# e-HKD Pilot Programme Phase 2

## Transforming Global Payments: The Role of Tokenized Money & Funds in Cross-Border Transactions

This is a continuation of the Interim Paper published on 9th June 2025

# Content Page





# Foreword

## Bank: ANZ

"ANZ is proud to contribute to the e-HKD+ Pilot Programme alongside Visa, ChinaAMC, and Fidelity International. This initiative represents a meaningful step forward in testing how tokenised forms of money may enhance cross-border investment flows and reduce settlement related counterparty risk.

By leveraging tokenized deposits, e-HKD, and our A$DC stablecoin, we've been able to simulate settlement of fund units programmatically, across public and permissioned blockchains. These real-world experiments are critical to understanding how digital money can operate securely, efficiently, and interoperably across borders.

We believe that scalable, compliant infrastructure and services—built on shared standards and collaborative innovation—will be key to unlocking the full potential of tokenized finance."

**Nigel Dobson, Banking Services Portfolio Lead, ANZ**

## Asset Manager 1: ChinaAMC (HK)

"ChinaAMC (HK) is proud to present the findings from our work in collaboration with our partners on the second phase of Hong Kong's e-HKD Pilot Programme. Under this pilot, we explored a next-generation fund distribution infrastructure—one that is instant, interoperable, and global by design.

We successfully validated that fund tokenisation can operate securely within Hong Kong's regulatory framework and demonstrated how programmable digital currencies, such as the e-HKD, can enable seamless and secure on-chain fund transactions. The pilot illustrated the potential of tokenization to enhance operational efficiency, improve transparency, and expand investor access under a regulated framework.

At ChinaAMC (HK), our vision is to architect a more efficient, accessible, and interconnected financial future. We will continue to collaborate with industry peers to develop practical, scalable real-world applications that directly contribute to the growth of Hong Kong's tokenised economy."

**Tian Gan, CEO of ChinaAMC (HK)**


# Foreword

## Asset Manager 2: Fidelity

"Fidelity International is delighted to present this insightful research paper, exploring the transformative potential of digital currencies and fund tokenization in reshaping financial services. We are thrilled to participate in the second phase of Hong Kong's e-HKD Pilot Programme, working alongside other leading financial institutions to test and explore how these innovations can redefine financial services and unlock new opportunities.

At Fidelity International, we are deeply committed to innovation in digital assets. We embrace an evolutionary approach to innovation, one that aligns with emerging market opportunities and evolving client needs. We envision a future where distributed ledger technology (DLT) and tokenization fundamentally reshape the financial landscape. As part of this vision, we are actively developing and testing real-world applications of asset tokenization. Our goal is to democratise access to financial services and foster capital efficiency, strengthening our leadership in the dynamic field of digital finance.

We see strong potential for fund tokenization to bridge the gap between traditional financial systems and the emerging digital asset economy. This advancement not only opens new distribution channels but also improves operational efficiency and supports cross-border investment opportunities.
Looking ahead, we expect tokenization to remain a critical area of focus for traditional financial institutions, with a particular emphasis on broadening distribution channels and enhancing capital efficiency. As more participants integrate tokenization into their operations, the industry must also navigate regulatory and operational challenges to unlock its full potential. Hong Kong's progressive steps in fund tokenization and the e-HKD initiative demonstrate significant momentum toward realising the potential of DLT, positioning the city as a global hub for digital asset innovation."

**Emma Pecenicic, Head of Digital Proposition and Partnership, APAC ex Japan Distribution**

## Technology Provider: Visa

"Visa is honored to participate in the second phase of Hong Kong's e-HKD Pilot Programme, working alongside ANZ, ChinaAMC (HK), and Fidelity International to advance the future of digital money and tokenized assets. This initiative marks a significant milestone in our ongoing commitment to building secure, interoperable, and efficient payment solutions that can operate seamlessly across borders and platforms.

Through this pilot, Visa contributed its expertise in tokenized asset infrastructure, leveraging the Visa Tokenized Asset Platform (VTAP) to facilitate the issuance and settlement of tokenized HKD deposits. By integrating programmable digital money with tokenized fund units, we demonstrated how atomic, real-time settlement can reduce counterparty risk and unlock new efficiencies for investors and institutions alike.

Our collaboration with leading financial institutions and regulators in Hong Kong underscores the importance of open standards, robust compliance, and cross-chain interoperability. We believe that the convergence of regulated digital currencies and tokenized assets will drive the next wave of innovation in global finance - expanding access, enhancing transparency, and enabling new business models.

Visa remains committed to supporting the evolution of digital money and tokenized finance, working with industry partners to deliver practical, scalable solutions that meet the needs of a rapidly changing financial ecosystem."

### Cuy Sheffield, Head of Crypto, Visa

Hong Kong stands at the forefront of digital financial innovation, and Visa is proud to support this vision through the e-HKD Pilot Programme. This initiative demonstrates Hong Kong's commitment to a future-ready financial ecosystem built on tokenized money and programmable assets to enhance efficiency, transparency, and global connectivity.

By partnering with Hong Kong Monetary Authority and leading institutions, Visa is shaping the next generation of cross-border payments and digital asset settlement. From remittance and commercial payments to procurement and trade, we leverage on the blockchain and tokenisation to strengthen payment infrastructure and enable a more seamless, secure and inclusive financial future.

As a trusted partner to Hong Kong's financial sector, Visa remains dedicated to supporting the city's role as a global hub for digital assets and to delivering innovative solutions that drives growth and inclusion in the digital economy.

### Paulina Leong, General Manager, Visa Hong Kong and Macau

# Tokenization of Money and Assets

## What is Tokenization ?

In financial markets, **tokenization** describes converting ownership rights of money or financial assets, such as physical assets like real estate or financial instruments like bonds, into **digital tokens** that are stored and managed on platforms using distributed ledger technology (DLT), most often a blockchain.

These tokens are **cryptographically secured** and **identifiable**, enabling them to be transferred and settled in real time across a shared ledger. Unlike traditional systems, where settlement occurs through a series of intermediaries and clearing processes that can take days, tokenization enables **direct, programmable transfer of value** between parties.

An essential component of tokenization is the use of **token standards**, such as Ethereum's Ethereum Request for Comment (ERC), which define the technical rules for how digital assets are developed, managed, transferred, and integrated with applications. These standards ensure interoperability between platforms and participants.

From a financial perspective, tokenization can be broadly divided into two main categories:

1. **Tokenization of Money** – The creation of digital tokens that represent a direct claim on money held with commercial or central banks. Examples include **tokenized bank deposits, central bank digital currencies (CBDCs),** and **stablecoins.**
2. **Tokenization of Financial Assets** – The issuance and management of instruments such as bonds, equities, units in money market funds (MMFs), or real estate securities in tokenized form. These tokens represent ownership or contractual claims and can be traded and settled on DLT platforms with the same, or enhanced, legal rights as their traditional counterparts.

According to the **Bank for International Settlements (BIS)**, tokenized assets retain the essential attributes of their underlying assets but gain increased efficiency and programmable features through the use of distributed ledger technology (DLT). While the intrinsic value and legal rights connected to the asset remain unchanged, the processes for issuing, transferring, and managing these assets become significantly more streamlined and adaptable.[1]

Tokenization offers a range of benefits for both issuers and investors.

Tokenization of money brings the primary medium of exchange onchain, unlocking the potential to conduct entire processes and move settlement infrastructure on the blockchain. This can help realize the full potential of tokenization.

## Digital Currencies and Fiat-Backed Tokens

### Stablecoins

Stablecoins are **digital tokens designed to maintain a stable value** relative to a reference asset, typically a fiat currency such as the U.S. dollar. Issued on DLT platforms, they are widely used as a medium of exchange, store of value, and settlement asset.

**Structural layers include:**

- **Token Layer** – Represents a claim on reserve assets or collateral.
- **Reserve and Collateral Infrastructure** – Fiat reserves held in bank or custodian accounts; crypto reserves locked in smart contracts. Transparency varies by issuer.
- **Ledger Infrastructure** – Public or permissioned on the blockchains record issuance, transfers, and redemptions via integration with smart contracts.

Regulated stablecoins are **fiat-backed** (off-chain collateralised), meaning they are backed 1:1 by fiat reserves; redeemable at par value.

- Examples: USDC (Circle), A$DC (ANZ Australia)
- Use Cases: Cross-border settlements, exchange trading pairs, remittances, on-chain lending.

Stablecoins have grown rapidly in cross-border use, offering near-instant settlement, lower fees, and 24/7 availability compared to traditional systems. However, **legal and regulatory requirements**, often jurisdiction-specific, remain a critical consideration.

## Tokenized Deposits

Tokenized deposits are **digital representations of commercial bank money** issued on DLT. They are liabilities of regulated commercial banks and retain the core attributes of traditional deposits: **singleness of money, regulatory oversight, and deposit insurance** where applicable.

According to the BIS, tokenized deposits are "programmable forms of bank deposits that exist on a shared ledger and are fully fungible with traditional deposit accounts." [2]

**Key features:**

- **Token Layer & Smart Contracts** – Each token represents a claim on a demand deposit, backed 1:1 by funds in a traditional account. Smart contracts enable programmable payments and conditional transfers.
- **Ledger Infrastructure** – Operates on public-permissioned, private, or consortium blockchains, often linked to interbank DLT platforms.
- **Interoperability Layer** – Designed to interact with traditional payment systems and other tokenized assets.

**Notable examples:**

- Project Ensemble (Hong Kong) – Exploring innovative financial market infrastructure (FMI) that will facilitate seamless interbank settlement of tokenised money through the e-HKD.[3]
- Project Guardian (Singapore) – Cross-border FX settlement using tokenized deposits and government bonds.[4]
- Project Agorá (BIS) – Testing interoperability between tokenized deposits and assets.[5]
- JPMD Token Pilot (J.P. Morgan) – Dollar deposits tokenized on public blockchain Base.[6]

Tokenized deposits are redeemable at par, ensuring liquidity consistency and preserving monetary policy transmission.

## Central Bank Digital Currencies (CBDCs)

CBDCs are **digital forms of central bank money**, representing a direct liability of the issuing central bank. They can be designed for retail or wholesale use.

**Two main types:**

| Type | Retail CBDC | Wholesale CBDC |
|---|---|---|
| Definition | Digital equivalent of cash for individuals and businesses | Settlement asset for high-value interbank and market transactions |
| Target User | General public | Regulated financial institutions |
| Use Cases | Everyday payments, financial inclusion, digital cash substitute | Interbank settlements, cross-border payments, asset settlement |
| Access | Broad, via wallets/ intermediaries | Restricted to banks, PSPs, FMIs |

**Examples:**

- Retail: e-CNY (China), Digital Rupee (India).
- Wholesale: Project Dunbar (multi-CBDC cross-border platform), mBridge (BIS), e-HKD (Hong Kong)

# Tokenized Assets – Bonds and Funds

## Tokenized Bonds

Tokenized bonds are **digital versions of traditional debt securities**, issued and recorded on the blockchain.

Like other tokenized real-world assets, they may be:
- **Natively issued** – Entire lifecycle managed on-chain.
- **Wrapped or "Digital Twin"** –Existing bonds mirrored on the blockchain for settlement efficiency or other benefits.

Core components:
- Token layer representing legal debt claims.
- Permissioned or hybrid DLT for issuance and transfer.
- Smart contracts for coupon payments, redemption, and compliance.

While tokenized bonds promise efficiency and transparency, many of the current models still rely on **centralized registrars** for legal ownership.

## Tokenized Funds

Tokenized funds represent **collective investment vehicles** (e.g., mutual funds, ETFs, MMFs) on the blockchain, with ownership recorded as digital tokens.

**Potential benefits:**
- Real-time, immutable transaction records.
- Enhanced automation for subscriptions, redemptions, compliance, and NAV calculations.
- Greater distribution reach, including regulated digital channels.

**Three maturity models:**
1. **Tokenization 1.0** – Digital twin tokens without legal ownership transfer; minimal operational change.
2. **Tokenization 2.0** – Hybrid on/off-chain ownership records; partial automation; increased regulatory complexity.
3. **Tokenization 3.0** – Fully on-chain issuance where the token is the legal share; highest efficiency potential, but requires harmonised regulation.

Tokenized funds could represent **a new evolution** in asset management, after mutual funds and ETFs, offering improved liquidity, transparency, and operational efficiency.

# Recognized Benefits and Use Cases of Tokenization in the Industry

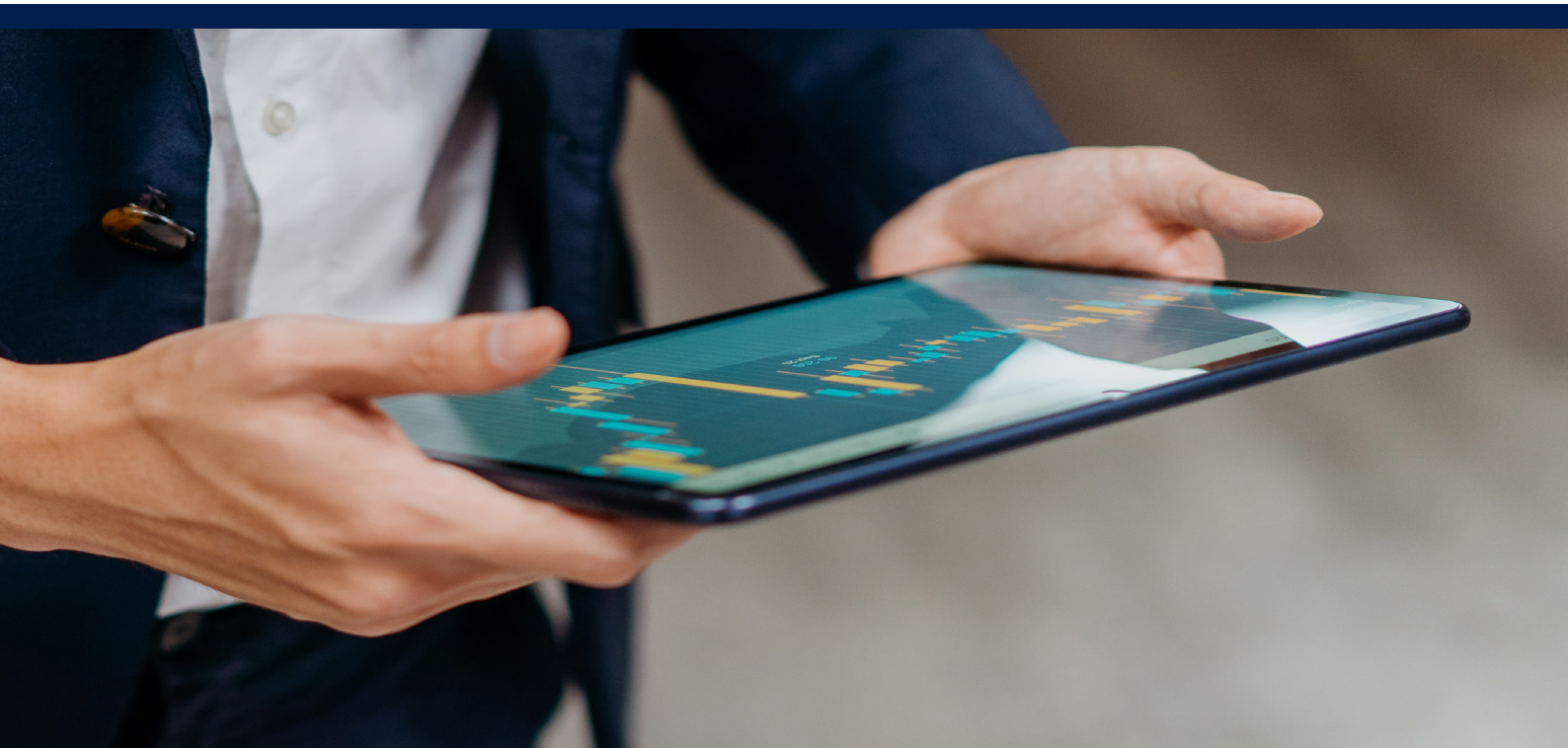
From a fund manager's perspective, tokenizing real-world assets (RWAs) represents a transformative evolution of traditional investment products into programmable, real-time, and globally accessible formats. This shift is not merely a technological enhancement, it is a fundamental rethinking of how investment products are issued, managed, and distributed.

ChinaAMC (HK), having issued Asia's first tokenized retail money market fund, has experienced how tokenization can reduce operational friction while enabling new distribution models.[24] The company continues to explore the practical implementation of on-chain automation of issuance and settlement of funds under full regulatory oversight.

For illiquid assets like real estate, private equity, or infrastructure, tokenization allows fractional ownership, lowering entry barriers and expanding investor access. Smart contracts embed governance features,such as lock-up periods, whitelist enforcement, and jurisdictional restrictions, improving compliance from the start.

Tokenization also meets growing demands for transparency. Smart contracts provide immutable audit trails and real-time position tracking, enabling fund managers and regulators to monitor activity without reporting delays.

In the long term, tokenization could simplify cross-border fund distribution, reduce transfer agency complexity, and enable innovations which unlock new features and services that could further benefit investors globally.



# Benefits of Fund Tokenization

Tokenizing funds, including unit trusts, mutual funds, and ETFs , can yield efficiency and market access improvements across the entire investment lifecycle. As tokenization ecosystems mature, the benefits for asset managers, distributors, and investors will expand.

**Below are some potential key benefits:**

## Faster Settlement

Traditional fund subscriptions and redemptions often operate on T+1 to T+3 settlement cycles, requiring multiple intermediaries for trade confirmation, clearing, and settlement. Tokenized fund units, when paired with tokenized cash (e.g., e-HKD, tokenized deposits, or stablecoins), can settle near-instantly.

This speed reduces counterparty and settlement risk, improves internal cash flow management, and enhances the investor experience , particularly for clients operating in volatile markets or under time-sensitive trading conditions.

**Example:** *In the e-HKD+ pilot programme, settlement of tokenized MMF purchases was designed to occur in near real time across borders*

## Programmability

Programmability is one of tokenization's most powerful differentiators. Fund managers can embed rule-based logic into tokens themselves, defining parameters such as:

- Investor eligibility (e.g., jurisdictional restrictions).
- Transfer restrictions.
- Lock-up periods for certain share classes.

This compliance-by-design approach aims to ensure that regulatory rules are enforced automatically at the transaction level. In the future, programmability could enable:

- **Dynamic fund structures** that adjust allocations based on real-time market data.
- **ESG-linked payouts**,where returns are tied to sustainability metrics.
- **Token-based loyalty incentives** for long-term investors.

## Increased Accessibility

Tokenization has the potential to enable fractional ownership and lower minimum investment thresholds, opening access to previously excluded investor groups, including younger, overseas, and underbanked populations.

This supports financial inclusion while enabling direct-to-client digital engagement via mobile-first investment experiences. In emerging markets, such accessibility can be a catalyst for retail investor participation in regulated investment products.

## Operational Efficiency

By embedding business logic directly into smart contracts, tokenized funds can automate core processes such as NAV updates, dividend distributions, and compliance screening.

Smart contract automation can potentially reduce administrative workloads and simplify audit trails. This automation can help minimise human error, reduce back-office costs, and provide real-time visibility for both managers and regulators.

Given the margin pressures in the global asset management industry, such operational savings are increasingly critical to sustaining competitive business models.

## Improved Transparency

On-chain recordkeeping ensures that every subscription, redemption, and transfer is recorded immutably and is visible in real time to authorised parties.

In the pilot, all fund transactions were directly verifiable, eliminating the delays associated with reconciliation between multiple intermediaries or nominee structures. This real-time transparency enhances investor trust and strengthens regulatory oversight.

## 24/7 Availability

Unlike traditional fund platforms, which operate within fixed market hours, tokenized funds can potentially be accessible at any time, including weekends and public holidays.

This supports cross-time-zone participation and lays the groundwork for secondary market development, where fund tokens could eventually be traded between investors globally.

## Expanded Distribution Channels

Tokenization bridges traditional finance (TradFi) and the digital asset economy. Fund tokens can be distributed not only through traditional channels but also over the blockchain rails via:

- Licensed digital platforms.
- Digital banks.
- Integrated wealth management apps.

This expanded reach gives asset managers access to new investor segments, including digital-native investors who may not engage through traditional channels.

## New Utility as Collateral

Tokenized fund units can be mobilised as collateral in both digital asset ecosystems and traditional finance.

For example, they could support:

- Collateralised lending on DeFi protocols.
- Margin trading facilities.
- Structured finance transactions.

By unlocking liquidity from traditionally static holdings, collateralisation increases the utility and appeal of fund ownership while deepening integration with modern financial ecosystems.

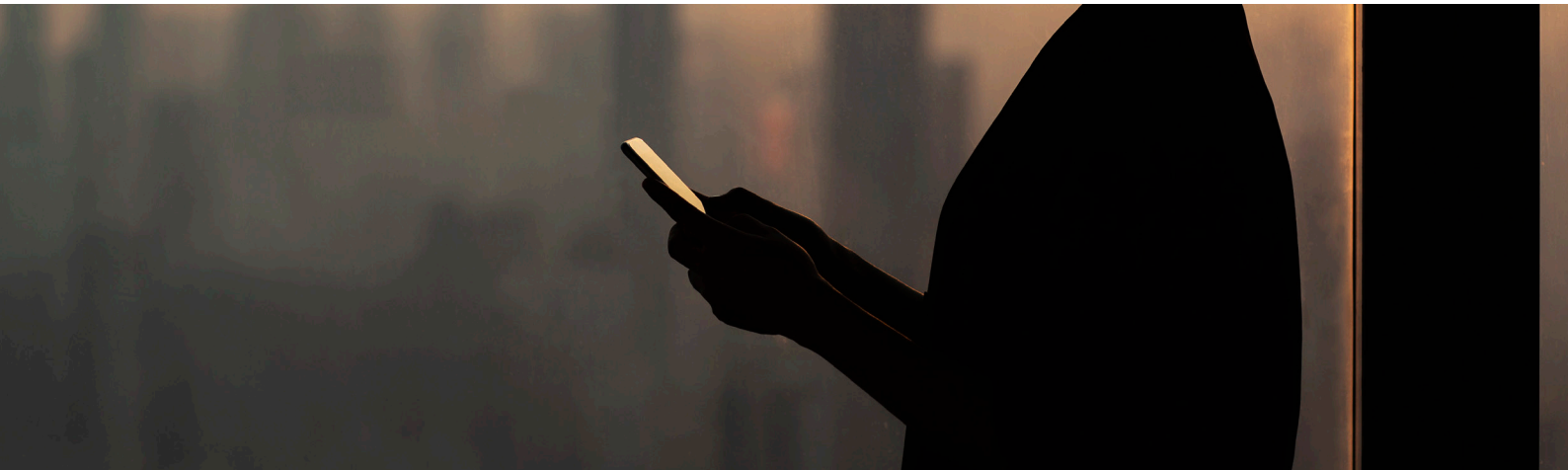
## Strategic Implications

The tokenization of funds is not just an operational upgrade , it is a strategic evolution of the asset management model. For fund managers, the shift promises:

For fund managers, the shift promises:

- **Higher investor engagement** through improved access and user experience.
- **Operational resilience** through automated processes and immutable records.
- **Regulatory alignment** through built-in compliance mechanisms.
- **Market expansion** through cross-border, multi-channel distribution.

As infrastructure, interoperability standards, and regulatory clarity improve, the adoption of tokenized funds is likely to accelerate, positioning early adopters , such as those involved in the e-HKD+ pilot programme , as leaders in the next era of fund management.



# Global Landscape

Tokenization is moving beyond pilots into regulated frameworks worldwide, driven by clearer rules and institutional adoption.

## Key jurisdictions:

### Hong Kong

Hong Kong Monetary Authority (HKMA)'s Project Ensemble and Project e-HKD+, plus SFC guidelines, have positioned Hong Kong as asia's tokenization hub. Milestones include Asia-Pacific's first tokenized retail money market fund (Feb 2025) issued by ChinaAMC (HK), the ASPIRe roadmap (Sep 2025), the third batch of HKSAR Government's digital bond issuance with the option to settle using tokenised central bank money (Nov 2025) and the launch of Ensemble$^{TX}$, the real-value pilot phase of Project Ensemble (Nov 2025). Licensing for VATPs and fiat-referenced stablecoins (FRS) issuers through the Stablecoins Ordinance (Cap. 656) reinforce regulatory certainty.[25,26,27,28]

### Singapore

The Monetary Authority of Singapore (MAS) pursues a balanced and deliberate strategy, pairing proactive exploration of financial technology with robust regulatory oversight. MAS' digital asset initiatives – Projects Guardian, Ubin, and Orchid – explore and experiment the use of tokenized deposits, bonds, and programmable money within controlled environments. By combining industry trials with strong regulatory frameworks, such as the Digital Payment Token (DPT) and Digital Token (DT) frameworks, Singapore aims to foster a trusted and stable environment for institutional tokenization.[29,30,31]

### European Union – MiCA

**Markets in Crypto-Assets Regulation (MiCA)** (the full regulation effective December 2024) harmonizes crypto-asset regulations across 27 EU member states, mandating Crypto-Asset Service Providers (CASP) licensing, reserve requirements for Electronic Money Tokens (EMTs) and Asset-Referenced Tokens (ARTs) issuers, and consumer protections. It simplifies cross-border operations and enables compliant tokenized RWAs.[32,33]

### United States – GENIUS Act

Passed in July 2025, the Guiding and Establishing National Innovation for U.S. Stablecoins Act (GENIUS Act) sets federal standards for payment stablecoins: 1:1 reserves, transparency, AML/CFT compliance, and clear issuer pathways (for example the option for regulation under a qualifying state-level framework). It provides greater legal certainty for USD-pegged stablecoins as settlement assets.[34,35]

### Australia

Australia is reforming licensing for DLT-based clearing and settlement, expanding sandboxes, and enabling conditional settlement to reduce counterparty risk, balancing innovation with oversight.[36,37]

### Global Institutions

The **Bank for International Settlements (BIS)** advocates a "unified ledger" for tokenized deposits and CBDCs under harmonized standards. The European Central Bank (ECB) emphasizes prudential supervision, systemic oversight, and legal finality for DLT integration.[38,39]

# HKMA and the future of Money Movement

## e-HKD Pilot Programme Background

Hong Kong stands as a global financial and commercial hub fostering trade between East and West. With a stock exchange capitalized at USD 6.1 trillion and the 8th busiest container port in the world, Hong Kong has positioned itself as a 'super-connector' and 'value-adder', Hong Kong plays a unique role in attracting and connecting businesses and investments from overseas and mainland China.

Since 2017, the Hong Kong Monetary Authority (HKMA) has led various initiatives to explore new forms of digital money, encompassing Central Bank Digital Currencies (CBDCs) and tokenized deposits. Its exploration of cutting-edge payment infrastructure aims to reinforce Hong Kong's status as a leading and efficient transactional environment. Its efforts reached a significant milestone in November 2022 with the launch of the Phase 1 of the e-HKD Pilot Programme, testing innovative applications of an e-HKD and their potential to become a prospective means of payment for individuals and corporates in Hong Kong.

## e-HKD Pilot Programme Phase 1 Summary

In May 2023, the HKMA commenced Phase 1 of the e-HKD Pilot Programme (Phase 1). Phase 1 involved pioneering firms, from the financial and technology sectors, including Visa, exploring e-HKD use cases.

The HKMA found three key areas where an e-HKD could add unique value to consumers and businesses:

1. **Programmability** - Automating complex transactions through smart contracts
2. **Tokenization** - Enhancing liquidity and facilitating secure asset transfer
3. **Atomic Settlement** - Ensuring near real-time simultaneous transaction settlement, eliminating counterparty risk

## e-HKD Pilot Programme Phase 2 Introduction

In September 2024, Project e-HKD was renamed to Project e-HKD+, expanding its scope beyond e-HKD to other forms of digital money, including tokenized deposits, and launched Phase 2 of the e-HKD Pilot Programme Phase 2 (Phase 2) to show its commitment to explore even more transformative applications of new forms of digital money. Phase 2 explores use cases across 3 themes: settlement of tokenized assets, programmability and offline payments. Visa, Australia and New Zealand Banking Group (ANZ), Fidelity International (FIL) and China Asset Management (Hong Kong) Limited ("ChinaAMC (HK)") are one of the 11 consortia participating in the pilot (collectively the "Pilot Participants") and will be focusing on programmability and the settlement of tokenized assets with cash-like characteristics (money market fund units).

The use case explores cross-border transactions in between new forms of digital money and a tokenized money market fund (MMF). The Pilot Participants will test how Australia-based investors can purchase tokenized fund units from Hong Kong asset managers using either a hypothetical e-HKD, or tokenized deposits. The process is two-fold. First, the investor's money will be exchanged for an hypothetical e-HKD by their bank (ANZ) and secondly, will be used to acquire an interest in a Hong Kong-based MMF using digital HKD. Pilot Participants have tested this use case with both e-HKD and tokenized HKD deposits. The transactions are designed to be near real-time and simultaneous, to simulate the potential reduction of settlement related counterparty risk.

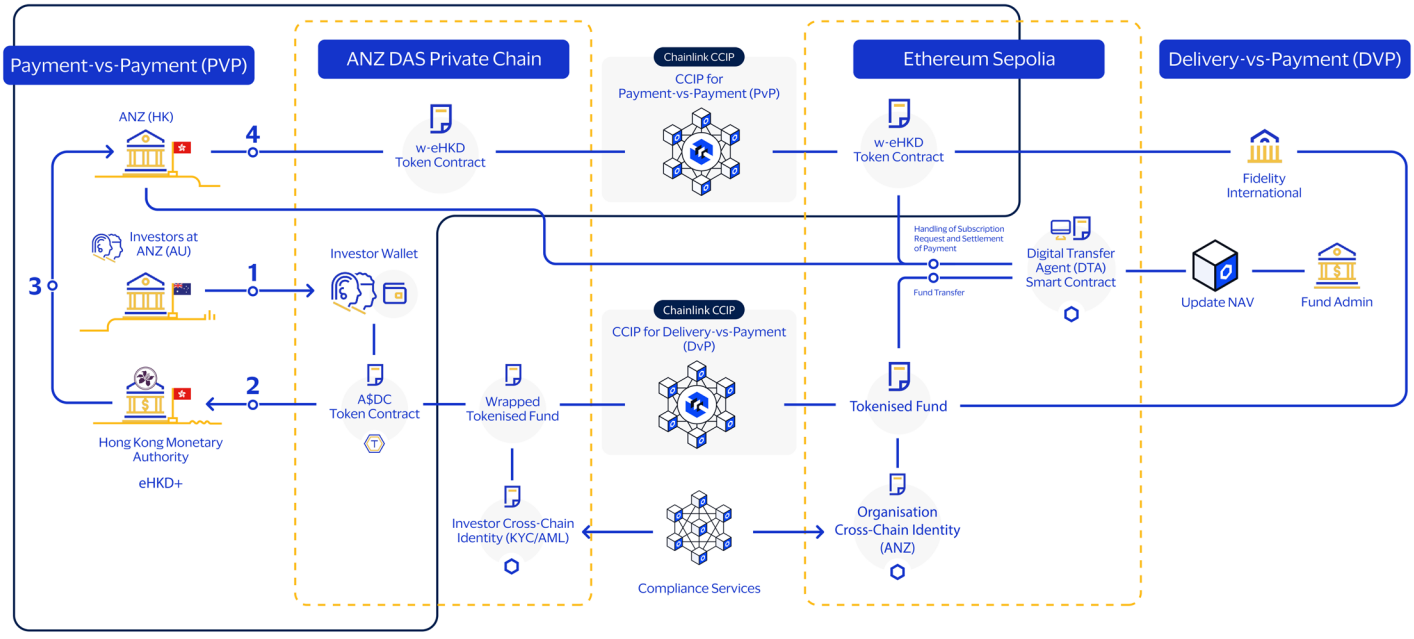
# Use Case

Throughout the course of the pilot, Pilot Participants designed and tested a simulated process of foreign exchange, tokenized asset purchase via a delivery-versus-payment (DvP) transaction, and minting of new forms of digital assets and money, including a hypothetical e-HKD and tokenized HKD deposits. These building blocks served to simulate an end-to-end transaction that allows an Australian investor to purchase a tokenized money market fund in Hong Kong.

Our pilot involved two experiments: First experiment relied on a "wrapped" version of a hypothetical e-HKD (wrapped hypothetical e-HKD or we-HKD) for the purchase of tokenized money market fund shares and was tested by ANZ and FIL. Second experiment used tokenized HKD deposits instead of a hypothetical e-HKD and was tested by ANZ, Visa, and ChinaAMC (HK).

## Flow Diagrams

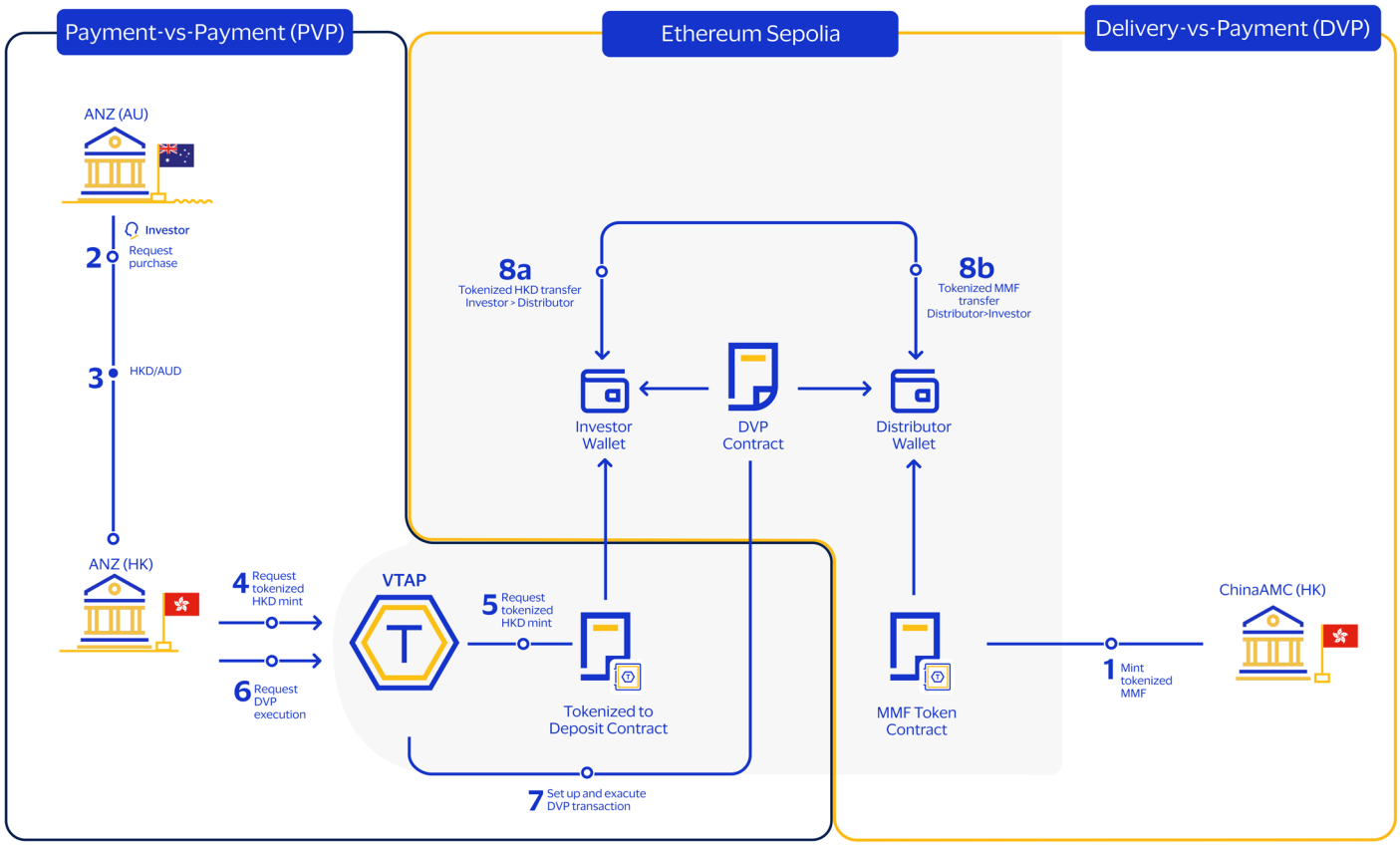
Exchanging an Australian Stablecoin (A$DC) against a hypothetical e-HKD to Purchase Tokenized MMF: ANZ and FIL




### Payment-vs-Payment flows

1. Investors from ANZ in Australia deposit AUD and receive A$DC into their wallets on the ANZ DAS Chain.
2. Subject to the ANZ internal reserve module for the foreign exchange transaction, ANZ purchases e-HKD from the HKMA.
3. The HKMA records the e-HKD transaction and returns it to ANZ for confirmation.
4. Upon the successful transaction above, ANZ Hong Kong mints wrapped e-HKD on the ANZ DAS blockchain.

Exchanging Australian Dollars (AUD) against Tokenized Deposits in HKD Denomination to Purchase Tokenized MMF: VISA, ANZ and ChinaAMC (HK)




## Fund Inventory Creation

1. ANZ acquires an inventory of tokenized MMFs to serve as a Liquidity Provider and Distributor. ChinaAMC mints the inventory of tokenized MMFs to the Distributor wallet.

## Payment-versus-Payment

2. Investor who is an ANZ customer in Australia requests to purchase Hong Kong MMF using their deposits at ANZ.
3. Using the Investor's deposits, ANZ conducts a foreign exchange transaction of AUD to HKD internally.
4. ANZ calls the VTAP APIs to request minting of equivalent amount of tokenized HKD deposits.
5. VTAP mints tokenized HKD deposits to Investor's wallet on Ethereum Sepolia.

## Delivery-versus-Payment

6. ANZ Hong Kong sends a fund subscription request to the Digital Transfer Agent (DTA) smart contract and settles the payment with wrapped eHKD+ using CCIP.
7. The DTA contract reads the NAV data and then triggers the transfer of the appropriate number of shares in the tokenized Fidelity International fund.
8. CCIP verifies ANZ's cross-chain identity (CCID) and CCIP locks the tokenized Fidelity International fund shares on Ethereum Sepolia.
9. CCIP verifies the investors' identity and CCIP unlocks the wrapped fund token on ANZ DAS.
10. The wrapped fund token is deposited to the investors' wallets on ANZ DAS."

# Technological Design Considerations and Implementation

## Tokenization Standards

### Wrapped e-HKD: ERC-20

For the pilot, Pilot Participants decided to implement wrapped hypothetical e-HKD (w-e-HKD) token using the ERC-20 token standard. This decision is grounded in the principles of interoperability, fungibility, and ecosystem compatibility that underpin modern digital asset infrastructure. ERC-20, as the most widely adopted token standard on the Ethereum blockchain and its compatible networks, offers a robust and mature framework for the issuance and management of fungible tokens, making it an ideal choice for representing a digital fiat equivalent such as w-e-HKD.

- **Fungibility and uniform representation**: The e-HKD is a fungible digital currency designed to mirror its fiat counterpart. ERC-20 supports this by making each w-e-HKD unit fully interchangeable, enabling seamless use in payments, settlements, and liquidity provisioning across decentralized platforms.

- **Protocol compatibility and ecosystem integration**: ERC-20 tokens integrate natively with a wide range of DeFi protocols, wallets, exchanges, and smart contracts. This allows w-e-HKD to plug into existing infrastructure without custom adaptations, including:
  - **Automated market makers (AMMs)** such as Uniswap and Curve
  - **Lending platforms** like Aave and Compound
  - **Custodial and non-custodial wallets** including MetaMask, Ledger, and institutional-grade solutions
  - **Cross-chain bridges and Layer 2 networks** that support ERC-20 interoperability

- **Security and auditability**: The ERC-20 standard is extensively peer-reviewed, formally verified, and battle-tested. Its simplicity lowers implementation risk and supports rigorous auditing. For a central bank-backed asset, ERC-20's clear interface and event structure enable transparent token tracking to support robust compliance and monitoring capabilities.

- **Scalability and future proofing**: ERC-20 tokens can be deployed on Ethereum Mainnet, Layer 2s, and other EVM-compatible chains, enabling scalability as w-e-HKD transaction volume and distribution grows. Its modular design supports future upgrades such as programmable payments, identity integration, and embedded regulatory controls.

- **Developer familiarity and tooling support**: ERC-20's ubiquity means developers and auditors already possess the expertise, tools, and best practices to work with it, reducing onboarding time, increasing productivity, and ensuring consistent quality.

### Tokenized Deposits & Tokenized Money Market Fund: ERC-3643

For the pilot, Pilot Participants implemented tokenized deposits and tokenized money market funds (MMF) using the ERC-3643 token standard. ERC-3643 builds on the ERC-20 standard, retaining its fungibility and ecosystem compatibility, while adding identity and transfer controls that make it particularly well-suited for regulated assets. These enhancements allow issuers to enforce KYC/AML, and other jurisdiction- or institution-specific rules onchain, bridging a critical gap between financial regulation and decentralized technology.

- **Fungibility and composable integration:** ERC-3643 itself is fully compliant with the ERC-20 standard to ensure that each unit of a tokenized deposit or MMF share is fully fungible and interchangeable. This ensures a familiar form factor for ERC-3643 tokens that is readily interoperable with the blockchain ecosystem similar to ERC-20 tokens, which includes all EVM-compatible blockchains.

- **Built-in identity**: ERC-3643 standard helps issuers ensure that token holders are authorized entities by relying on an onchain representation of identity. This identity that can be linked to wallet addresses and to certain "claims" (verifiable credentials), e.g., "this user has been KYC'd by a trusted institution". This offers a unified approach for dealing with identity on the blockchain, addressing a major gap between requirements for regulated institutions and current state of tokenization.

- **Programmable transaction controls**: ERC-3643 incorporate modular, rules-based controls that issuers can configure to enforce regulatory, accounting, or operational constraints. These may include jurisdictional restrictions, investor qualification requirements, or transaction limits, including velocity controls. By embedding these conditions directly in the token smart contract, compliance becomes inseparable from the transfer of value itself, making enforcement automatic, transparent, and resistant to circumvention.

## Chain Decisions

### Permissioned and Public Chains

Individual institutions or consortia can launch permissioned blockchains to form networks tailored for specific access controls, purposes, and technical designs.

In contrast, public networks are open to all actors by default, which may introduce new risk and privacy considerations for institutions. On the other hand, the public nature of these networks offer superior distribution and a wider range of assets and protocols to potentially interact with.

The merits of both approaches mean institutions will pick different chains depending on the use case, regulation, and type of asset tokenized. This necessitates a cross-chain interoperability solution that enables connectivity and helps realize the promised benefits of the blockchain technology–such as programmability and enhanced connectivity.

### Cross-chain Interoperability: Chainlink CCIP

For the pilot, we integrated Chainlink's Cross-Chain Interoperability Protocol (CCIP) to enable seamless communication and value transfer between permissioned chains like ANZ's DASChain and public Ethereum Testnet. This choice aligns with the need for secure, compliant interoperability in tokenized asset ecosystems.

In our implementation, CCIP relayed wrapped e-HKD (w-e-HKD) details from DASChain to public chain contracts, ensuring tamper-proof delivery to facilitate the purchase of tokenized MMFs on the public network. Beyond the bridging of the asset, CCIP enabled verification of identity credentials in real time while keeping personally identifiable information securely offchain, maintaining privacy, and supporting real-time compliance enforcement.


### Permissioned Network: DASChain

ANZ's DASChain blockchain architecture prioritizes security, scalability, and institutional control. While private Layer 1 (L1) chains provide controlled environments and flexibility, they often fall short on the strong security assurances and cryptographic trust anchors inherent in public blockchains. This can erode confidence in data integrity, transaction reliability, and long-term stability, key concerns in regulated finance.

To overcome these issues, DASChain uses a ZK Validium architecture that combines zero-knowledge proof (ZKP) technology with robust institutional oversight. This approach delivers a balanced solution: privacy-focused security, trust, and high performance suited to financial institutions and regulators. By implementing a ZK Validium architecture, DASChain is a secure, scalable, and compliant platform for digital assets. This strategