use design that supports optional biometric authentication.

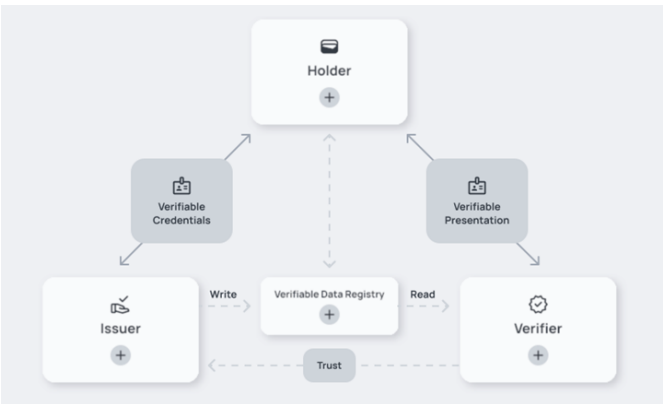
- *Identity Cloud Agent:* Secure your digital identity with real-time protection across multi-tenant cloud infrastructure and deploy on public, permissioned, self-hosted, or remote ecosystems.

- *Credential Management Services:* Create, issue, and manage verifiable credentials with flexible schemas and rapid revocation.

- *Cardano Blockchain Integration:* Anchor schemas and critical events for tamper-proof discovery and global interoperability. Integrate verifiable identity with digital assets, decentralized applications, and smart contracts.

- *Secure Identity Tunnel:* Enable multi-device connections and zero-trust interactions for frictionless user journeys from mobile to workstation.

The Veridian Platform operates on a Trust Triangle, which represents the future of digital identity, building verifiable trust without relying on centralized intermediaries.




## APPLICATIONS BUILT ON VERIDIAN INCLUDE

- *GuildOne (KYC, Carbon Credits, DeFi):* Bridging Public and Permissioned Ecosystems with Verifiable Assets.

ACDC verifiable credentials integrated with Cardano Native Assets, enables the seamless transfer of verifiable data from the permissioned Corda ecosystem to the public, permissionless Cardano blockchain. This enables verifiable data and identity integration within Cardano's native assets for credit issuance.

- *Tadamon by UNDP (NGO, Document Signing, White Label):* On-Chain Digital Identity Approval System for the Public Sector. Our digital ID solution empowers public sector beneficiaries to ensure grants are allocated to approved organizations. By utilizing our identifiers and digital signing through our wallet, we create immutable on-chain records that provide full transparency on the status of grant applicants, ensuring all parties are informed.

*For more information: cardanofoundation.org/veridian or veridian.id*

## DRUK HOLDING & INVESTMENTS (DHI)

# BHUTAN NATIONAL DIGITAL IDENTITY (NDI)

Envisioned by His Majesty the King, Bhutan National Digital Identity (NDI) was funded and overseen by the Government Technology (GovTech) Agency and developed as an innovation project by Druk Holding & Investments (DHI) InnoTech. Conceptualized in 2021, Bhutan NDI was launched nationwide on October 13, 2023. Today, Bhutan NDI has spun off as a start-up technology company and has surpassed 200,000 users since its launch.

Bhutan NDI is a cutting-edge digital identity solution that provides secure and verifiable identity-related credentials to Bhutanese citizens. The ecosystem has been designed on the principles of the self-sovereign identity (SSI) philosophy based on Decentralized Identifier (DID) technology, which allows individuals to maintain greater control over their personal information and decide who has access to it.

As a mobile wallet that holds your personal credentials, Bhutan NDI can be used to prove your identity and share your credentials while accessing government and business services online. These credentials include, but are not limited to, Foundational Identities such as name, citizenship ID, household and Functional Identities such as Thram numbers, bank account details, education certificates and more.

Bhutan NDI, at its core, embodies the following mandates:

- *Empowerment:* Bhutan NDI empowers citizens by providing easy access to essential government and business services, promoting digital inclusion for all.

- *Data Privacy:* Citizens maintain control over their personal data, selecting which entities they authorise to access their information, thus ensuring privacy and safeguarding sensitive data.

- *Data Security:* The platform establishes a highly secure National Digital Identity system, leveraging decentralised public key infrastructure to enhance the security and integrity of personal data.

- *Inclusivity and Accessibility:* The NDI Act promotes inclusivity, accessibility, and equity by catering to individuals with limited digital literacy, financial stability, and those who are differently abled.

The launch of Bhutan NDI—the first sovereign country to rollout a self-sovereign identity (SSI)-based decentralized national identity at a population scale—marked a significant milestone for DHI and the nation at large, representing a major step forward in the country's digital transformation efforts. By providing a secure and reliable digital identity solution, Bhutan NDI will enable citizens to access a wide range of government-to-citizen services, as well as private sector services with convenience, efficiency, and, most importantly, security and privacy.

## FILECOIN FOUNDATION
# ADVANCING NETWORKING IN SPACE

Filecoin is the world's largest decentralized storage network. Filecoin Foundation's mission is to preserve humanity's most important information, as well as to facilitate the open-source governance of the Filecoin network, fund research and development projects for decentralized technologies, and support the growth of the Filecoin ecosystem and community.

Filecoin Foundation (FF) successfully completed a first-of-its-kind mission deploying the InterPlanetary File System (IPFS) in space. The recent demonstration involved sending files from Earth to orbit and back using an implementation of the IPFS protocol designed for space communications.

This mission, conducted with Lockheed Martin (LM)-developed software, demonstrated how IPFS—a decentralized content distribution system—can bring the benefits of decentralized technologies to space to enable better communications across long distances and resilience in challenging environments.

As part of the demonstration, the IPFS white paper and an image of FF's mascot (Biscuit, the "FileCorgi") were transmitted to an orbiting Lockheed Martin In-space Upgrade Satellite System (LM LINUSS™) CubeSat and back using a purpose-built IPFS implementation that ran atop Lockheed Martin's SmartSat technology, a software platform that makes it easier to dynamically add and quickly change missions in orbit through simple app uploads.

This successful demonstration follows nearly three years of collaboration. FF and Lockheed Martin Space initially announced the collaboration in Davos in May 2022, and announced details of the mission in Davos in January 2023.

This mission demonstrates several key benefits of using IPFS for communications and networking in space:

***Faster Communications –*** Today's centralized Internet model doesn't work in space. In a centralized Internet model, data is retrieved from a particular server in a particular place. On Earth, the delay in retrieving that data may not be noticeable. But if you're on the moon, there will be a multi-second delay each time you retrieve data from Earth. With IPFS, data doesn't need to go back and forth from Earth with every click. That's because, with IPFS, data is identified by what it is rather than where it is. When you look for a piece of content, that content is retrieved from wherever is closest, rather than being retrieved from a particular server in a particular place. That means if someone nearby already has that data, it only has to travel a short distance and can get to you quickly instead of traveling back and forth from Earth with every click.

***Data Verification –*** With IPFS, each piece of content has a unique identifier called a "content ID." If a piece of content is altered, its content ID will be different as a result. That means that, by using IPFS, you can cryptographically verify that data has not been modified. This is also useful for authenticating data from space. For example, if a satellite takes photographs and then transmits them to the ground using IPFS, it is possible to cryptographically prove that those images were not tampered with, and are, in fact, the original images taken by the satellite.

**Data Resilience –** One challenge with storing data in space is that the data can easily be corrupted by radiation, or the storage hardware can be damaged by debris. In a centralized Internet model, data is stored in a particular location on a particular piece of hardware, and when you are trying to retrieve that data, there is only one place you can retrieve it from.

To put it another way: imagine that you recommend a book to a friend, but you don't tell your friend the name of the book—instead, you tell your friend that the book is in the New York Public Library, on the third floor, on the second shelf from the left, five books over.

That's how today's centralized Internet model works—you're looking for content in a particular location on a particular server. But it makes much more sense to tell your friend the name of the book, and let them find it wherever is closest and most convenient. That's how IPFS works.

With IPFS, you can store many copies of the data in many different locations. When you retrieve data using IPFS, you are looking for a particular content ID rather than looking for data at a particular location. That content will be retrieved from wherever is closest—so if there are many copies of the data, it doesn't matter if some of those copies have been lost or corrupted (as is often the case when data is being stored in space).

*Learn more: fil.org*

## KINTSUGI TECHNOLOGIES

# CHAMPIONING NATIONAL SOVEREIGNTY IN GLOBAL BLOCKCHAIN INFRASTRUCTURE

Kintsugi Technologies champions adoption of its focus on supporting hyperlocalized sovereignty-specific blockchain infrastructure through our pioneering Regional Embassy model. This was prominently showcased at our 2024 Blockchain Infrastructure Forum (BIF) in Hokkaido, Japan, which convened global leaders including Dan Albert (Executive Director, Solana Foundation), Naoki Tani (Managing Director, NTT Digital), Genki Oda (Managing Executive Officer, SBI and President, JVCEA), Angelina Kwan (former COO, BitMex), Sandra Ro (CEO, GBBC), and Jonathan Kim (Web3 Director, SKT), along with top validators from all around the world.

The forum underscored the core thesis of rapidly growing institutional and sovereign adoption of blockchain with emphasis on each country developing its own sovereign ecosystem of validators, infrastructure providers, and regulatory frameworks. This approach was evidenced by participation from the largest telecommunications companies of Japan (NTT) and Korea (SKT), demonstrating the growing institutional recognition that blockchain infrastructure is becoming as crucial as traditional telecom infrastructure.

Our Regional Embassy model supports this transition by:

- Establishing country-specific infrastructure hubs operated by local teams
- Providing institutional-grade validator and infrastructure services
- Facilitating regulatory compliance and institutional partnerships
- Developing local expertise in blockchain technologies

In 2025, we're focused on expanding our embassy network while maintaining our foundational principle that "Infrastructure must be sovereign, teams must be sovereign." This resonates strongly with institutional partners seeking compliant, locally-operated infrastructure solutions.

Our past history includes managing over $1 billion in staked assets across major networks, experience managing multi-billion dollar blockchain ecosystems, and developing institutional-grade infrastructure services. The success of BIF 2024, gathering leaders from major financial institutions, telecommunications companies, and regulatory bodies, demonstrates the growing institutional acceptance of our hyperlocalized approach to blockchain infrastructure.

## BUILDING SOVEREIGN WEB3 ECOSYSTEMS

The Kintsugi Technologies Regional Web3 Embassy incubation program has been establishing sovereignty-specific, self-sustainable web3 services in countries worldwide. Their approach ensures each nation maintains its own vertically integrated infrastructure—from validators to educational resources—rather than relying on external providers, thereby strengthening global decentralization. Currently, Kintsugi is actively developing these sovereign web3 ecosystems in Italy, Korea, Japan, and several Southeast Asian countries.

To highlight, the work it has been doing in Japan has made significant inroads by hosting multiple validator-specific workshops for both independent Japanese operators and interested Nikkei 500 technology companies. The Japanese Web3 Embassy initiative has provided private consultations to several of Japan's top 5 largest companies regarding web3 infrastructure development and has contributed substantially to advancing the zero-knowledge ecosystem in the country. Perhaps most notably, Kintsugi has facilitated private, invite-only forums for blockchain infrastructure stakeholders—bringing together operators representing over $500 billion in staked assets with Japanese regulatory participants, law firms, and centralized exchanges to strengthen the local blockchain ecosystem and foster regulatory clarity.

Looking ahead, Kintsugi Technologies continues to bridge the gap between traditional institutions and blockchain infrastructure, ensuring each country can build and maintain sovereign infrastructure capabilities while participating in the global blockchain ecosystem.

*Learn more: kintsugi.tech*

## LEARNING TOKENS LAB AT LF DECENTRALIZED TRUST

# LEARNING TOKENS FOR EDUCATION AND KNOWLEDGE TRANSFER

*Learning Tokens* represent the value of – and rights over – the transmission of knowledge. In a network society, education is the fundamental asset that develops human capacities to transform people's minds. Diverse learning environments foster self-regulated activities that construct wisdom collaboratively. However, our expanding universe of knowledge, skills, attitudes, and values demands constant understanding to improve human lives and labor markets. A skills-first initiative presented below provides one common foundation for that purpose, while our tokenization of learning contributes a much-needed *currency of expertise*.

## TOKENIZING THE LEARNING PROCESS

Skills are taught and learned through the transmission of knowledge. Learning is a lifelong journey where skills are your wealth. Learning Tokens represent the value of that wealth.

Granularity: Eleven millennia ago, at their appearance, tokens referred to the measurement of goods. In the Neolithic Age (10,000- 2,000 BC), the appearance of this new counting technology later morphed into writing, coincided with the cultivation of cereals, the management of communal storage for grains, and the commercial needs of the Agricultural Revolution.

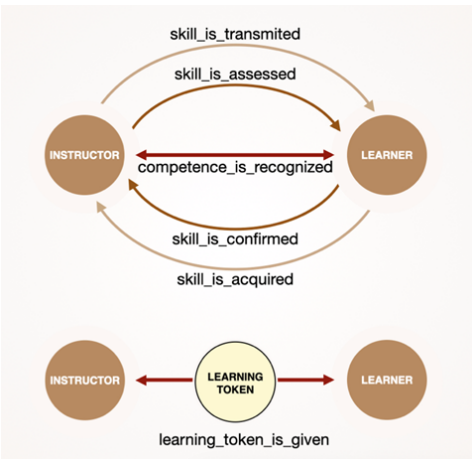
Nowadays, as bits replace clay, digital tokens are unique representations of a value recorded in a distributed ledger or blockchain. Cryptography supports their ownership and transfer. Consensus builds the collective registry of transactions for a network of stakeholders. They cannot be forged, are traceable, and can become negotiable instruments when they incorporate rights over financial, or non-financial, material or immaterial assets.

Learning Tokens represent the value of –and rights over– the transmission of knowledge.

At a granular level of detail, Learning Tokens recognize units of competency and five sequential actions to transmit them. An instructor conveys a unit of competency. A learner acquires it. The instructor assesses such acquisition. The learner responds correctly to this evaluation. The instructor awards the learner formal recognition of competence.

Units of competency are consensually agreed statements of knowledge, skills, attitudes, and values required for effective performance in a particular function.

***TRANSMISSION OF KNOWLEDGE, SKILLS, ATTITUDES, AND VALUES***




Instructors define units of competence in a course or a training program that transmits and certifies them. Lessons might convey multiple units of competency, and diverse assessments might confirm the efficacy of an educational strategy.

Their granularity allows for measuring assessments in detail, describing the logic of their aggregations throughout curricula, interweaving individual learning paths, and assembling skill profiles for life.

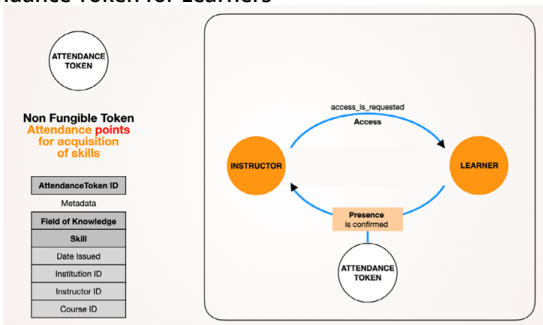
The original function of tokens, for measuring grains as goods in communal storage, becomes a relevant metaphor for harvesting educational results and gathering digital credentials in personal electronic wallets for the Digital Revolution.

## TOKENIZING LEARNING

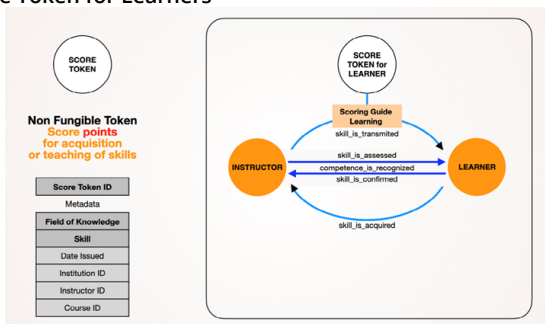
Four measurements assess learning: assistance to lessons, the score of responses to tests and tasks, engagement in class, and the feedback learners give for instructors' performance.

Four Tokens can attest to such assessments and become our currency of expertise.

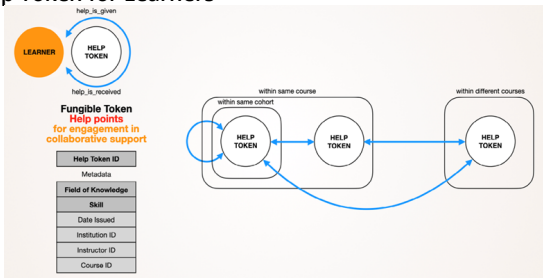
### 1. Attendance Token for Learners



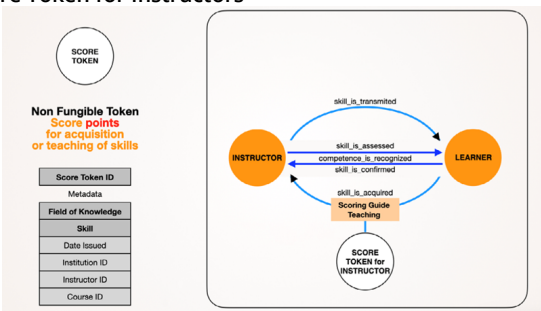

### 2. Score Token for Learners



### 3. Help Token for Learners




### 4. Score Token for Instructors




Scoring guides are the oracles to minting –or creating– and transferring these tokens.

Learning Tokens, our currency of expertise, represent the value of –and rights over– the transmission of knowledge, skills, attitudes, and values. They recognize the importance of attendance, the engagement of learning, the collaborative support of help, and the feedback for the instructor's performance.

## TOKEN TAXONOMY FRAMEWORK TO STANDARDIZE TOKENS

The Token Taxonomy Framework (TTF) of the InterWork Alliance, an initiative of Global Blockchain Business Council, is a meta-model for digital assets. Its goals are to establish a common ground on tokenization with a common language framework that shares base components and controls for industry stakeholders to work together in establishing token-based business models.

In the case of Learning Tokens, the TTF common language of templates, classes, and instances orders the tokens. Formulas set reusable taxonomy components to describe their type, behavior, and property sets. Definitions fill the details to deploy token classes with one or more instances of these digital assets. TTF's standard artifacts, which are designed to be implementation-neutral, provide the base components to build on, providing the right balance between standardization for basic tokenization and customization for the specified use case.

## IMPACT

Opportunities ahead lie in the integration of Learning Tokens into a wide range of courses. Increasing integrations and testing are expected as use cases expand. On a governance level, Learning Tokens has built its formulas, definitions, and artifacts within the standardized TTF repository to facilitate decision making and enforcement of rules. On a technical level, a software development kit (SDK) would allow any platform or program anywhere in the world to connect automatically to the Learning Tokens functionality. Its granular standardized registry can become a foundational layer of metrics to build solid and impactful AI applications.

Learning Tokens provide unprecedented benefits to the transparent delivery of education and practical usefulness of achievements. They facilitate a repository of knowledge for understanding the inherent nature of educational achievement. Learning Tokens also give learners ownership and control of their data to prove the competency employers need for a job, partners demand for new enterprise, investors require for confidence, and clients ask for a better service.

Ultimately, Learning Tokens support all stakeholders to create markets for collaborative learning, with a democratized and inclusive platform. This project aims to be the first step that can pave the way toward multiple implementations at the intersection of education, transparency, and collaboration.

## RECENT ADVANCES

Open-source software thrives on a community of alliances, creating an ecosystem of participants contributing to its development, use, maintenance, and governance.

Our initiative began as a joint project between Hyperledger and Global Blockchain Business Council (GBBC). Since its inception, Hyperledger has evolved into the Linux Foundation Decentralized Trust (LFDT), and our workspace has been renamed the LFDT Learning Tokens Lab.

We are currently working on two pilot projects. The LFDT Mentorship Program continues to support software development. We are utilizing AI to understand the taxonomies of knowledge and skills. Gradually, a community of mentees is building connections with instructional platforms, while a working group is defining a go-to-market strategy.

Learning Tokens enhance community building within the LFDT Healthcare Special Interest Group and provide skill wallets for young children learning about computer applications, robotics, and AI at BiniWorld Academy in India.

We have developed a Software Development Kit (SDK) that facilitates access to Zoom Meetups and monitors online community engagement during video communication or collaboration events.

YouTube videos become measurable learning resources through AI applications that integrate transcripts and summaries into quizzes, assessments, and the oracles of scoring guides to mint and transfer Learning Tokens.

This year, an AI dual education project unites students and faculty from the Tecnológico de Veracruz, a public university in Mexico, with mentors, developers, and computing resources from Comprende, a Mexican AI firm.

This collaboration aims to help instructors contextualize their course content using standardized metadata related to knowledge and skills.

Contributors are also developing an SDK for Google Meet. The following steps include mentees connecting with instructional platforms like edX, Canvas, Moodle, and others.

Students from GRC Berkeley research the key players in the Learning Tokens market and optimize a go-to-market strategy. GRC Berkeley is the university branch of GRC Group, a non-profit organization recognized by the student program of the Associated Students of the University of California, Berkeley.

*Further details on Learning Tokens can be found in the comprehensive report here.*

## MICROSOFT

# PROVIDING ENTERPRISES WITH STREAMLINED ACCESS TO VERIFIABLE BLOCKCHAIN ANALYTICS WITHIN THEIR EXISTING DATA INFRASTRUCTURE

Microsoft has been at the forefront of technological innovation for decades, and its involvement in blockchain technology is no exception. From early experiments to robust enterprise solutions, Microsoft has consistently pushed the boundaries of what blockchain can achieve.

## EARLY INVOLVEMENT IN BLOCKCHAIN

Microsoft's journey into blockchain began with exploratory projects and strategic partnerships aimed at understanding and leveraging this emerging technology. Early milestones included providing developers with the tools needed to build and deploy blockchain applications. In particular, a Visual Studio Code plug-in enabled development of Solidity for Ethereum smart contracts.

In the early days of picks and shovels and education of enterprises in distributed systems development, one of Microsoft's blockchain offerings was the Azure Blockchain Service, which simplified the formation, management, and governance of consortium blockchain networks on Quorum, a sister of Hyperledger Besu. This service has enabled numerous enterprises to adopt blockchain technology for POCs and pilots, leading to increased knowledge of development best practices at a time when the market was very early and disorganized.

## SETTING FOUNDATIONS FOR SECURITY INFRASTRUCTURE

Microsoft began its foundational work on self-sovereign identity models, aiming to give users control over their digital credentials. This led to the development of standards like digital identity (DID) and Verifiable Credentials, which Microsoft helped shape through open-source initiatives and collaborations. These concepts evolved into practical implementations within Azure AD, now Microsoft Entra, where decentralized identity is integrated into the Verified ID service.

Today, Entra enables secure, privacy-respecting identity verification across organizations and platforms. These standards are foundational in much of the regulatory frameworks in traceability today.

Early involvement in Zero Knowledge Proofs (ZKPs) at Microsoft was driven by the need for scalable, privacy-preserving cryptographic protocols. Microsoft researcher Srinath Setty played a pivotal role in advancing this space through his work on Nova, a recursive proof system that significantly improves efficiency and composability. Layer 2 networks using ZK verification require scalable, efficient proving systems. Nova laid the groundwork for more practical ZKP applications in real-world systems well beyond blockchain. His continued research has expanded the boundaries of verifiable computation and succinct proofs. Today, these innovations are influencing much of web3, as new ZKP implementations move beyond Groth16 and Plonky implementation.

## SPOTLIGHT ON SPACE AND TIME LABS

In May 2025, Microsoft Fabric—a unified platform for enterprise analytics—onboarded its first Web3 data provider, Microsoft M12 venture fund-backed Space and Time (SXT) Labs, providing developers access to blockchain data from Bitcoin, Ethereum, and other blockchains. Space and Time uses zero-knowledge (zK) proofs to verify and index information stored across a decentralized network of database validators for developers to query in app development and analytics.

## CHALLENGE

Organizations seeking to leverage blockchain data for analytics and application development faced significant barriers in accessing reliable, verifiable blockchain information.

## SOLUTION APPROACH

- SXT indexes popular blockchains (Bitcoin, Sui, Ethereum) and verifies data using zero-knowledge (zK) proofs
- Verified blockchain data becomes accessible through Microsoft Azure OneLake—an organization's single, unified, logical data lake—within the Fabric ecosystem
- Developers can query SXT's indexed data directly through Fabric for app development and analytics
- Key success factors:
    - *Zero-Knowledge Verification:* Ensuring data integrity through cryptographic proofs
    - *Native Platform Integration:* Seamless access through existing Fabric workflows
    - *Multi-Chain Support:* Coverage of major blockchain networks
    - *Enterprise-Ready:* Trusted by prominent financial institutions and enterprises
    - *Scalable Architecture:* Sub-second zK coprocessor (capable of executing cryptographically guaranteed analytic queries over 1,000,000-row tables in less than a second) enabling smart contracts to process on-chain and off-chain data at scale

## RESULTS AND BENEFITS

- *For Developers:* Developers gain direct access to real-time, verifiable blockchain data within an integrated and familiar environment, eliminating infrastructure complexity
- *For Enterprises:* Integration enables a wealth of new data-driven use cases across financial services, Web3 apps, and AI

- *Strategic Alignment:* The solution supports Microsoft's mission to democratize technology across diverse industries, including Web3, while providing tools that enhance productivity and drive innovation at a global scale

## LOOKING AHEAD

Microsoft is always looking to learn from partners and the fast pace of innovative ecosystems such as blockchain, cryptocurrency, and AI. We hope to see more activities among our Fortune 500 customers that will drive the need for more services.

*Learn more here: chainwire.org/2025/05/20/space-and-time-integrates-blockchain-data-with-microsoft-fabric-featuring-bitcoin-sui-and-ethereum*

**OKX**

# EMPOWERING YOU WITH SELF-CUSTODY & WEB3 ACCESS

## WHY OKX WALLET?

The OKX Wallet is a self-custody crypto wallet that gives you complete control of your assets while enabling seamless interaction with the decentralized web (Web3). Originally part of the OKX app, it is now a standalone application designed to improve accessibility and user experience.

## KEY CONCEPTS & BENEFITS

- *Self-Custody:* You hold your private keys, so only you control your funds
- *Seed Phrase:* A recovery key to your wallet – keep it safe and offline
- *Interoperability:* Use your wallet across other apps and services
- *No Third-Party Risk:* Not dependent on centralized exchanges or banks
- *Total Asset Control:* Swap, stake, and store with full autonomy
- *Web3 Passport:* Connect with DeFi, NFTs, memecoins, and more

## FAST FACTS



## APP FEATURES

- Self-custody with seed phrase backup
- Real-time token swaps
- NFT creation, collection, and trading
- Onchain rewards, yield, farming, and staking
- DEX Aggregator for best swap prices across networks

## SECURITY

- Fully self-custodied – OKX cannot access your funds
- Backed by top security audits (Hacken & CertiK)
- Never hacked since launch
- Recoverable via your seed phrase

## USE CASES

- *Gaming:* Store and use in-game assets
- *DeFi:* Lend, borrow, and earn yields
- *NFTs:* Mint, collect, and trade art
- *Memecoins:* Access viral digital tokens
- *Web3 Identity:* Use your wallet to log in & interact

## TO GET STARTED

1. Visit web3.okx.com
2. Download the OKX Wallet app
3. Create or import a wallet
4. Save your seed phrase securely
5. Start exploring Web3

**RIPPLE IMPACT**

# UNLOCKING OPPORTUNITY: RIPPLE AND MERCY CORPS VENTURES EQUIP EMERGING MARKET ENTREPRENEURS

In 2024, Ripple announced Unlocking Opportunity, the next phase of the existing partnership with Mercy Corps Ventures (MCV) supporting emerging market entrepreneurs and small-medium enterprises (SMEs) building solutions for financial resilience through blockchain and fintech innovation.

The expanded partnership will include financial and technical support from Ripple for fintechs and SMEs—including those leveraging the XRP Ledger (XRPL) and Ripple's products, such as the recently launched Ripple USD stablecoin (RLUSD)—focusing on financial inclusion use cases such as savings, remittances, micropayments, and tokenization of real-world assets.

With a focus on transformative, scalable solutions, Ripple has now committed more than $5.5M to support Mercy Corps Ventures.

## SCALING IMPACTFUL SOLUTIONS

MCV is the impact investing arm of Mercy Corps, a leading global development and humanitarian organization. They have unparalleled visibility into high-impact startups across frontier markets, evaluating more than 1,500 startups annually and supporting founders whose products tackle critical financial inclusion challenges.

Over the past three years, Ripple and Rippleworks' partnership with MCV has supported investments in 54 early-stage companies, 44% of which have at least one female co-founder, which has resulted in more than $500M in follow-on funding.

Among Mercy Corps Ventures' investments are Ejara and Bitmama, two standout startups advancing financial inclusion across Africa. Ejara, a pioneering fintech based in Cameroon, offers accessible savings and investing products including tokenized assets like government bonds.

Meanwhile, Bitmama leverages stablecoin infrastructure to address key market challenges, including currency devaluation, dollar shortages, and high remittance costs.

*Scott Onder, Chief Investment Officer at Mercy Corps Ventures, underscores the importance of this long-term partnership, "Ripple has been a catalytic funder and partner for Mercy Corps Ventures, helping us drive meaningful impact across our portfolio. Together, Ripple and Mercy Corps Ventures will equip more entrepreneurs with the tools and resources to implement web3 technologies that foster financial and climate resilience in underserved markets."*

*Ken Weber, Ripple's Vice President of Sustainability and Social Impact, added, "Mercy Corps Ventures has been a trusted partner for Ripple with an exceptional record of responsibly testing scalable, transformative solutions in emerging markets. With Unlocking Opportunity, we are confident we can maximize the impact of our partnership for entrepreneurs on the frontlines of financial innovation and aid-delivery."*

## CRYPTO FOR GOOD FUND

Unlocking Opportunity kicks off with MCV's latest Crypto for Good Fund, which funds real world use cases for Web3 technology in the Global South with equity-free grants up to $100,000. Use cases focus on DeFi loans, real-world-asset tokenization, savings and payments, and stablecoins in humanitarian aid delivery.

In December 2024, Mercy Corps Ventures and XRPL Commons hosted an informational webinar for builders interested in leveraging XRPL in their submissions to the Crypto for Good Fund. The XRPL's low transaction costs and scalability, and upcoming EVM sidechain launch, make it an ideal choice for fintechs looking to develop affordable, accessible financial solutions. Watch the recording here.

Projects funded in previous cohorts include the asset tokenization of Cameroonian government bonds by Ejara to avail a low-risk, high-yield savings product to unbanked micro, small, and medium enterprises (reaching 11,000+ savers in the pilot period) and an anticipatory action pilot with DIVA Donate leveraging stablecoins, smart contracts, and crypto rails to provide climate risk financing to farmers in the Horn of Africa.

## A SHARED VISION FOR GLOBAL IMPACT

Unlocking Opportunity reflects Ripple and MCV's shared mission to support entrepreneurs in creating more resilient economies. As we strengthen our partnership, Ripple remains committed to empowering innovators to build transformative solutions and to making financial services more inclusive and sustainable across emerging markets.

# RIPPLE
# UNLOCKING NEW FINTECH REVENUE STREAMS WITH DIGITAL ASSET CUSTODY

From digital wallets to real-time cross-border payments, fintechs and neobanks have helped modernize finance, setting new standards for innovation and reshaping expectations for financial services. Now, with 10% of global assets forecast to be digital by 2030, fintechs have a new opportunity: institutional digital asset custody.

Many fintechs are already responding to rising demand for more secure, compliant storage of digital assets. For those seeking to capitalize on this opportunity, Ripple's newest guide provides fintechs with a roadmap for how digital asset custody infrastructure can build trust, create new use cases and fuel growth across fintech custody services.

## THE DIGITAL ASSET OPPORTUNITY FOR FINTECHS & NEOBANKS

Digital asset adoption has evolved into an increasingly mainstream component of financial portfolios. Initially driven by retail enthusiasm, the market for these assets is now witnessing rapid institutional adoption, with 96% of institutional stakeholders seeing digital assets as an important diversification opportunity.

This surge in interest is driving a $20 trillion opportunity and making institutional crypto custody a priority strategic investment for fintechs. Unlike less agile traditional providers, fintechs can move swiftly and decisively to meet market demand for institutional crypto custody infrastructure.

First movers are eager to leverage flexible, secure storage and management options—including multi-party computation and/or hardware security models for private key management—that address heightened compliance and security requirements for a broad range of digital assets.

## VERSATILE INSTITUTIONAL CRYPTO CUSTODY SOLUTIONS FOR EVOLVING DEMANDS

Fintechs must be constant innovators, offering expanded use cases for an institutional investor and a digitally savvy retail customer base. This progressive mindset is why the industry's revenues are predicted to grow nearly three times faster than those of the traditional banking sector. A robust custody solution will be key to this growth as it positions fintechs to serve both a wide range of current client needs and future use cases.

Institutional clients, for example, are seeking reliable custody options that provide security and regulatory compliance across complex portfolios. B2B fintechs can meet this demand with high-quality custody services tailored to institutional investors—such as banks and regional financial institutions—that allow for AML-compliant asset management and tokenized assets.

The custody service mix might be different for neobanks catering to younger customers in emerging markets where secure crypto on-ramps and off-ramps are a main priority. Given end-user needs, the custody service should also deliver on expectations for a user-friendly interface, higher transaction speeds and connections to liquid markets and multiple protocols.

Ripple Custody is a comprehensive, enterprise-grade solution that can support a wide spectrum of customer needs. Its combined digital asset custody and tokenization infrastructure also enables customizable control over operating and security models—including flexible deployment or private key management—giving fintechs the ability to bring even more innovative use cases to market. These could include:

- Crypto custody and trading for institutional, high net worth and retail clients
- Structured products with underlying digital assets
- Issuance and custody of tokenized commodities like gold and other rare metals
- Retail use cases for tokenization, such as NFTs in loyalty reward programs
- Secure, seamless access to decentralized applications

By tapping Ripple Custody, fintechs can unlock new custody service revenue streams and expand their customer offerings without the cost and risk of building an in-house custody solution.

## PROVEN, PURPOSE-BUILT INSTITUTIONAL DIGITAL ASSET CUSTODY SOLUTIONS

With digital assets on the rise, fintechs and neobanks have a unique, urgent opportunity to outpace the competition by offering a new financial service and becoming the partner of choice for all their customers' crypto asset custody and management needs.

Ripple Custody has been proven to reduce costs, strengthen security, and streamline digital asset management. Already trusted to support live commercial custody offerings in more than 20 regulatory jurisdictions today, Ripple Custody empowers fintechs to confidently meet evolving client demands, address regulatory compliance requirements and unlock new revenue streams as a reliable custody provider. Institutional client and retail demand for crypto custody services is steadily rising, and fintechs can capitalize on this growing user base with Ripple Custody.

Download Digital Asset Custody: Quick Guide for Fintechs to discover how you can remain ahead of the curve and activate new growth strategies as a crypto custodian.

## SUREMARK DIGITAL

# SUREACCESS - IDENTITY YOU CAN TRUST, ANYWHERE

In an age of deepfakes, voice cloning, and digital impersonation, how do you know who you're really talking to?

SureAccess solves that problem by letting you prove your identity at the start of any audio, video, or conference call—no matter what device or number you're using. Whether you're dialing in from your corporate phone, personal cell phone, or home landline, SureAccess ensures that others can verify it's really you.

SureAccess is a scalable, cryptographically secure evolution of the FBI-recommended "codeword" protocol—where close associates use a private signal to confirm one another's identity. But unlike traditional codewords, SureAccess is purpose-built for today's communication challenges, with security that works across all calling platforms and circumstances.

Designed for both organizational professionals and individuals frequently targeted by impersonation, SureAccess protects anyone whose identity might be exploited in a scam.

That includes:

- A grandmother receiving a panicked call from someone claiming to be her grandchild needing money fast;
- A retiree interacting with his banker, attorney, or accountant;
- A celebrity, entertainer, or public figure who must protect—and project—their verifiable authenticity in an online world awash with imposters.

SureAccess works for any individual who purchases the credential and includes up to five trusted associates they select. These associates can verify the subscriber's identity—and be verified in return—across all calls. And because the system is mutual and scalable, any two credentialed users can authenticate each other seamlessly, without the need for shared contact methods or special arrangements.

This breakthrough is developed by the same cryptographic team behind the original blockchain: W. Scott Stornetta and Stuart Haber, whose pioneering work at Bell Communications Research laid the foundation for the $2 trillion+ blockchain economy. SureMark Digital builds on this blockchain foundation and innovates further by adapting decentralization, widely-witnessed events, and removing the need for a trusted third-party, to solve the problem of unforgeable identity in real-time communication.

SureAccess is simple to use, lightweight to deploy, and requires no technical integration or change in communication habits. It delivers what today's conversations lack: trusted identity at the start.

In an AI-powered world where anyone's voice or likeness can be forged, SureAccess restores the most basic human assurance: knowing who you're talking to.

Because in every conversation, trust should come first.

*Learn more about SureMark Digital: suremark.digital*

# THE PROVENANCE CHAIN™ NETWORK (PCN)
# ESTABLISHING COMMERCIAL TRANSPARENCY AND TRUST

The Provenance Chain™ Network (PCN) is building commercial transparency and trust by leveraging blockchain-based technologies and artificial intelligence (AI) to verify the claims made of people, parties, places, products, and processes (5-Ps) of supply chains through the deployment of a standard framework known as the Commercial Trust™ Protocol (CTP). The CTP goes beyond classical web2 and web3 solutions by functioning as an abstraction layer of proprietary and web3 technologies to facilitate component-level data property rights, evaluations, and selective disclosure of requirements, incentives, claims, and evidence (RICE™) in commercial transactions.

The CTP captures an immutable record of: production; orders; shipments; settlements; requests; and the results of evaluations of evidence needed to verify claims, without centralizing or disclosing sensitive data, intellectual property, or trade secrets. Companies can now be transparent and run their business without giving away their business. Third-party services and web3 technologies can plug into the platform supporting the CTP, extending the platform's capabilities and creating additional value to the network. As a result, this approach delivers outcomes that include:

**1. Absolute legal and structural protection of IP** for institutions, companies, and individuals, through the creation of a decentralized system of evidence shared via licensing and governed by data property rights

**2. Convening various industries, ecosystems, and communities** to collaborate and deploy standards and requirements that deliver true traceability, provenance, and supply chain resilience

**3. Consensus on the verification of relevant supply chain claims** through the evaluation of associated evidence, as well as the evaluation of encrypted, permissioned, and indexed commercial and network transactions

**4. Federated, permissioned, machine-reliable, data and platform** consisting of non-hallucinogenic data supporting agentic and generative AI and other PCN-based or third-party additive services

Use cases of the CTP emerge when looking at the marketplace of various users' interests in the validation of claims against the protocol's 5-Ps.

## VERIFIED CLAIMS OF PEOPLE

**Workforce Development:** The CTP enables industries to establish standardized credentials for specific roles, allowing candidates to present and securely share validated qualifications with employers and other relevant parties.

*Other use cases: Immigration Management, Professional Credentials, Reputation Systems, Smart Credentials, Smart Careers*

## VERIFIED CLAIMS OF PARTIES (COMPANIES & OTHER LEGAL ENTITIES)

**Supplier Qualification:** The CTP allows companies to create standardized credentials for vendor qualification, enabling suppliers to showcase capabilities and customers to verify claims, while oversight bodies can efficiently monitor and validate credentials.

*Other use cases: Source Selection, Supply Chain Risk Management (SCRM), Regulatory Compliance Automation, RFP Response Assistance, Smart RFPs, Smart Customer Relations*

## VERIFIED CLAIMS OF PLACES

**Critical Infrastructure Assurance:** The CTP enables critical infrastructure facilities to present evidence of qualifications, certifications, and compliance with industry standards, which can be securely shared with stakeholders and support national security through selective real-time status disclosure.

*Other use cases: Real-estate Title Management, Decentralized Land Registries, Advanced Manufacturing, Smart City and Facility Monitoring, Smart Permitting, Geospatial Data Marketplaces*

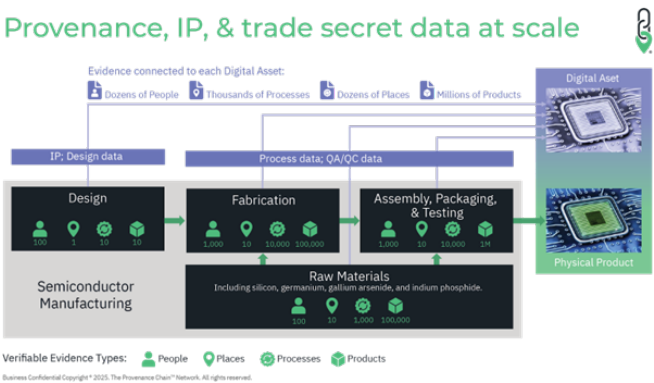
## VERIFIED CLAIMS OF PRODUCTS

**Smart Recalls:** The CTP verifies product credentials by creating a Provenance Identification Number™ (PIN) for each data asset and associating the PIN to its physical twin, allowing supply chain professionals to manage nested bills of material (nBOM) and minimize the impact of product failures through efficient recall management.

*Other use cases: Parts Pedigree, Network Inventory Control, Network Inventory Management, In-Transit Traceability, Counterfeit Detection, Product Provenance, Circular Economy Tracking, Smart Inspections*

## VERIFIED CLAIMS OF PROCESSES

**Microelectronics Designs:** The CTP verifies credentials of intellectual property, including patents, industrial designs, and trade secrets, allowing secure sharing of process details (such as semiconductor recipes) with authorized parties while maintaining integrity and facilitating licensing.




*Other use cases: Distributed Manufacturing, IP Management, Cross Chain Interoperability, Decentralized Machine Learning, Network Scorecards, Automated Dispute Resolution, Smart SDAs (Selective Disclosure™ Agreements)*

*Read more about the PCN's CTP: [theprovenancechain.com](theprovenancechain.com)*

## UNITED NATIONS JOINT STAFF PENSION FUND (UNJSPF)

# BLOCKCHAIN FOR IDENTITY: VERIFYING BENEFICIARIES FOR PENSION BENEFITS

The United Nations Joint Staff Pension Fund (UNJSPF) was established in 1948 by a resolution of the General Assembly to provide retirement, death, disability, and related benefits for staff upon cessation of their services with the United Nations, as well as the other organizations admitted to membership in the Fund.

Today, the UNJSPF counts 25 member organizations and serves over 250,000 people, including participants, retirees, and beneficiaries.

Every year, UNJSPF retirees and beneficiaries need to prove that they are still alive, sending to the Pension Fund a proof-of-life in order to receive their benefits. Historically, this process has been conducted through the use of a paper form called "Certificate of Entitlement (CE)." Since 2021, the UNJSPF has introduced a significant innovation: the "Digital Certificate of Entitlement (DCE)", a digital identity solution to support its retirees and beneficiaries' proof-of-life. This digital solution facilitates a process that normally involves mailing 86,000 proof-of-life documents for a handwritten signature (which is often required to make a document legally binding and prove its authenticity). With the DCE, the UNJSPF introduced a new process that involved users downloading the application to prove identity, existence, transaction and location using blockchain-based technology, biometrics, AI and geo-location. Among the benefits of the solution are:

- **Convenience:** The annual CE process can be completed from the comfort of home without mailing any documents.
- **Optionality:** Beneficiaries can still receive and return paper CEs if preferred.
- **Reversibility:** It is possible to switch between digital and paper CE at any time.
- **Security:** Features are in place to protect personal information, ensuring that data remains safe even if the phone is compromised.

- **Environmental friendliness:** It helps reduce paper use.
- **Health and safety:** It avoids trips to the post office, especially important for elderly individuals.

The DCE won the United Nations Secretary-General Award for Innovation and Sustainability (2022) and the Government Blockchain Association's Social Impact Award (2023). The Digital CE solution has been certified in accordance with international cybersecurity standards, and it will continue to be assessed on an annual basis. This is in addition to the statutory internal and external audits conducted on the Fund's operations. An additional feature is being planned for beneficiaries living in various geographical areas, including some with connectivity issues: a kiosk mode, allowing the submission of Digital CEs from kiosks at various duty stations. Regular outreach and support are provided by a dedicated team at the Fund for those beneficiaries who wish to enroll or have questions about the application.

*For more information, visit the UNJSPF website: unjspf.org/for-clients/digital-certificate-of-entitlement*

## ZODIA CUSTODY

# COMPLIANT CUSTODY THROUGH ZODIA CUSTODY'S SAAS

As financial institutions increasingly explore the potential of digital assets, secure, scalable, and compliant custody solutions are critical. Zodia Custody's Software-as-a-Service (SaaS) offering is specifically designed to address these challenges, empowering institutions to confidently offer digital asset services like custody while maintaining brand integrity and regulatory alignment.

## BRIDGING THE GAP

For Tier-1 financial institutions and enterprises, building proprietary custody infrastructure is costly and complex, while outsourcing can limit customisation. Zodia Custody's turnkey SaaS platform fills this gap, allowing clients to integrate advanced custody solutions seamlessly into their operations without compromising on brand identity or service offerings.

Zodia Custody's model supports clients throughout their digital asset journey, from discovery and proof of concept (PoC) to full implementation and scaling, meeting their needs at every stage.

In addition to foundational custody, Zodia Custody's SaaS model includes deployment management, secure integrations, and ongoing operational support. This enables enterprises to scale efficiently while addressing the complex challenges that are specific to their operations.

## COMPLIANCE AT THE CORE

A key strength of Zodia Custody's SaaS platform lies in its commitment to regulatory compliance. Built to meet UK FCA standards and the EU's Markets in Crypto-Assets Regulation (MiCAR), the platform ensures compliance across global jurisdictions. This provides clients with the confidence to operate securely and adapt to evolving regulatory landscapes.

## A FUTURE-READY SOLUTION

Digital assets are redefining financial services. Zodia Custody's SaaS offering equips firms with the infrastructure to innovate securely, unlocking new opportunities while mitigating risks. As the digital asset industry evolves, Zodia Custody remains a trusted partner, delivering solutions that evolve with the market to allow institutions to lead with confidence in a dynamic and regulated environment.

SECTION VIII

# NON-FUNGIBLE TOKENS (NFTS)



## 6529 CAPITAL
# INVESTING IN NFTS WITH AN NFT-NATIVE APPROACH

The goal of 6529 is to help investors make wise investments, while also supporting NFT-native and decentralization-oriented values. While at present, funds take on a traditional structure, we hope, in time, to reach a decentralized, tokenized end-state. Unlike traditional investing, investing in NFTs provides unique transparency in that the fund's NFT investments are visible and verifiable on chain (see the fund's wallets here).

NFT investing is difficult specifically due to its non-fungibility, with the market value fragmented across and within collections. We believe there is no substitute for individual expertise in order to succeed in this field. The 6529 Capital collecting team comprises those we believe are some of the best-regarded NFT collectors in the world.

Target investments include: diversified sets of NFTs across the PFP, generative art, 1of1 and photography categories. Secondarily, the fund may make early-stage investments in project teams and NFT infrastructure. Check out Living Architecture – Casa Batllo from our NFT Fund Galleries.

We abide by a Global Digital Rights Charter.

## NFT DELEGATIONS

Our Delegation Center allows users to manage by collection and complete the following tasks:

***DELEGATIONS***

- Mint with your hot wallet on behalf of your vault wallet
- Eliminate manual wallet mapping

***CONSOLIDATIONS***

- Use up to 3 wallets to manage your 6529 Collections NFTs
- Transfer NFTs between wallets without losing Total Days Held (TDH)

***DELEGATION MANAGEMENT***

- Give another wallet permission to handle delegations and consolidations on your behalf
- Increase your wallet security

## DATA DECENTRALIZATION FOR NFTS AND RECORDS

One of our goals is to demonstrate how applications can be built in a decentralized manner. Effectively all information on 6529.io comes from on-chain or public sources, or is derived in transparent ways from on-chain or public sources. This means anyone can replicate the data available on this site for a website or application of their own, without seeking permission from us and without any dependency on us. 6529 shares the source of all data displayed on 6529.io.

***ON-CHAIN (ETHEREUM)***

- The token #
- The location (URI/URL) of the JSON with the token's metadata
- The collectors' Ethereum addresses
- The collectors' NFTs currently owned, as well as bought, sold, or transferred
- ENS addresses of collectors

***ARWEAVE (DECENTRALIZED STORAGE)***

- The image of the art associated with each NFT
- The metadata for the NFT

***OPENSEA API***

- NFT listing prices on OpenSea

***INTERNAL DATABASE***

- 6529 Team addresses. A record of these can be found on Arweave here. We will move this list 100% on-chain in the coming weeks.

***INTERNALLY CALCULATED / COMPUTED***

- Thumbnail images to match the site design (transformed from the original image from Arweave)
- TDH values (calculated from on-chain data, using this formula. We will release sample code for this calculation soon)

***COMPILED 6529.IO DATA***

- Even though everyone can compile and calculate the same data as we do, we also export daily all our compiled and calculated data for the convenience of those without programming backgrounds
- Every day, we post our complete set of on-chain and calculated values shown on the site to Arweave as a CSV. The specific links can be found here

## FUND STRUCTURE AND APPROACH

Current 6529 funds are Delaware series limited partnerships focused on investing in what we believe to be a relatively small number of "blue chip" (high quality) NFTs that we believe will be important over time. The Master Partnerships intend to invest broadly across the three main categories of NFTs – PFPs, generative art and 1/1s.

The Master Partnerships' strategy is primarily to buy and hold these "blue chip" NFTs over a five to ten-year timeframe. Each of the Master Partnerships will have four quarterly vintages in 2022, each funded separately, that will purchase separate NFTs (the vintages do have the right to rollover undeployed capital into future vintages).

## THE MEMES

Memes are intersubjective myths. Memes are how all advanced societies organize themselves across large groups of people. Elections, politics, culture, brands, consumer behavior, cash-flows all derive from the most powerful memes in society at any given point in time.

The Memes is a collection of art NFTs whose goal is to spread the message of decentralization, in a way that tweetstorms, policy papers, and podcasts can't.

The Memes are large edition, CCO (public domain) NFTs that are actively encouraged to be spread far and wide, to be remixed, to be rememed and to be reinterpreted by the world at large.

We believe that permissionless NFTs on decentralized public blockchains should be used as the default ownership layer for digital objects—profile pictures, avatars, art, virtual spaces, game objects, identities and so on—and that application providers should reference that ownership layer. This is what we call "the open metaverse." We think whether our digital objects are recorded in centralized corporate databases or user-owned public blockchains is the most consequential technology decision in our society right now.

*Access more information here: 6529.io/capital*

## BIRINA HANDMADE

# NFT AUTHENTICATION FOR HANDMADE INDIAN GAMOSAS & APPAREL

The Gamosa handwoven cloth represents an article of profound cultural and traditional importance for the indigenous communities in Assam, India. The handloom weavers are mostly women who have inherited the art and skills of weaving the colorful rectangular cloths featuring intricate designs over generations.

## CHALLENGE

With the advent of machine-powered looms revolutionizing the textile industry in recent years, Assamese Gamosas are now being mass-produced outside Assam in machine looms that are destroying the eco-friendly history of Gamosas and the livelihoods of the women weavers. These 'counterfeit' Gamosas can destroy the entire Gamosa market – traceability is a dilemma.

## SOLUTION

Birina Handmade is working to empower the weavers while preserving the heritage of the Gamosa with blockchain technology. By recording each original Gamosa's provenance on blockchain, Birina can authenticate its origins and trace its journey directly from the artisan to the customer. Each beautifully handwoven cloth comes with a scannable QR code linking to the story of the woman who wove it. Traceability ensures authenticity.

Birina Handmade provides handmade Gamosas and apparel from the Assam region in India and uses the Algorand blockchain to provide NFT authentication of their products. A Gamosa is a meaningful piece of fabric for the people of Assam, worn much like a scarf throughout very old traditions.

Birina's weavers, designers, and tailors are mostly women from remote, marginalized communities of Assam. With "Birina Handmade", they can earn a decent living with their raw talents using the raw materials they source from the land.

## PROVIDING ACCESS TO GLOBAL MARKETS THROUGH WEB3

Blockchain technology can extend the reach of Assamese craftsmanship beyond regional boundaries, providing access to global markets and revenue streams. Birina Handmade connects weavers to international buyers, which is transforming Gamosa production into a transparent global marketplace that bridges a centuries-old tradition with digital technology of today. This is a case of technological innovation safeguarding cultural preservation, such that the Assamese heritage can thrive into the digital age.

*Learn more about Birina Handmade here.*

SECTION IX

# STANDARDS

## DIGITAL TOKEN IDENTIFIER FOUNDATION (DTIF)

# BRIDGING TRADITIONAL AND DIGITAL MARKETS: THE ROLE OF DIGITAL TOKEN IDENTIFIERS

The rise of digital assets is reshaping financial markets, presenting both opportunities and complexities. Distributed ledger technology (DLT) is being embraced by major institutions like the World Bank, European Investment Bank (EIB), and Hong Kong Government, all of which have issued digital bonds. Banks and market infrastructure providers are also increasingly using DLT to revolutionise the issuance, settlement, and trading of digital assets, aiming for greater efficiency and connectivity.

To fully unlock this potential, aligning traditional and digital markets through robust standards is critical. Globally recognised identifiers, like the International Securities Identification Number (ISIN), have long supported traditional finance. Digital Token Identifiers (DTIs) now complement ISINs by uniquely identifying digital assets on DLTs, fostering transparency and trust.

Regulatory bodies such as the European Securities and Markets Authority (ESMA) and the UK's Financial Conduct Authority (FCA) are leading the integration of DTIs into transparency frameworks. ESMA's MiFIR Review and the EU's Markets in Crypto-Assets (MiCA) regime have highlighted DTIs as essential tools for monitoring tokenised financial instruments and stablecoins. The UK's FCA also sees DTIs as crucial for tracking tokenised securities across multiple blockchains.

Similarly, tax authorities are increasingly considering how to manage the reporting of crypto assets.

To address concerns on inconsistent naming of crypto assets, DTI naming conventions and codes are increasingly being integrated into tax reporting guidelines and templates.

The OECD's user guide for its Crypto Asset Reporting Framework (CARF) and the US Internal Revenue Service 1099-DA form for crypto tax reporting are two recent examples which leverage the DTI standard for crypto asset identification.

The Association of National Numbering Agencies (ANNA) and the Digital Token Identifier Foundation (DTIF) are driving efforts to streamline market operations by mapping ISINs and DTIs. This integration enhances market transparency and simplifies processes like regulatory reporting, enabling straight-through processing (STP). Applications include linking ISINs and DTIs for DLT-based securities, stablecoins, and crypto-derivatives.

Progress is underway. Over 220 DLT-based securities have been mapped, and XT ISINs now identify more than 500 stablecoins and crypto assets. Collaboration with the Global Legal Entity Identifier Foundation (GLEIF) aims to further unify reference data across markets.

As digital assets evolve, cooperation among regulators, industry participants, and standards organisations will ensure the market remains transparent, innovative, and stable — bridging the gap between traditional and digital ecosystems.

## EUROCLEAR

# DIGITAL ASSET SECURITIES CONTROL PRINCIPLES (DASCP)

By 2030, the tokenisation of global illiquid assets is projected to be a $16 trillion business opportunity. However, progress on institutional adoption has reached an inflection point as firms continue innovating in silos, with small-scale initiatives that fail to progress or prioritise broad ecosystem development. In this context, Financial Market Infrastructures (FMIs) have a crucial role to play.

FMIs – historically, the linchpins of the financial system, facilitating clearing, settlement and record-keeping – are now supporting the integration of digital asset securities into the conventional financial fabric.

Euroclear has partnered with DTCC and Clearstream to lay out a blueprint for establishing an industry-wide digital asset ecosystem to drive acceptance of tokenised assets in the whitepaper 'Building the Digital Asset Ecosystem.' This paper introduces the Digital Asset Securities Control Principles (DASCP), utilising the organizations' combined decades of experience to effectively manage regulatory compliance and reduce operational risks.

### WHAT ARE DIGITAL ASSET SECURITIES (DAS)?

**DAS are securities that use distributed ledger technology (DLT) to represent rights similar to traditional securities. They include**:**

- Native security tokens issued directly on a blockchain
- Digital twins of existing securities (equity, debt, derivatives)
- Securities providing traditional rights (dividends, voting, interest)

### Framework Features

- Asset class and technology neutral
- Applies to the entire DAS lifecycle (issuance, clearing, settlement, custody, asset servicing)
- Excludes secondary trading activities
- Developed with input from over 20 market participants
- Designed to evolve through industry feedback

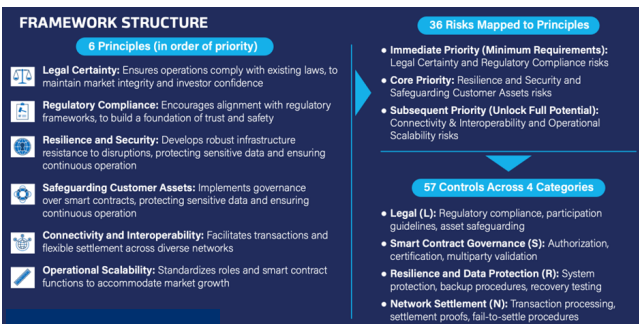
### Why DASCP? Framework Functions

- **Regulatory Compliance and Market Integrity:** Consistent with existing and evolving regulatory frameworks.
- **Risk Management:** Structured approach to identify, asses, and manage risks related to DAS
- **Market Adoption:** Clear guidelines reducing barriers to entry for DAS adoption
- **Interoperability and Efficiency:** Crucial for efficient transactions across market players
- **Building Trust:** Among issuers, investors, regulators, market participants

**Note: Cryptocurrencies, stablecoins, and CBDCs are excluded from this framework as money or money-like digital assets

DASCP proposes a set of principles outlining a safe and efficient ecosystem, identifies potential risks specific to digital asset securities and provides recommendations for controls to mitigate these risks. The six principles promote the successful adoption of tokenisation and digital asset securities.

In addition to the six core principles, the paper also presents a list of controls to help firms mitigate risks such as asset mismanagement or insufficient controls to govern smart contracts. Recommended controls include defining who can access smart contracts and maintaining a comprehensive record of digital asset events/transactions.




- *Access the report "Building the Digital Asset Securities Ecosystem" here.*
- *Access the GBBC Fact Card on DASCP here.*

## GLOBAL LEGAL ENTITY IDENTIFIER FOUNDATION (GLEIF)

# UNLOCKING THE POTENTIAL OF BLOCKCHAIN FOR REGULATED DIGITAL ASSETS - THE ROLE OF LEI AND VLEI

The Financial Stability Board founded the Global Legal Entity Identifier Foundation (GLEIF) in 2014. It has been tasked with supporting the implementation and use of the Legal Entity Identifier (LEI) ever since. LEI was established in the wake of the 2008 financial crisis, providing a distinct and unique identifier for entities involved in financial transactions. While the LEI system has significantly enhanced transparency in the financial sector, the rapid pace of digital transformation called for its evolution.

Recognizing the digital shift and the increasing need for verifiable digital identities, GLEIF promoted the evolution from LEI to Verifiable Legal Entity Identifier (vLEI). GLEIF's initiatives have been instrumental in setting the standards, protocols, and frameworks that underpin the vLEI system.

GLEIF stands as a crucial player in the world of digital identity verification. As the driving force behind the vLEI initiative, GLEIF's role is multifaceted, ensuring the system's integrity, reliability, and global acceptance.

## THE PROBLEM: IDENTITY GAPS IN BLOCKCHAIN-BASED FINANCIAL MARKETS

As financial institutions scale their blockchain strategies for regulated digital assets, a persistent roadblock remains: trusted, interoperable organizational identity. Regulatory compliance, risk management, and interoperability remain fragmented without a globally recognized mechanism to verify the legal entities involved in digital asset issuance, custody, trading, and servicing.

- *Lack of Organizational Identity Standards Across Chains:* Current blockchain ecosystems often lack a native, reliable way to verify who is issuing, holding, or transacting digital assets - especially across multiple ledgers and permissioned environments.

- *Fragmented Know Your Customer (KYC)/Anti-Money Laundering (AML) and Sanctions Screening:* Financial institutions must repeatedly identify and validate counterparties off-chain, leading to duplication, friction, and compliance risk.

- *Wallet Whitelisting Is Not Scalable:* Efforts like Project Guardian have demonstrated the shortcomings of wallet whitelisting to control access and maintain trust. This approach does not scale across entities, roles, and jurisdictions, especially as financial institutions seek interoperability across networks.

- *Regulatory Uncertainty and Siloed Implementations:* Different jurisdictions define digital asset rules at varying speeds. Without a common identity protocol, banks, asset managers, and other financial institutions risk vendor lock-in and limited scalability.

- *Inconsistent Onboarding Across Platforms:* Digital asset networks (e.g., tokenization platforms, DLT-based FMIs) onboard participants using bespoke processes, delaying scaling and interoperability.

## THE SOLUTION: ISO 17442 LEI AND VLEI AS INTEROPERABLE ORGANIZATIONAL IDENTITY ANCHORS

The Legal Entity Identifier (LEI) and its verifiable credential-based evolution, the vLEI, offer a globally standardized, regulator-recognized solution. They can serve as the foundation layer of organizational trust in digital finance—enhancing compliance, operational efficiency, and cross-platform interoperability.

- *LEI (Legal Entity Identifier):* A 20-character, alpha-numeric code that uniquely identifies legal entities engaged in financial transactions. Includes globally standardized reference data on the entity itself, mappings to other identifiers (ISIN, MIC, BIC, etc.), as well as a link to parent/children entities. It is already widely adopted by regulators and institutions worldwide.

- *vLEI (Verifiable Legal Entity Identifier):* A digitally signed credential that makes LEIs verifiable in real time on digital platforms.

vLEI provides strong identity assurance for organizations, authorized representatives (e.g., employees, systems, AI agents) as well as external parties engaged with that organization (client, supplier, etc).

## STRATEGIC BENEFITS FOR FINANCIAL INSTITUTIONS

- *Regulatory Compliance and Auditability:* LEI is already mandated in over 200 regulations worldwide. The Global LEI system was created by the Financial Stability Board and is overseen by the Regulatory Oversight Committee (70+ regulators from 50 countries). vLEI enables automated, cryptographically verifiable compliance across digital asset ecosystems.

- *Faster, Safer Onboarding Across DLT Networks:* LEI/vLEI allows asset managers, banks, custodians, and issuers to onboard to tokenization platforms, DeFi protocols, and DLT FMIs with trusted, reusable identity artifacts.

- *Interoperability Across Chains and Networks:* The vLEI can be integrated across permissioned and public chains, but also more traditional infrastructures, ensuring consistent entity identity in multi-network environments—critical for settlement, collateral, and risk calculations.

- *Reduced Fraud and Counterparty Risk:* Digitally verifiable credentials reduce impersonation risks and enable real-time counterparty validation, boosting trust in peer-to-peer or atomic transactions.

- *Operational Efficiency:* Machine-readable, portable vLEIs automate workflows such as role validation (e.g., who, at an institution, is authorized to issue or redeem tokens), reducing manual checks and reconciliation.

## REAL-WORLD USE CASES FOR REGULATED USE OF BLOCKCHAIN

- *Verification of Wallet Identity and KYC/AML Status:* vLEIs can be used to link wallets to real-world legal entities and optionally include KYC/AML verification attributes - either through role-based extensions or verifiable credentials issued by regulated virtual asset service providers (VASPs) or KYC providers.

This allows smart contracts, trading platforms, or custodians to confirm that counterparties involved in a transaction have undergone necessary identity checks, are not sanctioned, and are legally permitted to interact with regulated financial instruments. Unlike static whitelisting, this approach supports dynamic, policy-based compliance that can be enforced on-chain or off-chain and is interoperable across jurisdictions.

- *Verification of Smart Contract Issuers and Auditors:* With smart contracts underpinning asset issuance, trading, settlement, lending, staking, and more, trust in their origin is essential. vLEIs allow legal entities—such as token issuers, protocol developers, or third-party service providers—to digitally assert authorship and ownership of smart contracts. Similarly, smart contract auditors can use vLEIs to prove that a recognized, legally accountable entity has reviewed the code. These credentials can be referenced on-chain and verified off-chain in a portable way, support due diligence, and mitigate risks from unverified or malicious deployments.

Specifically:

- **Tokenized Securities Issuance**
- **Custody and Fund Administration Services**
- **DeFi Protocols with Institutional Onboarding**
- **Cross-Border Payment and Settlement Networks**
- **Proof of Reserves and Custodianship Declarations**

## CONCLUSION

To scale the promise of regulated digital assets, financial institutions need more than DLT—they need a digital trust public good that is recognized by regulators, respected across ecosystems, and resilient across jurisdictions. The LEI and vLEI deliver this trust.

GLEIF invites financial institutions, regulators, and technology providers to adopt the LEI/vLEI as the universal trust anchor for legal entities across the digital finance lifecycle.

- *Access more information about GLEIF: gleif.org*
- *Access more information about vLEI: gleif.org/en/organizational-identity/introducing-the-verifiable-lei-vlei*

## INTERWORK ALLIANCE (IWA)
# TOKEN TAXONOMY FRAMEWORK (TTF)

The InterWork Alliance (IWA), an initiative of Global Blockchain Business Council (GBBC), seeks to empower organizations to adopt token-powered services in their operations, promoting interoperability through standards and guidance for tokenization use cases. Created by Accenture, Digital Asset, Microsoft, and others, the IWA was initially formed under the Enterprise Ethereum Alliance (EEA) before spinning out to maintain platform neutrality.

IWA developed the Token Taxonomy Framework (TTF), a common-language, open-source framework used to define tokens, their data, and their behaviors. TTF is implementation-neutral, accommodates a range of use cases, and can have additional terms added as new topics are explored.



**TOKEN BASES**
the fundamental type of token being used (e.g., Fractional Fungible)



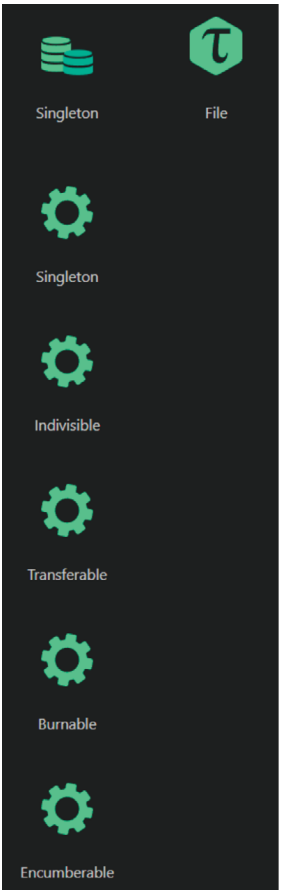
**BEHAVIORS**
actions that the token can exhibit (e.g., Transferable, Divisible)



**PROPERTY SETS**
data that the token contains (e.g., SKUs, Date Ranges)

### TTF STRUCTURE: TTF DEFINES TOKENS USING THE FOLLOWING ARTIFACTS

These artifacts are combined to create a Token Formula, outlining the structure of a token. The TTF may be extended to include new artifacts and support new use cases. The modular nature of the TTF allows for the reuse of artifacts between use cases.




*Example Token Formula for a Document: [tN{~d,t,s,e,b}+phFile]*

An example token definition for a Document is shown to the left. It is made up of a Singleton Token Base, five Behaviors, and one Property Set. The shorthand Token Formula is included below the image. This was generated using the Token Designer Tool, a sandbox environment to ideate tokens.

## BENEFITS OF THE TTF AND OUTPUT

Common standards for tokenization are key for interoperability and markets that function more effectively. Tokenization is expected to impact all industries and sectors, and TTF offers the following benefits:

- Allows for the definition of tokens using plain language and terminology
- Enables business and technical stakeholders to collaborate on token structures
- Serves as an educational/ workshop tool to discuss tokenization among stakeholders

- Composability and modularity enable the reuse of artifacts using open-source code

- Promotes interoperability by establishing common terminology and definitions

The TTF has been used by IWA working groups to define tokens and provide guidance for Voluntary Carbon Markets, Carbon Emissions Tokenization, and Digital Measurement, Reporting, and Verification (dMRV). Additionally, the TTF is being leveraged by use cases spanning supply chain, education, financial services, and beyond.

**NEXERA**

# MANAGING RWAS WITH THE NEXERA STANDARD (ERC-7208)

In recent years, there's been a growing trend of turning real-world assets—like buildings, gold, art, and even commodities—into digital tokens that can be bought, sold, and traded online. This process, known as **tokenization of real-world assets (RWAs)**, makes investing in valuable assets easier, even if just in small part.

One big challenge is ensuring these RWAs follow each country's laws and rules where they are traded, and those purchasing the assets do so. With the **Nexera Standard (ERC-7208)**, we now have a smart way to ensure that tokenized assets stay compliant with these rules, no matter where they're being traded. Let's explore how this technology helps keep things simple, fair, and legal.

## THE CHALLENGE: DIFFERENT RULES IN DIFFERENT COUNTRIES

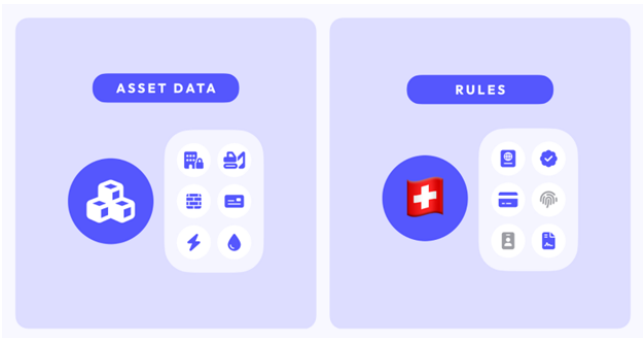
Every country has rules about buying and selling assets, especially important assets like houses, land, or gold. For example:

- Some countries need you to show proof of identity before you can buy or sell
- Others only allow certain people to own certain kinds of assets
- Countries might have different parameters, such as credit scores, that determine asset purchasing

This makes managing these assets tricky when people buy and sell them worldwide.

## HOW THE NEXERA STANDARD (ERC-7208) ENSURES CROSS-JURISDICTIONAL COMPLIANCE

The core of the Nexera Standard is its ability to separate an asset's **data** (the core information stored on the blockchain) from **rules** (the instructions on how that data behaves within different token standards). This separation allows data to adhere to multiple sets of rules at the same time.

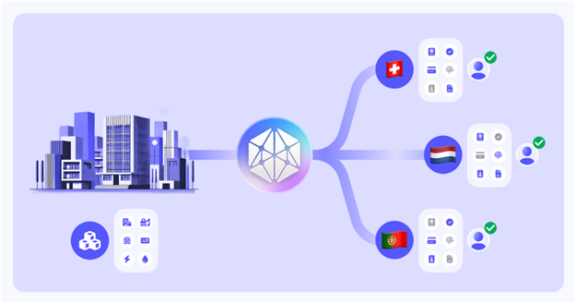



Here is how it works:

1. **One Set of Information for Each Asset -** Instead of having different versions of the asset for every country, we keep one main version with all the important information.

2. **Different Interfaces for Each Country's Rules -** Each country has laws that tell us what rules we need to follow. These guides are special sets of code, and by enabling them, the Nexera Standard (ERC-7208) ensures that every purchase is made correctly, following the laws of the country involved.

3. **Transferring Assets Between Countries -** The Nexera Standard ensures that both the person who owns the asset and the person who utilizes the asset must comply with the given laws before utilizing the asset. If they don't, asset activity is paused until they do.



The Nexera Standard enables cross-border fractional ownership of RWAs by exposing different compliance properties to buyers in different jurisdictions.

## THE NEXERA STANDARD'S OMNICHAIN CAPABILITIES

One of the most powerful features of the Nexera Standard is its **omnichain capabilities**, ensuring that tokenized assets are accessible and tradable across multiple blockchains simultaneously.

For example, imagine a luxury apartment building in New York that has been tokenized into digital shares. These shares need to follow the rules of different countries, ensuring that only eligible investors can buy or trade them. They also need access to a broad liquidity pool to make trading more efficient.

The Nexera Standard's omnichain functionality enables seamless, legal, and transparent trading across blockchain communities, expanding market access, enhancing liquidity, and ensuring full compliance within a connected system.

## WHY THIS IS IMPORTANT

By using the Nexera Standard, we can ensure that real-world assets like buildings, gold, or art can be traded worldwide in a way that's safe, fair, and legal. It helps keep everything organized and compliant, even when different countries have different rules.

*Read more: [nexera.network/stories/managing-rwas-with-the-nexera-standard-erc-7208](nexera.network/stories/managing-rwas-with-the-nexera-standard-erc-7208)*

## PEARSON

# CONVERGENCE OF EMERGING TECHNOLOGIES FOR SUCCESS

It is irrefutable to say that material global progress has been made to advance the role of blockchain and digital assets shaping the future of our economies and societies everywhere around us. The **combinatorial power of AI, Blockchain, and Extended Reality** may be the most impactful aspect of emerging innovations. The world's institutions globally are recognizing the importance of innovating responsibly for the future, with increasing recognition of the role of collaboration to fuel our future and intelligent age. The tide is turning, and the doors are flinging open for emerging technologies to underpin virtually all our industries and activities.

With blockchain technology, the world is being transformed by the power of digital trust, allowing stakeholders globally to access the same data, ensuring its security and protection, and verify its provenance. This digital trust, when paired with AI and the convergence of emerging technologies, further multiplies the opportunities ahead. In this context, we are continuing our unwavering commitment to the future of **tokenized identity, money, and objects.**

There has been incredible progress around digital wallet infrastructure and what it can unlock, with fascinating projects globally starting to apply it. In the European Union, this is a focus area of member states selecting digital wallet infrastructure with the Electronic Identification, Authentication, and Trust Services (eIDAS) regulation, which intends to foster the safety, speed, and efficiency of electronic exchanges. The formation of the Global Acceptance Network (GAN) also calls for the need to break data silos, where the need for decentralized digital trust, as a public utility, becomes front and center.

Many of these developments highlight the importance of schema creation for the acceptance of credentials.

With widespread access to data, our world today has become increasingly about lifelong learning, and the broad scope of learning opportunities becomes truly global when it comes to digital infrastructure and trust. As the fields of education and workforce become transformed by technology, proving credentials in the digital world becomes core. How do we best prove what we know, and use that proof to get to our next job and stage of life? Digital wallet infrastructure and agentic AI systems can perform a wide range of valuable tasks for individuals, reducing the barriers of opportunity and improving access to global networks of exchange.

## ACQUISITION OF CREDLY FAST TRACKED PEARSON'S CREDENTIALING LEADERSHIP

Pearson acquired Credly in 2022 to expand the company's global presence in the workforce skills sector.

Credly is the world's leading digital credentialing platform that empowers learning & training providers, educational institutions, and enterprises to recognize skills and achievements with verified, portable credentials. By turning learning outcomes into shareable, data-rich credentials, Credly provides the labor market with a trusted source of workforce skills data while helping individuals showcase their abilities and unlock new opportunities for growth and employment.

Nearly 4,000 organizations use Credly to issue and verify credentials, with Credly having issued 110 million credentials to 51 million unique individuals since its inception in 2013, making it the world's largest professional credentialing marketplace.

## FUTURE OUTLOOK

With the fast pace of technological change, Pearson continues its commitment to advancing and exploring innovative and emerging technology and exploring to maximize the learning outcomes for learners and educators. We must also continue our focus toward responsible innovation to ensure resiliency, regulatory compliance, and reliability which ultimately make these developments sustainable for the long term.

# U.S. COMMODITY FUTURES TRADING COMMISSION (CFTC)

# PUBLIC PRIVATE COLLABORATION TO ADVANCE RESPONSIBLE INNOVATION

This case study highlights how collaboration between public and private entities can advance major work for blockchain and digital assets. GBBC co-chairs the Digital Asset Taxonomy and Digital Asset Infrastructure Working Groups under Global Markets Advisory Committee (GMAC) - Digital Asset Market Subcommittee (DAMS) of the U.S. Commodity Futures Trading Commission (CFTC). In this role, GBBC has collaborated closely with DAMS Co-Chairs from BNY Mellon and Franklin Templeton, convening key stakeholders including large global banks, crypto native firms, international organizations, and regulatory entities, to reach consensus and agreement on themes that are critical for the scaling of blockchain and digital assets. Over the course of 2024, DAMS has approved major advancements in taxonomy and tokenized collateral, and it will continue to build on these and other key workstreams in 2025.

## TAXONOMY

GBBC, alongside co-chairing organization GFMA, presented the recommendations and publication of the *Digital Asset Classification Approach and Taxonomy*, put forth by the Digital Asset Markets Subcommittee (DAMS) working group on taxonomy, during the Global Markets Advisory Committee (GMAC) Meeting at the CFTC on March 6.

This taxonomy was passed by majority vote and adopted. It reflects the consensus of key stakeholders who came together over several months to agree upon digital asset categories and definitions. According to the recommendation, *"A clear, consensus-driven approach to classifying assets and the functions they serve underpins robust markets and effective regulation... This Approach aims to set out consistent language for participants in the digital asset ecosystem to promote innovation, identify and address risk considerations, and enable effective regulatory understanding."*

The taxonomy, by identifying major categories of digital assets and specific instruments they entail, is intended to facilitate a use case-driven approach. It provides insight on the features of digital assets, introduces a framework to categorize them, and provides baseline definitions under each category for relevant assets and instruments. The framework is aimed to assist policymakers and market participants to engage effectively and to work collaboratively as digital asset markets continue to innovate.

## INFRASTRUCTURE

GBBC, alongside DAMS leadership and co-chairs, has developed and published a functionality survey for web3 blockchains and distributed ledger technology (DLT) protocols to provide insights. We directly reached out to 80+ blockchains and DLTs over a 6-month period. The data collected will play a pivotal role to delineate and distinguish the diverse infrastructure and features constituting the digital asset ecosystem. The purpose is to support a better understanding of various blockchain networks. It is part of an effort to harmonize best practices and standards to scale these technologies, from Layer 1 (L1) protocols, to hybrid blockchains and private DLTs.

Insights from those who complete the survey, and additional feedback following the survey, have been collected and analyzed, with a focus on infrastructure attributes, interoperability considerations, risks and mitigants, and finally definitions and taxonomy. In the future, the data collected can be helpful for continued regulatory engagement and may contribute to craft recommendations for a regulatory framework for Digital Asset Infrastructure.

## TOKENIZED COLLATERAL

DAMS has unanimously approved and advanced recommendations for the use of non-cash collateral using distributed ledger technology. The *Digital Asset Markets Subcommittee Recommendations to Expand Use of Non-Cash Collateral through Use of Distributed Ledger Technology* mark a significant milestone for capital markets.

With US regulatory clarity regarding tokenized non-cash collateral, initial steps can be taken to pursue opportunities in US derivatives markets, while ensuring the same guardrails and market integrity measures remain in place. The recommendations provide a framework for market participants to apply existing policies, procedures, practices, and processes toward the application of DLT as non-cash collateral, in a manner that remains consistent with existing margin requirements.

## VERRA

# STREAMLINING STANDARDIZED SOLUTIONS FOR CARBON MARKETS

Verra, a global leader advancing climate action and sustainable development, is working with Hedera Foundation to accelerate the development of digital tools that can enhance the transparency, auditability, and integrity of methodologies and monitoring systems in carbon markets using the Hedera Guardian.

Verra is the first standards body in the global carbon market to integrate with Hedera Guardian, a leading open-source platform funded by the Hedera Foundation and powering the digital economy. The integration enables faster, more automated project processes and lays the foundation for a more scalable, high-integrity carbon market built on trust and transparency.

The Hedera Guardian integrates directly with the Verra Project Hub, the standard setter's online platform that supports streamlined project development, registration, and review processes and feeds directly into the Verra Registry. This integration produces benefits including:

- Allowing project developers to access updated digitalized methodology information for optimal predictability from project registration to credit issuance;
- Enabling users to easily manage projects that use digitalized methodologies with additional digital tools that streamline workflows and surface key insights;
- Streamlining processes for users to search, analyze, and apply data, while respecting the confidentiality of project proponent submission; and

- Housing a digital-first user experience to enable the easy integration of all project-related processes, including digital monitoring, reporting, and verification (dMRV), which results in easily accessible data for faster turnarounds of reviews and requests, improving the overall client experience and expediting the issuance process.

The collaboration will also enable open-source software contributors to lead the way in digitalizing additional methodologies, with financial incentives of up to $5,000 per methodology provided by the DLT Earth Bounty Program.

Overall, the collaboration helps create a more transparent, verifiable system of record that supports Verra's broader effort to digitalize the project lifecycle for as many projects as possible. The effort is driven by Hedera's open-source framework, which empowers the global carbon market community to innovate and scale climate solutions faster and more transparently than ever before.

The collaboration was announced at the site of the ALLCOT Blue Carbon (ABC) Mangrove Restoration Project in Senegal (Verra Project 4653), which is requesting registration with Verra's VCS Program and its Climate, Community & Biodiversity Standards (CCBS) Program. The project uses the digitalized version of VM0033 Methodology for Tidal Wetland and Seagrass Restoration and will be the first project to benefit from the collaboration, enabling the project to automate the creation and submission of its project design document.

A five-year capital investment from the Hedera Foundation will further accelerate Verra's digitalization efforts, including a commitment to digitalize an additional 20 methodologies this year, helping to grow Hedera Guardian's library of digitalized and open-source methodologies.

SECTION X

# SUPPLY CHAINS



## IOTA

# TRADE WORLDWIDE INFORMATION NETWORK (TWIN)

Global trade is the backbone of the world economy; yet it remains constrained by outdated, paper-based processes that create inefficiencies, delays, and increased costs. Trade Worldwide Information Network (TWIN) is transforming global trade by providing a digital infrastructure that enhances transparency, efficiency, and accessibility of trade-related data.

TWIN is a neutral, open-source infrastructure running on the IOTA distributed ledger protocol, designed to enable trusted digital exchange and coordination of trade-related data between organizations. Each stakeholder, whether a business, logistics provider, or government agency, has its own system for managing trade data, often leading to siloed, inefficient processes. TWIN bridges these gaps by allowing data to be exchanged in a way that ensures authenticity, integrity, and compliance with international standards.

Built for interoperability, TWIN adheres to global data models and technical standards, ensuring compatibility with industry systems and regulatory frameworks. By leveraging distributed ledger technology, TWIN reduces errors in trade documentation and improves risk screening for border agencies. Its automated data exchange through REST APIs has demonstrated significant efficiency gains, cutting export and import processing times and costs by 20-50%.

## REAL-WORLD IMPACT AND USE CASES

TWIN is already driving change across multiple regions and industries:

- **Trade and Logistics Information Pipeline (TLIP):** Deployed in East Africa through a partnership between TradeMark Africa and the IOTA Foundation, TLIP enables Kenyan exporters and logistics providers to exchange trade data digitally. By integrating with government agencies, TLIP streamlines document authentication, reducing delays and building trust.

- **UK Ecosystem of Trust Trials:** TWIN technology has been tested since spring 2024 by UK government departments and border agencies under the Border 2025 Strategy. It has successfully digitized trade flows for products like coffee, tea, and frozen goods, demonstrating its ability to optimize customs processes and improve supply chain visibility.

- **Responsible Supply Chains and Logistics Due Diligence (RESULD):** Focused on fruit and vegetable supply chains between Kenya, the Netherlands, and the UK, RESULD integrates TWIN to ensure traceability and accountability from farm to table.

- **MISSION (Maritime Just-in-Time Optimization):** This initiative enhances port efficiency by leveraging TWIN to reduce congestion, optimize fuel consumption, and improve real-time logistics coordination.

- **Trade Finance:** TWIN supports the digitization of commercial invoices, a critical step in enabling trade finance solutions such as invoice factoring and automated risk assessment. By standardizing digital trade documentation, TWIN improves access to financing, reduces transaction costs, and accelerates payment cycles.

## A COLLABORATIVE ECOSYSTEM FOR TRADE DIGITALIZATION

TWIN is a collaborative effort backed by six leading organizations: the IOTA Foundation, TradeMark Africa, the World Economic Forum, the Global Alliance for Trade Facilitation, the Tony Blair Institute for Global Change, and the Chartered Institute of Export and International Trade. Actively expanding its reach, TWIN is in discussions with the Secretariat for the African Continental Free Trade Agreement for continent-wide collaboration. By providing a neutral, scalable digital infrastructure, TWIN is paving the way for the next era of trade where trust, efficiency, and innovation drive global economic growth.

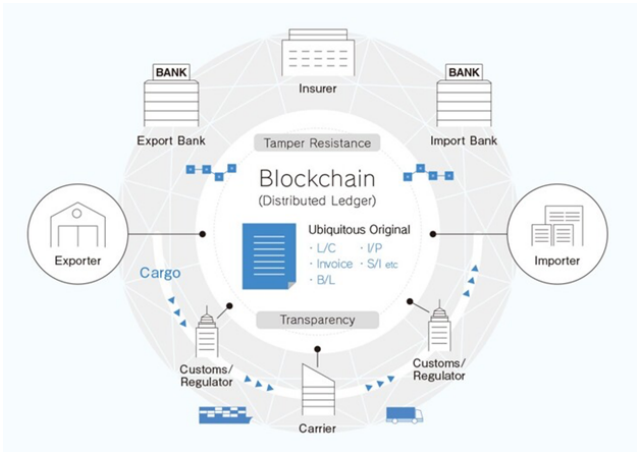
## LF DECENTRALIZED TRUST

# TRADEWALTZ: CREATING THE FUTURE OF GLOBAL TRADE

TradeWaltz™ is a cross-industry trade-information collaboration platform built on Hyperledger Fabric. It was built to address inefficiencies in global trade by digitizing documentation and streamlining communication among stakeholders. Traditional trade processes rely heavily on paper-based transactions, which are time-consuming, costly, and difficult to manage across geographies. The challenges became more apparent during the COVID-19 pandemic when global supply chains faced disruptions due to the inability to process physical documents remotely. Recognizing the need for a digital transformation, TradeWaltz developed a blockchain-powered platform that enables real-time, secure, and transparent trade operations.

The platform was developed in collaboration with NTT Data and leverages Hyperledger Fabric to ensure data integrity and security while allowing multiple stakeholders—including banks, insurance companies, government agencies, and logistics providers—to interact efficiently. TradeWaltz connects users through a digital interface that integrates with existing enterprise systems, eliminating the need for extensive infrastructure changes. The use of blockchain provides a tamper-resistant record of transactions, ensuring compliance with trade regulations while reducing fraud and errors.

Since its implementation, TradeWaltz has demonstrated measurable improvements in efficiency. The platform has digitized approximately 85–90% of standard trade documents, reducing administrative burdens and enabling remote work. Initial pilot projects showed a 47% increase in cross-industry communication efficiency, with transaction times significantly reduced across different markets.




Beyond digitization, TradeWaltz is working to enhance the platform with additional features that add value to global trade operations. Future developments include digitized compliance checks for hazardous materials, real-time credit ratings based on transaction history, and IoT-enabled shipment tracking for increased transparency. The platform has also successfully tested interoperability between Hyperledger Fabric and Ethereum-based financial networks, demonstrating the potential for seamless integration across different blockchain systems.

TradeWaltz aims to continue expanding its network and services to support a fully digital trade ecosystem. By improving accessibility, particularly for small and medium-sized enterprises, the platform reduces barriers to entry and lowers operational costs for companies looking to engage in international trade. With ongoing enhancements and increasing industry adoption, TradeWaltz is positioned to play a key role in shaping the future of global trade by making processes faster, more secure, and more efficient.

*Additional details can be found at [lfdecentralizedtrust.org/case-studies/how-tradewaltz-is-using-hyperledger-fabric-to-create-the-future-of-global-trade](lfdecentralizedtrust.org/case-studies/how-tradewaltz-is-using-hyperledger-fabric-to-create-the-future-of-global-trade)*

## PARAVELA
# PARAVELA'S SECURE SUPPLY CHAIN

## PROBLEM
Ensuring product integrity in today's global supply chains is increasingly complex. The electronics manufacturing industry in particular faces major challenges related to counterfeiting, regulatory compliance, and sustainability.

Recent research estimates that the global trade in counterfeit goods could reach US$1.79 trillion by 2030—marking a 75% increase from 2023 levels and growing 3.6 times faster than the global economy. These alarming figures underscore the urgent need for solutions that can verify the legitimacy of products and reduce the risk of counterfeiting and fraud.

At the same time, new regulations—such as the EU Ecodesign for Sustainable Products Regulation—are pushing for enhanced circularity, energy efficiency, and sustainability for products.

However, traditional manufacturing and supply chain systems remain opaque and fragmented, making it challenging to trace product origins—from raw materials and components to assemblies—and verify their authenticity, ownership, and location, both within and beyond the factory. This lack of transparency creates opportunities not only for fraud and inefficiencies, but also ethical issues such as sourcing from suppliers in conflict regions or with exploiting labor practices.

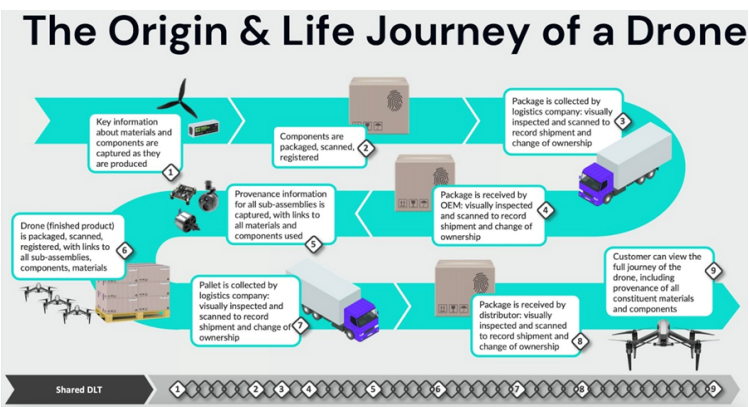
## SOLUTION
Building on widely recognized open standards and leveraging its blockchain-backed provenance platform, **Paravela has developed a comprehensive provenance domain—the Secure Supply Chain**. This solution enables end-to-end traceability for products, capturing data about their materials, components, assembly, packaging, ownership, location, and more throughout their lifecycle—both within and beyond the factory.

Key Features:

- **Unified Traceability:** Integrates external supply chain provenance with internal manufacturing traceability, delivering a single, accessible source of truth for all participating organizations.
- **Open Standards:** Incorporates the W3C PROV family of specifications and all event types specified in the IPC-1782 standard, while aligning with NIST's Supply Chain Traceability: Manufacturing Meta-Framework.
- **Decentralized Collaboration:** Utilizes blockchain technology to ensure secure data sharing across supply chain participants, eliminating the need for complex integrations or third-party intermediaries.

## WHAT SETS IT APART?

The uniqueness of Paravela's approach lies in its seamless integration of blockchain technology with a common provenance domain language grounded in open industry standards. This enables a comprehensive provenance and traceability solution that tackles the long-standing challenge of ensuring product integrity across the entire supply chain—from materials and components to assemblies and finished goods, and everything in between.



## BENEFITS

Paravela's Secure Supply Chain paves the way for a new era of supply chain management within the electronics manufacturing industry, delivering:

- Improved regulatory compliance
- Effective counterfeit prevention
- Increased supply chain resilience
- Verifiable circular economy and sustainability practices

By implementing a secure, transparent, and collaborative approach, we aim to lay a solid foundation for the future of global electronics manufacturing—with broad applicability across multiple industries and supply chains.

## TCS BLOCKCHAIN, INC. (TCS)

# SOLVING THE TRADE FINANCE EPIDEMIC IN THE $2T+ NORTH AMERICAN TRANSPORTATION INDUSTRY

TCS has a "main street" use case solving the largest problem in American supply chains: the cost and time associated with trade finance. TCS supports small businesses and essential businesses, and TCS settlement makes transportation companies more solvent, strengthening 'food security' in the supply chain. Reducing the costs of trade finance puts downward pressure on freight rates, which can benefit households and consumers (especially low-income constituencies). TCS is utilizing a utility token to make transportation more profitable for truck drivers.

## PROBLEM: DIRECT PAYMENT TERMS (FROM SHIPPERS) TAKE 30-180 DAYS IN THE U.S. & CANADA

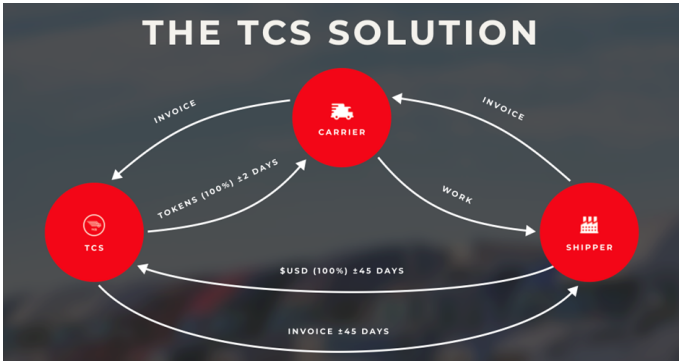
- Carriers (Users) cannot wait to get paid, and are often forced to "factor" freight invoices
- Factoring results in net revenue losses often greater than 50%, and high costs of capital flow downhill impacting cost of goods

***STATISTICS***

- Number of transport companies failed or insolvent (2022-2025): 50,000
- Losses in net revenue by carriers who "factor": >50%

## SOLUTION: TCS UTILIZES A PROPRIETARY MOBILE APP, AI AND A BLOCKCHAIN-AS-A-SERVICE PLATFORM (BAAS) TO INCREASE THE SPEED AND REDUCE COSTS OF SETTLEMENT BY UP TO 90%

- TCS can also increase the security of invoice settlement by utilizing products that screen wallet addresses for authenticity prior to settlement
- TCS is up to 90% faster and cheaper than "factoring"




TCS Blockchain is also a trade finance company. At scale, the TCS network can eliminate billions in annual intermediary costs throughout global supply chains, and this tranche of savings can transfer to consumers, households and small businesses. TCS endeavors to provide needed relief to the companies creating the backbone for developed economies, and to reduce the aggregate cost of consumer packaged goods, food, and related products in an era of rampant inflation.

A digital asset functioning as a synthetic commodity can be utilized to eliminate costs associated with trade finance (known in most industries as "factoring"). In the transportation industry, factoring companies (banks and intermediaries) charge unreasonably high interest rates – usually exceeding 25% annualized – with a true cost often exceeding 50% of a carrier's net revenue on every load of freight. These fees lead to artificially increased shipping costs for all, trickling down to every consumer and household when they purchase goods from grocers and retailers. In effect, there is a silent Value Added Tax (VAT) in supply chains that every consumer is paying – atop inflation.

TCS, a blockchain-as-a-service (BaaS) company, has created a solution for settlement, allowing transportation Users to exchange (barter) collection rights in freight invoices for digital assets (TCS Tokens) – with no USD (fiat) exchanged. To avoid volatility and slippage, Users can then immediately sell TCS tokens to gain USD liquidity on exchanges, and recapture invoice values.

In so doing, TCS provides faster and cheaper settlement services to transportation companies. Many of these Users are forced to factor today, as they cannot wait the industry standard 30-180 days for payment. These Users also haul 90% of the full truckload "spot" capacity in America every day. Without them, every grocer and retailer would be rationing products within a week. Collectively, in the US and Canada, Users are factoring nearly $1T per year in commercial paper, though the total addressable market in North America exceeds $2T annually. As TCS also serves as the buyer of last resort on exchanges, the economic models advanced here conclude in a fully sustainable and deflationary monetary policy, with guaranteed supply and demand that aligns incentives for all participants in the transportation industry, a faster and cheaper solution is long overdue. TCS has solved factoring and – with a dream team of strategic partners—the solution is now advancing to market at scale.

## HOW IT WORKS




*Want to Learn More? Check Out Our Site: tcsblockchain.com*

*Read our whitepaper here: tcsblockchain.com/tcs_whitepaper_v3.pdf*

APPENDIX I

# GLOSSARY



Below is a selection of acronyms for organizations, regulatory developments, and common industry terms used throughout this use case handbook. While this list is not all-encompassing, we hope to provide a selection of basic terms that can make this space understandable to all audiences. **We have done our best to provide definitions, but this is not a comprehensive list. We have only focused on identifying the most relevant ones.**

- For a comprehensive list of industry terms and definitions, access GBBC's **Global Standards Mapping Initiative** taxonomy here.
- For educational infographics on key concepts, access GBBC resources here.

## ORGANIZATIONS & REGULATIONS

| Acronym | Term | Link |
|---|---|---|
| **ABC** | ALLCOT Blue Carbon (ABC) Mangrove Restoration Project - Senegal | https://registry.verra.org/app/projectDetail/VCS/4563 |
| **ABMI** | Asian Bond Markets Initiative | https://asianbondsonline.adb.org/ |
| **ADB** | Asian Development Bank | https://www.adb.org |
| **ANNA** | Association of National Numbering Agencies | https://anna-web.org |
| **ASEAN** | Association of Southeast Asian Nations | https://asean.org |
| **ATS** | Hedera Asset Tokenization Studio | https://hedera.com/asset-tokenization-studio |
| **AXOL** | AsiaNext orchestration layer | https://www.asianext.com/axol-main/ |
| **BDAN** | Busan Digital Asset Nexus | https://www.businesskorea.co.kr/news/articleView.html?idxno=227972 |
| **BIF** | Blockchain Infrastructure Forum | https://bif.institute |
| **BIS** | Bank for International Settlements | https://www.bis.org |
| **CARF** | Crypto-Asset Reporting Framework | https://www.oecd.org/en/publications/2024/10/crypto-asset-reporting-framework-xml-schema_d15d81d3.html |

| Acronym | Term | Link |
|---|---|---|
| **CBAM** | Carbon Border Adjustment Mechanism | https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en |
| **CCBS** | Climate, Community, and Biodiversity Standards | https://verra.org/programs/ccbs/ |
| **CFTC** | Commodity Futures Trading Commission (US) | https://www.cftc.gov |
| **CFTC - GMAC** | Global Markets Advisory Committee (US CFTC) | https://www.cftc.gov/About/AdvisoryCommittees/GMAC |
| **CFTC - GMAC - DAMS (or DAM)** | Digital Asset Market Subcommittee (US CFTC) | https://www.cftc.gov/About/AdvisoryCommittees/GMAC |
| **CSIF** | Cross-Border Settlement Infrastructure Forum | https://asianbondsonline.adb.org/csif-briefs.php |
| **DASCP** | Digital Asset Securities Control Principles | https://www.dtcc.com/-/media/DASCPWhitePaper.pdf |
| **DCE** | Digital Certificate of Entitlement | https://www.unjspf.org/for-clients/digital-certificate-of-entitlement/ |
| **DHI** | Druk Holding & Investments | https://www.dhi.bt |
| **DMV** | Department of Motor Vehicles (for US State of California) | https://www.dmv.ca.gov/portal/ |
| **DSDC** | Digital Securities Depositary Corporation | https://www.dsdc.net |
| **DSS** | Digital Securities Sandbox | https://www.bankofengland.co.uk/financial-stability/digital-securities-sandbox |
| **DTCC** | Depository Trust & Clearing Corporation | https://www.dtcc.com |
| **DTIF** | Digital Token Identifier Foundation | https://dtif.org |
| **ECB** | European Central Bank | https://www.ecb.europa.eu/ |
| **EEA** | Enterprise Ethereum Alliance | https://entethalliance.org |
| **EIB** | European Investment Bank | https://www.eib.org/ |
| **FATF** | Financial Action Task Force | https://www.fatf-gafi.org/ |
| **FCA** | Financial Conduct Authority (UK) | https://www.fca.org.uk |

| Acronym | Term | Link |
|---|---|---|
| **FF** | Filecoin Foundation | https://fil.org |
| **FINMA** | Financial Market Supervisory Authority (Switzerland) | https://www.finma.ch/ |
| **FSB** | Financial Stabiltiy Board | https://www.fsb.org |
| **GAN** | Global Acceptance Network | https://www.gan-global.org |
| **GBBC** | Global Blockchain Business Council | https://www.gbbc.io |
| **GCN** | Global Collateral Network | https://www.prnewswire.com/news-releases/digital-asset-and-euroclear-start-first-project-phase-to-increase-the-mobility-of-collateral-assets-through-the-canton-network-302384365.html |
| **GFMA** | Global Financial Markets Association | https://www.gfma.org |
| **GLEIF** | Global Legal Entity Identifier Foundation | https://www.gleif.org |
| **HCS** | Hedera Consensus Service | https://hedera.com/consensus-service |
| **HKMA** | Hong Kong Monetary Authority | https://www.hkma.gov.hk |
| **HKT** | Hong Kong Telecom | https://www.hkt.com/ |
| **IBRD** | International Bank for Reconstruction and Development | https://www.worldbank.org/en/who-we-are/ibrd |
| **ICVCM** | Integrity Council for the Voluntary Carbon Market | https://icvcm.org/ |
| **ICMA** | International Capital Market Association | https://www.icmagroup.org/ |
| **IDA** | International Development Association | https://ida.worldbank.org/ |
| **IDB or IADB** | Inter-American Development Bank | https://www.iadb.org/ |
| **IFAD** | International Fund for Agricultural Development | https://www.ifad.org/ |
| **IFC** | International Finance Corporation | https://www.ifc.org/ |
| **ISSA** | International Securities Services Association | https://issanet.org/ |
| **ISO** | International Organization for Standardization | https://www.iso.org/ |

| Acronym | Term | Link |
|---|---|---|
| **IWA** | InterWork Alliance - GBBC | https://www.gbbc.io/interwork-alliance |
| **JFSA** | Financial Services Agency of Japan | https://www.fsa.go.jp/ |
| **LF** | Linux Foundation | https://www.linuxfoundation.org |
| **LFDT** | Linux Foundation Decentralized Trust | https://www.lfdecentralizedtrust.org |
| **LM** | Lockheed Martin | https://www.lockheedmartin.com/ |
| **MCV** | Mercy Corps Ventures | https://www.mercycorps.org/ |
| **MiCA** | Markets in Crypto-Assets Regulation (EU) | https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1114 |
| **MiFID** | Markets in Financial Instruments Directive (EU) | https://eur-lex.europa.eu/eli/dir/2014/65/oj/eng |
| **MR** | Moody's Ratings | https://ratings.moodys.io |
| **NARA** | National Archives and Records Administration (US) | https://www.archives.gov |
| **NIST** | National Institute of Standards and Technology | https://www.nist.gov |
| **PCN** | Provenance Chain™ Network | https://www.theprovenancechain.com |
| **QCB** | Qatar Central Bank | https://www.qcb.gov.qa/ |
| **QFC** | Qatar Financial Center | https://www.qfc.qa/ |
| **SCBHK** | Standard Chartered Bank Hong Kong | https://www.sc.com/hk/ |
| **SDGs** | United Nations Sustainable Development Goals | https://sdgs.un.org/goals |
| **TCS** | TCS Blockchain, Inc. | https://www.tcsblockchain.com |
| **TFR** | Transfer of Funds Regulation (EU) | https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1113&qid=1704828669920 |
| **TTF** | Token Taxonomy Framework - GBBC - IWA | https://www.gbbc.io/interwork-alliance/token-taxonomy-framework |
| **TWIN** | Trade Worldwide Information Network | https://www.twin.org/home |

| Acronym | Term | Link |
|---|---|---|
| **UN** | United Nations | https://www.un.org/ |
| **UNDP** | United Nations Development Programme | https://www.undp.org/ |
| **UNJSPF** | United Nations Joint Staff Pension Fund | https://www.unjspf.org |
| **USDA** | U.S. Department of Agriculture | https://www.usda.gov |
| **VCS** | Verified Carbon Standard Program | https://verra.org/programs/verified-carbon-standard/ |
| **WFP** | UN World Food Programme | https://www.wfp.org |

## TERMS

| Acronym | Term | Definition |
|---|---|---|
| **AI** | Artificial Intelligence | Refers to the capability of a system to acquire, process, and apply knowledge to perform tasks that typically require human intelligence (ISO) |
| **AML** | Anti-money laundering | A set of policies and procedures designed to combat money laundering (FATF) |
| **AMM** | Automated Market Maker | Component of the decentralized finance (DeFi) ecosystem, enabling permissionless and automatic trading of digital assets (Coinbase) |
| **API** | Application Programming Interface | A set of functions and protocols that application software uses to invoke services and provide greater functionality to applications or to websites. (ISO) |
| **BTC** | bitcoin (currency) | Bitcoin, launched in 2009, was the first decentralized convertible virtual currency, and the first cryptocurrency. (FATF) |
| **CASP** | Crypto-Asset Service Providers | A service provider that conducts a wide range of activities relating to crypto-assets, including but not limited to, admission to trading, trading (as agent or principal), operating a market, custody, and other activities such as services relating to lending/staking of crypto-assets and the promotion and distribution of crypto-assets on behalf of others. (IOSCO) |

| Acronym | Term | Definition |
|---|---|---|
| **CBDC** | Central Bank Digital Currency | Digital tokens representing a claim on a central bank for a fixed amount of central bank money denominated in a single currency; also, a liability of a central bank, with no credit or liquidity risk. It may or may not be programmable. (CFTC - GMAC) |
| **CET** | Carbon Emissions Tokens | A token representing a specified volume of metric tons of greenhouse gas emissions; distinguishes between the scope and category of emissions being reported. (GBBC - IWA) |
| **CSD** | Central Securities Depository | Central securities depository: an entity that provides securities accounts, central safekeeping services and asset services, which may include the administration of corporate actions and redemptions, and plays an important role in helping to ensure the integrity of securities issues (that securities are not accidentally or fraudulently created or destroyed or their details changed). (BIS) |
| **DAO** | Decentralized Autonomous Organization | A DAO is a decentralized autonomous organization, a type of bottom-up entity structure with no central authority. (ISSA) |
| **DAS** | digital asset securities | Securities that use distributed ledger technology to represent rights similar to traditional securities. They include: (1) native security tokens issued directly on a blockchain; (2) digital twins of existing securities (equity, debt, derivatives); (3) securities providing traditional rights (dividends, voting, interest). Cryptocurrencies, stablecoins, and CBDCs are excluded from this framework as "money or money-like digital assets." (DASCP Whitepaper) |
| **dApp** | decentralized application | Application that runs on a decentralized system. (ISO) |

| Acronym | Term | Definition |
|---|---|---|
| **DeFi** | Decentralized Finance | "DeFi commonly refers to the provision of financial products, services, activities, and arrangements that use distributed ledger technology (DLT), including self-executing code referred to as smart contracts. DeFi aims to operate in a disintermediated and decentralized manner, eliminating some traditional financial intermediaries and centralized institutions, and enabling certain direct investment activities." (IOSCO) |
| **DEX** | Decentralized Exchange | A decentralized Exchange is a peer-to-peer marketplace of crypto trading. DEX utilize a particular blockchain to facilitate transfers and are considered a part of decentralized finance (DeFi) tools. (IOSCO) |
| **DLT** | Distributed Ledger Technology | DLT is a database construct that brings together existing approaches around distributed computing networks and data encryption. It enables a new way to record state updates and transactions of assets between participants on a network. (CFTC - GMAC) |
| **dMRV** | Digital Monitoring, Reporting, and Verification | Software solutions capable of automated data collection, processing, analysis, and generation of carbon credits, including validation and verification processes. (Verra) |
| **DTI** | Digital Token Identifier | A Digital Token Identifier (DTI) is a global identification system for digital tokens and is defined by the International Organisation for Standardization's ISO 24165 (DTIF) |
| **ERC** | Ethereum Request for Comment | ERCs (Ethereum Request for Comments) are technical documents used by smart contract developers at Ethereum. They define a set of rules required to implement tokens for the Ethereum ecosystem. (EthHub) |
| **ETF** | Exchange Traded Fund | ETFs are a type of exchange-traded investment product that must register with the SEC under the. (U.S. SEC) |
| **ETH** | Ether (coin) | "Ether" is the main internal crypto-fuel of Ethereum, and is used to pay transaction fees. (Ethereum Foundation) |

| Acronym | Term | Definition |
|---|---|---|
| **EVM** | Ethereum Virtual Machine | The Ethereum Virtual Machine (EVM) is a core piece of Ethereum that helps power the DLT and smart contracts. It is vital in assisting Ethereum to achieve user adoption and decentralization. (ISSA) |
| **FMI** | Financial Market Infrastructure | A multilateral system among participating institutions, including the operator of the system, used for the purposes of clearing, settling, or recording payments, securities, derivatives, or other financial transactions. (BIS) |
| **IoT** | Internet of Things | The network of devices that contain the hardware, software, firmware, and actuators which allow the devices to connect, interact, and freely exchange data and information. (NIST) |
| **IPFS** | InterPlanetary File System | IPFS is a set of building blocks for a better web. Open protocols to make your data smarter: content-addressed, verifiable, and unstoppable. (IPFS Docs) |
| **ISIN** | International Securities Identification Number | ISINs uniquely identify a security -- its structure is defined in ISO 6166. Securities for which ISINs are issued include bonds, commercial paper, equities and warrants. (ISIN Organization) |
| **KYC** | Know-your-customer | Acronym for 'know your customer'. A set of rules laid out by the government for companies to obtain a certain amount of information from their users/participants with the objective to prevent and detect financial crime and money laundering. (IOSCO) |
| **L1** | Layer 1 [blockchains] | Layer 1 smart contract platforms act as the primary settlement layer of a blockchain and decentralized application (dApp) ecosystem. Most on-chain transactions and smart contract activities take place on Layer 1. A decentralized network of validators processes transactions in blocks and are compensated for their services in the form of gas fees, paid for as a fee denominated in the protocol's token. These gas fees fluctuate relative to the computational demand that the transaction imposes on the network and reflect the overall network congestion at any given time. (CoinDesk) |

| Acronym | Term | Definition |
|---|---|---|
| **LEI** | Legal Entity Identifier | A 20-character, alpha-numeric code based on the ISO 17442 standard developed by the International Organization for Standardization (ISO). (GLEIF) |
| **LLM** | Large Language Model | Large language models (LLMs) are a category of foundation models trained on immense amounts of data making them capable of understanding and generating natural language and other types of content to perform a wide range of tasks. (Microsoft) |
| **MDB** | Multilateral Development Bank | MDBs provide financial and technical support to developing countries to help them strengthen economic management and reduce poverty. (US Department of Treasury) |
| **NFT** | Non Fungible Token | A token that has unique characteristics which make it neither interchangeable nor divisible into smaller units. (ISSA) |
| **OTC** | Over the Counter | The trading of securities between two counter-parties executed outside of formal exchanges (Corporate Finance Institute) |
| **POC (PoC)** | Proof of Concept | A demonstration of a product, service or solution in a sales context. A POC should demonstrate that the product or concept will fulfill customer requirements while also providing a compelling business case for adoption. (Gartner) |
| **REC** | Renewable Energy Certificates | Market-based instrument that represents the property rights to the environmental, social, and other non-power attributes of renewable electricity generation. (US Environmental Protection Agency) |
| **RTGS** | Real-Time Gross Settlement | Real-Time Gross Settlement - An infrastructure operated by us that holds accounts for banks, building societies and other institutions. The balances in these accounts can be used to move money in real time between these account holders. (Bank of England) |
| **RWA** | [Tokenized] real-world assets | Real-World Assets (RWAs) are tangible assets that exist outside the digital spectrum, which can be tokenized and brought into the blockchain ecosystem. (Coinbase) |

| Acronym | Term | Definition |
|---|---|---|
| **SSI** | Self-Sovereign Identity | An identity system architecture based on the core principle that identify owners have the right to permanently control one or more identifiers together with the usage of the associated identity data. (Sovrin Glossary) |
| **VASP** | Virtual Asset Service Provider | "Virtual asset service provider means any natural or legal person who is not covered elsewhere under the Recommendations, and as a business conducts one or more of the following activities or operations for or on behalf of another natural or legal person:<br><br>i. exchange between virtual assets and fiat currencies;<br><br>ii. exchange between one or more forms of virtual assets;<br><br>iii. transfer[1] of virtual assets;<br><br>iv. safekeeping and/or administration of virtual assets or instruments enabling control over virtual assets; and<br><br>v. participation in and provision of financial services related to an issuer's offer and/or sale of a virtual asset." (FATF) |
| **VAT** | Value Added Tax | VAT is a comprehensive, indirect consumption tax imposed by more than 170 countries on sales or exchanges and imports. (Bloomberg Tax) |
| **VCM** | Voluntary Carbon Market | A decentralised market where private actors voluntarily buy and sell carbon credits that represent removals or reductions of greenhouse gases (GHGs) in the atmosphere. (ICVCM) |
| **vLEI** | Verifiable Legal Entity Identifier | A digitally verifiable credential containing the LEI (Legal Entity Identifier). (GLEIF) |
| **ZKP** | zero-knowledge proof | In cryptography, a zero knowledge proof enables one party to provide evidence that a transaction or event happened without revealing private details of that transaction or event. (ICMA) |

## APPENDIX II

# ADDITIONAL REFERENCES

In this section, we have included additional insights from industry experts who are at the forefront of the latest developments in the space – trends that we hope will lead to more use cases being built as this space develops. This section does not reflect the views of GBBC, but observations from our community.

# AI ON YOUR BALANCE SHEET: ACCOUNTING FOR SYNTHETIC INTELLIGENCE ON A BLOCKCHAIN

**BY NIRMATA-AI VENTURES**

As artificial intelligence (AI) continues to disrupt and reshape global business, organizations must proactively determine how to recognize and quantify synthetic and artificial intelligence as tangible assets on corporate balance sheets. Clear regulatory frameworks for valuing curated, specialized, fine-tuned, and domain-specific AI models and related assets are essential for informed decision-making, effective governance, and transparent reporting.

From a strategic perspective, accurately identifying and valuing AI assets extends beyond traditional accounting practices. It directly influences market positioning, investment strategies, and operational effectiveness. Both public and private sector organizations across various industries must implement robust valuation methodologies to strategically manage and leverage these emerging technological assets. Additionally, evaluating AI as an environmental asset or liability—given its significant energy consumption and ecological footprint—will increasingly become a focal point in public and regulatory discussions.

Organizations must also acknowledge the risks associated with synthetic and AI assets and their use, as these may manifest as liabilities. Issues such as algorithmic bias, privacy violations, cybersecurity threats, malicious model behavior, and regulatory compliance failures can lead to substantial financial losses, legal exposure, and reputational harm. Proactively identifying and managing these risks through rigorous governance and transparent accounting practices is crucial to maintaining organizational stability and fostering market and public trust.

Failure to accurately recognize and account for AI assets can result in considerable strategic disadvantages.

Without precise valuation, organizations may struggle to convey the full extent of their technological investments and portfolio value to investors and regulators, potentially undermining market confidence and competitive standing. Such oversight can lead to inefficient resource allocation, stifle innovation, and leave organizations vulnerable to competitors that effectively leverage and transparently manage their AI assets.

Blockchain technology presents a foundational solution to these valuation and accountability challenges. Its decentralized and immutable ledgers offer unparalleled transparency, accuracy, and verifiability for tracking AI assets. A blockchain-supported accounting framework is essential for a future where AI assets become integral to organizational performance and sustainability. Both public and private entities can benefit significantly from blockchain's capability to securely monitor and track synthetic intelligence assets, enhancing compliance, governance, and strategic asset valuation.

To fully capitalize on AI's potential, organizations should foster interdisciplinary collaboration between technology, finance, legal, and sustainability departments. Establishing cross-functional teams will ensure comprehensive evaluation, risk management, and strategic integration of AI assets.

Organizations that swiftly integrate blockchain-enabled AI asset management will not only secure their strategic position but will also shape the standards of transparency, accountability, and innovation that define tomorrow's AI-powered global economy.

# AI SAFETY - WHY A NEW APPROACH IS NEEDED

**BY GBBC BOARD DIRECTOR & DEUTSCHE BANK SENIOR LEGAL COUNCIL**

As AI models and systems advance, concerns about their potential risks and long-term effects grow. While the industry promotes the idea of safe AI with built-in protections and alignment with human values and ethical principles, recent developments suggest that achieving safe AI will be a rocky road. We summarise the commonly used approaches towards AI safety, their shortfalls, and propose a radically new approach for the industry.

## STATE-OF-THE-ART SAFETY TECHNIQUES AND THEIR SHORTCOMINGS

Refusal behaviors in AI systems are ex ante mechanisms ostensibly designed to prevent frontier AI models, i.e., large language models (LLM), from generating responses that violate safety guidelines, ethics, or other undesired behavior. These mechanisms are typically realised using predefined rules and filters that recognise certain prompts and requests, including terms and phrases, as harmful. In practice, however, prompt injections and related jailbreak attacks enable bad actors to manipulate the model's responses by subtly altering or injecting specific instructions within a prompt.

Guardrails for AI models are post facto safety mechanisms that attempt to ensure the LLM produces ethical, safe, and otherwise appropriate outputs. However, they typically fail because they often have limited scope, restricted by their implementation constraints, being able to cover only certain aspects or sub-domains of behaviour. Adversarial attacks, inadequate training data, and overfitting are some other ways that render these guardrails ineffective. Additionally, in complex tasks, it is highly challenging to design guardrails that fully account for all known scenarios, let alone the unknown, leading to severe gaps in their effectiveness.

In the context of LLMs, the latent space is a mathematical representation capturing the underlying patterns and features of the training data. It is essentially a compressed, lower-dimensional space where different points represent various aspects of learned information. By manipulating these points, an LLM can generate diverse outputs. One strategy for enhancing AI safety involves modifying the model's parameters to constrain its latent space. However, this method typically proves effective only along one or a few specific directions within the latent space, making the model still susceptible to further parameter manipulation by malicious actors.

Formal verification of AI models uses mathematical methods to prove or attempt to prove that the AI will behave correctly and safely within defined limits. Since AI models such as LLMs are non-linear and stochastic (meaning they are non-deterministic), verification methods for such systems focus on offering probabilistic guarantees. Techniques like Monte Carlo simulations are often used, but they can only provide probabilistic assurances, not definitive proof. Additionally, formal methods have difficulty in scaling to large, complex systems, further constraining their limited effectiveness as frontier AI models get more sophisticated.

Last, but not least, as LLMs get more and more powerful, it is very apparent that the models exhibit emergent behaviors, such as 'faking' alignment with the safety rules and restrictions that are imposed on their behavior. Latent behavior in such models is an area of research that is yet to be broadly acknowledged; in particular, deceptive behavior on the part of the models is an area that researchers are yet to fully understand. We can extrapolate that the scope and extent of latent behaviors is only going to increase as the models scale further in terms of complexity and capability.

## NEW APPROACHES TO ADDRESS THE SAFETY FLAWS

One approach is to use the metaphor of the 'Oracle' as the preferred way to use AI models, i.e. ask questions and interpret the responses within the safety frameworks in place. The Oracle at Delphi was consulted for insight; it was not asked to act on behalf of the requester. Similarly, frontier LLMs may be utilized as founts for expert guidance, insight, advice, and understanding, without any execution being delegated to the models.

This approach becomes particularly relevant as the industry is now beginning to evangelize the idea of AI agents, with varying degrees of autonomy. Since the AI agent is taking actions autonomously without always keeping humans in the loop, AI safety risks become more severe.

Another approach is to use a second layer of AI models to manage and control the behavior of the base LLM; a simplistic illustration of this approach is to use a set of domain-specific, and highly specialized Chain-of-Thought Monitor (CoTs) models that monitor the base LLM and may help identify undesired, malicious and otherwise unsafe behaviors, as defined by the safety framework. CoTs often reveal insights into the LLMs intent and reasoning process. A big challenge is that CoTs must remain impervious and immune to manipulation by the base LLM. It also may occur that CoTs may not entirely remediate obfuscation risks as excessive CoT optimization encourages LLMs to obscure their true intent degrading the CoTs utility for monitoring.

Our recommendation is that the industry use what is known as Byzantine Fault Tolerance in the field of Computer Science. Byzantine Fault Tolerance (BFT) is a consensus-based, algorithmic technique to ensure that the overall system can still function correctly even if some parts fail or act maliciously. The best-known example of BFT application is probably by the Boeing Company, which incorporates Byzantine Fault Tolerance in aircraft systems to enhance reliability and safety for the airplane sensors. Rather than targeting the alignment and safety of a single LLM in isolation, multiple peer-level AI models may be used in mission-critical scenarios, with the application of BFT across these multiple peer-level AI models to ensure that the collective set of models converge on outputs and responses that are safe. If one or a subset of the AI models provides incorrect, faulty or malicious data, the majority vote from the other AI models will override it, ensuring a safer outcome. Further, we recommend that these peer-level AI models be designed and trained with heterogeneity in mind i.e. diverse software and hardware approaches, including algorithms, architectures, and training data sets, and ideally sourced from diverse vendors.

## CONCLUSION

The future of AI alignment and safety lies not in futile attempts to shoe-horn safety into a single AI model, but rather to use multiple AI models to respond to the same request or prompt and to use algorithmic mechanisms to reach consensus on the correct 'safe' outcome. The consensus approach inherent to BFT algorithms can be deemed as an effective mitigating factor, particularly in the context of frontier LLMs used in mission-critical business scenarios.

*This article has been published by Solicitors Journal here.*

# CFTC'S DIGITAL ASSET MARKETS SUBCOMMITTEE RECOMMENDS EXPANDED USE OF NON-CASH COLLATERAL THROUGH BLOCKCHAIN TECHNOLOGY

**BY LATHAM & WATKINS**

On November 21, 2024, the Digital Asset Markets Subcommittee (the Subcommittee) of the Commodity Futures Trading Commission's (CFTC) Global Markets Advisory Committee (GMAC) issued a report (the Report) that recommended expanding the use of non-cash collateral in derivatives markets through distributed ledger technology (DLT).

In the Report, the Subcommittee identifies several ways in which using DLT may mitigate or avoid the challenges that have historically constrained the use of non-cash collateral in derivatives markets, such as improved transfer timing and avoiding other inefficiencies of existing market and technology infrastructure.

Although various non-cash assets are already eligible collateral under the CEA and CFTC Rules, the Report notes that operational challenges have traditionally constrained their posting as regulatory margin, adversely affecting market efficiency.

For example, the Report notes that certain forms of eligible collateral, such as shares in money market mutual funds, typically do not allow for secondary transfers and thus must be sold and converted to cash for posting. In addition, the infrastructure used for holding and transferring various non-cash collateral is typically not available on a 24/7/365 basis. Moreover, transfers of non-cash collateral frequently require the sequential involvement of multiple intermediaries.

These complexities make it difficult for parties to meet deadlines for posting of collateral, which at most is next day and in the cleared context can be same-day or intra-day.

Because of these inefficiencies, market participants often default to cash to satisfy margin requirements while maintaining liquidity reserves in non-cash assets that must be liquidated to cash as needed to satisfy margin requirements. This practice entails a number of undesirable implications, including potentially contributing to volatility in times of market stress due to the need to offload assets in a fire-sale to obtain cash.

As the Report notes, market participants have begun to use DLT in connection with various forms of "real world" assets, including certain debt securities and gold. Doing so can help reduce or eliminate the challenges described above by improving the transferability and useability of assets already eligible to serve as regulatory margin. Because DLT is available 24/7/365 and allows for the pledge or transfer of eligible assets on a direct, peer-to-peer basis, use of DLT promises to allow higher efficiency of transfer, reduced intermediation, and a broader available pool of assets for use as collateral without the need to convert into cash.

The Report makes three recommendations for how participants in CFTC-regulated derivatives markets could leverage DLT for holding and transferring non-cash collateral in a responsible and compliant manner:

1. When DLT infrastructure is used as an internal books and recordkeeping tool, a registrant should be able to rely on its existing policies, procedures, practices, and processes to assess information security and other relevant operational risks.

2. When a registrant looks to accept eligible non-cash collateral in a tokenized form, it should be able to satisfy relevant requirements by applying its existing policies, procedures, and practices to assess and mitigate the risks relating to (i) legal enforceability; (ii) segregation and custody arrangements; (iii) credit and custodial risk; and (iv) operational risk.

3. No new rules or guidance should be necessary to permit DLT usage for holding and transferring non-cash collateral because (i) DLT does not affect the character of the underlying asset, and (ii) registrants already have extensive policies, procedures, practices, and processes to address the use of new technologies and infrastructures.

# COMPLIANCE AND REGISTRATION PLATFORM ENVISIONED FOR BLOCKCHAIN AND DIGITAL ASSETS

**BY MARYLAND BLOCKCHAIN ASSOCIATION**

The Maryland Blockchain Association is partnering with the Digital Asset Regulatory Authority (www.dara.foundation) to create a bridge between real world compliance and on chain attestations available to consumer investors in Maryland.

The Maryland Blockchain Association has created a team to develop an industry tool to be released in the 3rd quarter of 2025. The DARA platform is a modern compliance and registration system built to support entrepreneurs, token issuers, and Web3 companies navigating the complex regulatory environment of the digital asset space. Designed with modular components, DARA brings together token registration, jurisdiction-specific obligations, policy templates, and real-time reporting into a unified operating system for global crypto compliance. But at the core of its innovation is a critical feature: the use of on-chain attestations.

For innovators and compliance officers in the state of Maryland, on-chain attestations provide verifiable, immutable records that prove actions have been taken — whether it's completing a jurisdictional checklist, submitting a Suspicious Activity Report (SAR), undergoing a smart contract audit, or verifying token risk disclosures. In Maryland, where entrepreneurs must comply with both federal regulations (FinCEN, SEC, IRS) and evolving state-level laws (like Maryland's approach to digital assets under its money transmitter framework), DARA enables teams to record regulatory milestones on-chain, creating a cryptographically provable compliance history.

This is especially valuable in financial hubs like Baltimore and government-adjacent innovation centers near D.C., where trust, traceability, and accountability are non-negotiable. A startup issuing a stablecoin or launching a DeFi protocol from Maryland can use DARA to complete its internal AML/KYC workflow, have that process signed by the compliance officer, and generate a timestamped attestation on Polygon or another blockchain.

This attestation can then be used when applying for licenses, partnering with exchanges, or proving regulatory diligence to venture capital firms.

Moreover, DARA supports role-based attestations — meaning the legal officer, CTO, or auditor can each sign off specific compliance steps. These attestations are useful not just for internal tracking, but also as public trust signals. A Maryland startup that's "DARA-compliant" with verifiable on-chain proof can build faster institutional and user confidence.

Ultimately, DARA empowers Maryland's blockchain ecosystem with tools to proactively manage compliance, while aligning with global standards through transparent, on-chain reporting. In a landscape where policy uncertainty often stifles innovation, DARA ensures that builders in Maryland can move quickly and securely — with compliance not as a barrier, but as a badge of credibility.

*For additional information, please visit:*
*www.marylandblockchainassociation.org*

# DIGITAL ASSETS GOING MAINSTREAM

**BY OLIVER WYMAN**

## OPPORTUNITIES

The digital asset ecosystem continues to present substantial opportunities for institutions as market dynamics evolve. As regulatory frameworks mature and retail and institutional demand for digital asset exposure increases, the potential to design innovative offerings and enhance infrastructure has never been greater. The following are six models for financial institutions to participate in the crypto market:

| Category | Overview | Oliver Wyman Experience |
|---|---|---|
| **Custody and wallets:** Offer licensed and regulated custodial services | Financial institutions are providing secure custody solutions to address the safekeeping of digital assets. As regulatory clarity improves, these services are expanding to include integrated offerings that combine custody with other financial services, enhancing client value propositions. | **Designed and built new digital assets custody for Global Systemically Important Bank (G-SIB)** |
| **Trading venues:** Provide institutional-grade trading and settlement platforms | Institutional-grade trading platforms offering liquidity, fiat settlement, and compliance features are under development. These platforms aim to establish trusted ecosystems for market participants, enabling secure and efficient trading of digital assets. | **Designed, built and launched a greenfield "first-in-the-region" digital asset exchange for leading market infrastructure firm** |
| **Wealth and Fund Management:** Offer digital asset exposure through wealth and fund management products to clients | The creation of structured investment products, such as crypto ETFs and tokenized funds, offers investors exposure to digital assets through regulated vehicles. These products cater to rising client demand and contribute to portfolio diversification. | **Identified suitable opportunities and supported launch of a trading and wealth management business for global investment bank** |

| Category | Overview | Oliver Wyman Experience |
|---|---|---|
| **Prime Brokerage Services:** Set up prime brokerage desk service and provide access to crypto markets for institutional traders | As institutional interest grows, so does the need for solutions encompassing financing, execution, and custody. Building comprehensive prime brokerage offerings requires a solid infrastructure and rigorous risk management to serve sophisticated investors effectively. | **Designed roadmap for building out a vertically integrated digital asset prime brokerage offering service for leading bank** |
| **Payment and Settlement:** Provide safer and faster payment and settlement systems to banks, institutions, and merchants | Digital money, such as stablecoins and CBDCs, present opportunities to improve payment systems across both regionally and cross-border realms. Adopting these solutions can streamline payment and settlement processes, resulting in faster, more efficient, and cost-effective operations for both consumers and businesses. | **Supporting the European Central Bank in designing and launching the Digital Euro** |
| **Innovative Financial Offerings:** Develop and offer new financial offerings combining financial contracts and engineering with digital instruments | Institutions can develop new financial products by blending technical features enabled by digital assets with innovation in financial engineering. For instance, tokenization facilitates the creation of new instruments with fractional ownership and programmable contracts. | **Developed an end-to-end strategy to tokenize global supply of a prominent commodity** |

## RISKS

As institutions broaden their digital asset activities, they face a complex risk landscape that blends established risks with emerging technology-related challenges. Adequately addressing these risks is crucial to developing sustainable and trusted digital asset services that can withstand market volatility and regulatory pressures.

- **Compliance Challenges:** The pseudonymous nature of digital assets, particularly across permissionless systems, complicates Anti-Money Laundering (AML) and Know Your Customer (KYC) efforts. Effective controls are essential to mitigate risks linked to illicit activities.

- **Technological Risks:** Rapid evolution of blockchain protocols introduces security and operational uncertainties. Financial institutions must invest in robust technological solutions and remain cautious in blockchain adoption to safeguard against vulnerabilities.

- **Regulatory Uncertainty:** Despite progress, the regulatory environment for digital assets remains fragmented across jurisdictions. Global institutions need adaptive strategies to navigate varying regulations and ensure compliance, which is critical for ongoing operations.

- **Market Volatility:** Digital assets frequently experience pronounced price fluctuations, posing risks to investment portfolios and financial stability. Effective risk management practices are necessary to protect against adverse outcomes.

## THE PATH AHEAD

The integration of digital assets into the financial system brings both opportunities and challenges. Financial institutions are at a crossroads where they can embrace innovation through collaboration or risk obsolescence. Success in this rapidly evolving landscape requires:

- **Regulatory Engagement:** Active participation in shaping and adhering to regulatory frameworks fosters industry standards and upholds market integrity.

- **Strategic Partnerships:** Collaborations with technology firms and other stakeholders enable the co-development of scalable, compliant solutions that address market needs.

- **Technological Investment:** Investing in advanced infrastructure, covering custody, trading, and settlement, ensures security and efficiency.

# OPEN SOURCE AI AND PUBLIC BLOCKCHAINS - THE FUTURE OF BUILDING

**BY PROVIDENTIA CAPITAL**


## ABSTRACT

The fusion of open-source AI and public blockchains is redefining solution-building. Open-source AI, like DeepSeek, disrupts big tech by democratizing access, but integrating public blockchains enhances governance, data management, and cost efficiency. This paper explores how this synergy empowers smaller players to rival industry giants—an unexpected outcome that levels the technological playing field. We argue this approach is the future, excelling for user-centric, domain-specific models over monolithic ecosystems. By combining transparency, security, and collaboration, open-source AI and public blockchains promise a decentralized, innovative tomorrow.


## INTRODUCTION

Artificial intelligence (AI) and blockchain technology are reshaping how we build solutions, challenging centralized paradigms. Open-source AI, with freely accessible models and tools, accelerates innovation through global collaboration. Public blockchains—decentralized, open-source ledgers—offer transparency and trust via immutable records. Together, they form a robust framework for future development.

This white paper examines this integration's potential, spotlighting DeepSeek, an open-source AI disrupting big tech. We counter that embedding public blockchains into such models improves governance and resource management, amplifying their impact. The key takeaway—that this combination unexpectedly democratizes technology, enabling smaller entities to compete with giants—drives our thesis. We show why this model thrives for personalized, domain-oriented AI, surpassing monolithic systems. As of April 2025, this convergence is poised to redefine building in a decentralized world.

## OPEN-SOURCE AI: DISRUPTING THE STATUS QUO

### *THE RISE OF OPEN-SOURCE AI*

Open-source AI has transformed technology by making advanced tools accessible beyond big tech's proprietary walls. Unlike closed models from Google or OpenAI, open-source projects invite global contributions, fostering rapid progress. DeepSeek, launched in 2023, exemplifies this shift. A community-driven language model, it rivals GPT-4 in performance, offering free access to startups, researchers, and small firms. A 2024 Hugging Face report notes a 300% adoption surge for such models, signaling a move away from centralized control.

DeepSeek's disruption lies in its cost-free availability and adaptability. Small businesses, unable to afford big tech's licensing or infrastructure, can now deploy sophisticated AI. This challenges the dominance of firms like Microsoft, whose proprietary models lock users into expensive ecosystems. Open-source AI's collaborative nature also accelerates innovation—developers worldwide refine DeepSeek, outpacing the slower, siloed updates of closed systems.

### *LIMITATIONS OF OPEN-SOURCE AI ALONE*

Yet, open-source AI has flaws. Training models like DeepSeek demands vast datasets, often from uncoordinated sources, risking bias and quality issues. Costs—estimated at $500,000 to $1 million per model—are borne by fragmented communities or underfunded groups, causing inefficiencies. Utilization is uneven, with some users benefiting without contributing back. Governance is weak; there's no clear mechanism to oversee data ethics or resource allocation. While DeepSeek disrupts big tech, these gaps limit its scalability and sustainability, necessitating a complementary solution.

## PUBLIC BLOCKCHAINS: ENHANCING OPEN-SOURCE AI

### *THE POWER OF PUBLIC BLOCKCHAINS*

Public blockchains, like Ethereum and Solana, are decentralized, open-source platforms ensuring transparency and security. Their immutable ledgers and consensus mechanisms build trust without intermediaries.

For open-source AI, they address critical weaknesses. Blockchain can track data provenance, ensuring quality and ethical sourcing. Smart contracts automate resource distribution—e.g., rewarding contributors with tokens—creating a sustainable model. Projects like SingularityNET, a blockchain-based AI marketplace, showcase this potential.

#### *COUNTERING DEEPSEEK'S DISRUPTION WITH BLOCKCHAIN*

DeepSeek's disruption is impressive but incomplete without blockchain. Its data governance relies on loose community oversight, risking inconsistencies. A public blockchain could log every input, offering an auditable trail for transparency. Contributors might earn tokens via smart contracts, aligning efforts with outcomes. Training costs, a burden for DeepSeek's community, could be shared across a decentralized network—users stake tokens to fund computation, tracked on-chain. Utilization becomes fairer; blockchain monitors usage, ensuring equitable benefits.

This integration transforms DeepSeek from a disruptor into a governed ecosystem. Big tech's centralized models thrive on control, but blockchain decentralizes it, enhancing open-source AI's reach and resilience. It's not just about access—it's about managing the process sustainably, making this pairing a stronger contender.

## THE UNEXPECTED TAKEAWAY: DEMOCRATIZING TECHNOLOGY

#### *LEVELING THE PLAYING FIELD*

The standout benefit of merging open-source AI and public blockchains is its unexpected democratization of technology. Big tech—Google, Amazon, Microsoft—dominates through proprietary models, vast data, and infrastructure. DeepSeek's open-source approach cracks this monopoly, but blockchain takes it further, empowering smaller players to compete. Startups and independents can build solutions without big tech's resources, shifting power dynamics.

Consider a small healthcare firm using DeepSeek for diagnostics.

Without blockchain, it might rely on AWS for data and compute,

staying tethered to giants. With a public blockchain, it collaborates securely with others, sharing costs and data on a decentralized ledger. This cuts dependency, lowering barriers. The unexpected twist is how this levels the field—small entities gain capabilities once exclusive to tech titans.

#### *CASE STUDIES AND EVIDENCE*

OpenMined and The Graph illustrate this. OpenMined uses blockchain to decentralize AI training, letting individuals contribute data securely. The Graph, on Ethereum, indexes AI-driven blockchain data, aiding small developers in building dApps. A 2025 Securities.io report highlights these as top AI-blockchain projects, showing practical impact. A 2024 Entrepreneur piece predicts decentralized ecosystems could outpace centralized ones by 2030, driven by this democratization.

Big tech's edge is centralized control. Open-source AI and blockchain distribute it, giving smaller players tools to innovate at scale. This isn't just technical—it's a socio-economic shift, redefining who shapes technology's future.

## WHY THIS MODEL EXCELS FOR PERSONALIZED, DOMAIN-ORIENTED MODELS

#### *THE LIMITATIONS OF MONOLITHIC AI ECOSYSTEMS*

Big tech's AI is monolithic—general-purpose models like GPT-4 aim for broad use but falter in specificity. Fine-tuning for niches like law or medicine is costly and complex, locking users into centralized providers. Data opacity raises privacy and bias concerns, limiting user control. This rigidity hampers innovation in specialized fields needing tailored solutions.

#### *THE ADVANTAGE OF USER-CENTRIC, DOMAIN-ORIENTED MODELS*

Open-source AI with blockchain supports personalized, domain-specific models. DeepSeek can be forked for agriculture or therapy and refined by communities. Blockchain manages domain data—e.g., encrypting patient records for a medical AI, rewarding contributors via tokens.

This ensures transparency and user agency, unlike proprietary models. Deployment on decentralized networks avoids centralized servers, enhancing control.

For instance, a mental health chatbot built on DeepSeek could use blockchain to track anonymized user data, ensuring privacy and funding via token stakes. The result is a tailored, transparent model, not a generic one. This contrasts with big tech's one-size-fits-all approach, offering flexibility for niche needs.

#### *SCALABILITY AND SUSTAINABILITY*

This model scales via collaboration. Decentralized updates outpace centralized ones, and blockchain's tokenomics sustain it—contributors are incentivized, reducing costs. A 2025 MDPI study estimates 40% cost savings over centralized systems. It fosters a network of specialized models, not a single monolith, aligning with personalization trends noted in Wired (2024).

## CHALLENGES AND FUTURE DIRECTIONS

#### *ADDRESSING THE HURDLES*

Challenges persist. Open-source AI's data quality varies, and public blockchains face scalability issues—Ethereum's fees can deter small users. Standardization lags, lacking unified protocols for integration, per a 2022 MDPI study. These hurdles require solutions to unlock full potential.

#### *PATHWAYS FORWARD*

Hybrid blockchains with sharding could boost scalability. Decentralized autonomous organizations (DAOs) might govern standards, balancing innovation and ethics. Collaboration across tech, policy, and ethics is key to refining this model for widespread use.

## CONCLUSION

Open-source AI and public blockchains redefine building, with democratization as the unexpected linchpin. DeepSeek disrupts big tech, but blockchain integration enhances governance, empowering smaller players. This excels for user-centric, domain-oriented models, offering flexibility over monolithic ecosystems.

# PIONEERING BLOCKCHAIN AND RWA TOKENIZATION SOLUTIONS

**BY MLL LEGAL AG**

As a leading Swiss law firm with around 160 lawyers and a strong international focus, MLL Legal AG is at the forefront of supporting innovative DLT projects. Our expertise in financial market regulations, blockchain, fintech and AI, combined with our strategic location in Switzerland and our full-service offering, positions us uniquely to offer comprehensive legal and regulatory support for cutting-edge blockchain initiatives, such as:

## SUPPORTING LAYER 1 BLOCKCHAIN PROTOCOLS

At MLL Legal AG, we provide robust legal support for Layer 1 blockchain protocols domiciled or planning to domicile in Switzerland. These protocols often operate through association or foundation non-profit structures (including Decentralized Autonomous Organizations (DAO)) combined with for-profit corporation or LLC-structures, in particular providing IT-services. Our services encompass corporate housekeeping, contractual work, financial regulatory advice, intellectual property (IP) management, and tax advisory, ensuring that these blockchain entities are compliant with Swiss regulations and optimized for the growth of their respective ecosystem. Switzerland's stable legal, economic, and political environment, along with its strong infrastructure, makes it an ideal hub for blockchain innovation.

## INTERNATIONAL TOKENIZATION STRUCTURES

One of our standout offerings is our expertise in international tokenization structures (including tokenization of real-world assets), exemplified by our work with Backed Finance.

This project involves the issuance of tokenized securities backed by Swiss collateral structure, leveraging Switzerland's long-standing reputation in wealth and asset management. Such initiative is designed to provide a secure and reliable RWA tokenization platform, benefiting from Switzerland's robust legal framework, as well as political and financial stability.

Our role as lead counsel includes the structuring of tokenization projects in cross-border setups, ensuring in particular compliance with financial market and tax regulations, as well as corporate requirements, and providing ongoing legal support to navigate the complexities of international setups in coordination with local adivsers.

## FUTURE STEPS

Looking ahead, MLL Legal AG is committed to furthering the adoption of blockchain technology and tokenization in the financial sector. We aim to expand our services to support more innovative projects, fostering a regulatory environment that encourages growth while ensuring investor protection. Our goal is to continue being a trusted partner for our clients, helping them achieve their strategic objectives in a rapidly evolving digital landscape.

# SECURING BITCOIN'S FUTURE - A FUNDING INITIATIVE FOR BITCOIN CORE DEVELOPERS

**BY MMH GROUP**

Bitcoin's protocol and infrastructure require continuous maintenance to remain secure, efficient, and scalable. Despite underpinning a trillion-dollar industry, Bitcoin development remains largely underfunded. This initiative aims to incentivize Bitcoin mining companies to financially support Bitcoin Core developers, ensuring long-term sustainability and innovation.

## THE PROBLEM

Bitcoin miners and businesses depend on a secure and scalable network; yet the open-source nature of Bitcoin means developers often lack sufficient funding. Without financial support, the network faces risks such as stagnation and security vulnerabilities.

## PROPOSED SOLUTION

Educating industry leaders on the importance of developer support is crucial. Bitcoin's long-term success depends on well-funded developers working on security, scalability, and usability improvements. Declining developer participation could jeopardize the network's stability. Mining companies benefit directly from a well-maintained Bitcoin network and should invest accordingly. Partnering with organizations like Brink can help facilitate structured funding for developers.

To ensure Bitcoin development remains strong, financial support for developers must be competitive. Salaries in the range of $100,000 - $120,000 per year are necessary to attract and retain top talent. A tenure-like model offering long-term contracts of three to five years provides financial stability and research autonomy.

Developers should have access to dedicated research budgets, peer evaluations, and opportunities for open-source collaboration.

A pledge program would formalize mining companies' commitment to supporting at least one Bitcoin developer. This initiative can be promoted at major industry events to garner recognition and encourage participation. Companies can also partner with BRINK or similar organizations to streamline employment and payment structures.

## BENEFITS FOR MINING COMPANIES

Supporting Bitcoin development enhances long-term sustainability by ensuring the network remains robust and profitable. Companies that contribute will gain goodwill within the Bitcoin community, strengthening their public image. Additionally, financial support provides early insight into emerging protocol advancements, giving companies a competitive edge.

If you are interested in learning more or participating, please reach out to Emma Todd at emma@mmhgroup.io.

# TOKENISATION - A DIGITAL ASSETS USE CASE IN A DIGITALIZED WORLD

**BY NORTON ROSE FULBRIGHT LLP**

In discussions with our clients, one question that often comes up is: What are other stakeholders in the tokenization space focusing on as they seek to take advantage of tokenization's transformative ability to enable them to digitize and trade assets (or asset value) on a global scale?

Are they, for example, focusing on the many upsides, such as the ability to represent real-world assets - such as real estate or commodities - as digital tokens on a blockchain, helping to unlock liquidity as collateral, enhance peer-to-peer transacting and foster transparency? Or are they concerned to navigate the legal and regulatory considerations? The answer, of course, is typically both of these things.

## ARE THE KEY LEGAL AND REGULATORY CONSIDERATIONS ANY DIFFERENT?

A fair question often put to us is why should the regulatory and legal considerations in relation to tokenization be any different from those that apply to other new financial products and services? Part of the challenge in answering that question lies in the nascent nature of the technology and how it fits within existing legal and regulatory frameworks globally. While regulators globally are beginning to address the regulatory status of tokens and tokenized assets specifically, many have not yet done so. Novel issues raised by the decentralized nature of blockchain technology need to be reconciled with the requirements of existing regulatory frameworks, raising questions about regulatory compliance and stakeholder protection.

The legal landscape around tokenization is as dynamic as the technology itself, and regulators are grappling with how to classify and regulate these digital assets (approaches can vary from country to country).

## WHAT ARE THE KEY TOKENIZATION "BIG ISSUES"?

Conversations with a broad range of FinTech solution providers and financial services businesses gives us a view on what are some of the big issues the industry is currently grappling with. We have captured our "take" on this for the benefit of the industry as a whole, in a tokenization knowledge product - Understanding tokenization: Insights, challenges and opportunities – a series featuring videos, podcasts, webinars and articles that assist businesses to deal with the evolving legal requirements, regulatory environment and opportunities relating to tokenization.

Set out below is our current view on what the big issues are, and we have launched podcasts dealing with each of the following:

- *How is tokenization impacting liquidity and collateral management?* How will tokenization impact liquidity and collateral management, including in relation to trades, collateral and sales, as well as in relation to pledges and other routes for taking security?

- *Asset-backed tokens:* How will asset-backed tokens be used in relation to real-world assets? What are the use cases and legal considerations involved in tokenizing tangible assets, and what considerations should issuers and other stakeholders bear in mind (including securities and commodities regulation)?

- *Securities law issues in tokenization projects:* When is a token a regulated instrument, what does that mean for issuing, trading or providing client services in relation to it, and can you market them freely? How are the regulators around the world approaching tokenisation of different assets?

- *Capital markets and tokenization:* what is a digital bond? How do you address smart contract requirements and legal formalities in relation to them? What issues does a tokenized government bond use case raise?

- *The transformative impact of tokenization on insolvency and bankruptcy proceedings:* Traditionally, bankruptcy is a slow process for creditors, but today, tokenized assets are transforming recovery timelines in the U.S. and elsewhere.

Recent U.S. Chapter 11 cases are using tokenized assets to accelerate distributions. What is the potential for digitizing and trading claims on secondary markets, and will they enable faster, more flexible recovery options for creditors?

- *Fund tokenization:* Will tokenization revolutionize the future of funds? Will tokenization mean that the "retailization" of private funds is inevitable?

## NAVIGATING GLOBAL FINANCIAL SERVICES REGULATION

In addition to the issues mentioned above - and of fundamental importance - is the impact of global financial services regulation on tokenization more generally. To address this complex issue, we assembled our lawyers from Asia, Dubai, Europe, London and the U.S. in a webinar to explore the key regulatory developments, issues and considerations in the context of real-world case studies.

The podcasts, webinar and other thought leadership mentioned above are all published on our website: Understanding tokenization: Insights, challenges and opportunities.

## WHAT CAN WE EXPECT NEXT?

The rapid evolution of digital assets more generally continues to reshape the global legal landscape, presenting new challenges and opportunities for regulators, courts, and market participants alike. From disputes over tokenized assets and smart contract enforcement to insolvencies within the crypto industry and evolving regulatory frameworks, 2024 was a year of significant developments. We recently published a review, our Global FinTech Series: 2024 review and 2025 outlook, reflecting on key trends, landmark cases, and legislative updates that shaped the digital asset dispute landscape in the UK, the US, Singapore and Australia throughout 2024.

The review also looks at what 2025 may bring in terms of anticipated regulatory reforms, greater clarity in international enforcement cooperation, and the potential for further litigation, as stakeholders test the boundaries of digital asset law.




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GBBCGSMI

## WORKING GROUP: DECENTRALIZED FINANCE (DEFI)

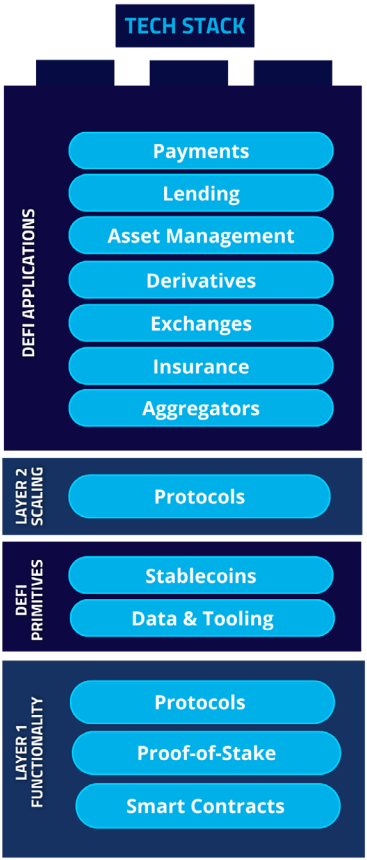
# OPPORTUNITIES, RISK CONSIDERATIONS, AND KEY PRINCIPLES FOR GROWTH

The **Global Standards Mapping Initiative (GSMI)**, the think tank under GBBC, has a workstream focused on Decentralized Finance (DeFi).

"DeFi commonly refers to the provision of financial products, services, activities, and arrangements that use distributed ledger technology (DLT), including self-executing code referred to as smart contracts DeFi aims to operate in a disintermediated and decentralized manner, eliminating some traditional financial intermediaries and centralized institutions, and enabling certain direct investment activities."(IOSCO)

DeFi is a new trend in commerce that has emerged from the onset and maturation of decentralized networks and blockchain technology. At first DeFi focused on ways to leverage blockchain's programmability, autonomously functioning code to "decentralize" financial activities. This initial foray into traditional finance sought to disrupt and replace the institutions that have traditionally been integral to financial services. As the rise of tokenization expands to encompass various asset types, DeFi has travelled beyond its financial roots, paving the way for innovation across a broad range of financial and commercial markets. This shift brings exciting possibilities, such as enhanced liquidity, broader access to global markets, and entirely new forms of value exchange. However, it also introduces challenges, including regulatory uncertainties, risks of technical vulnerabilities, and the potential for market manipulation.

DeFi can be viewed as a tech stack with the following structure:




Composable financial primitives can be used to build products with a plug and play architecture. Key features include:

- Protocols define sets of common rules for each financial function
- Total Value Locked (TVL) as the total value of digital assets deposited into DeFi protocols, indicates liquidity, user engagement, and market sentiment
- Liquidity pools combine deposits of digital assets to enable trading
- Automated Market Makers (AMM) provide liquidity management and asset pricing mechanisms
- Flash loans enable borrowing and returning funds within a single automated transaction
- Proof-of-Stake is generally the consensus mechanism to process transactions effected on the protocol, in addition to other consensus mechanisms

Total Value Locked has increased over the years and normalized following an initial hype. While most early DeFi users have been institutional and professional investors seeking excess returns , early users of DeFi in crisis situations where traditional financial systems have failed are showing real opportunities for financial inclusion. DeFi user growth has been especially significant in emerging markets, with Latin America leading, followed by Sub-Saharan Africa and Eastern Europe respectively. DeFi can reduce barriers to entry, especially for financial services like secondary trading and funding, helping to democratize alternative assets and scale innovations to make Web3 infrastructure more mainstream. In order to achieve the opportunities that DeFi promises, so including the democratization of finance, there are a number of challenges to address and milestones to achieve in its early stages. Finding solutions to these challenges and getting closer to capitalizing on existing opportunities are represented as milestones below:

## STEPS TO SCALE

In order to achieve the opportunities that DeFi promises, so including the democratization of finance, there are a number of challenges to address and milestones to achieve in its early stages. Finding solutions to these challenges and getting closer to capitalizing on existing opportunities are represented as milestones below:

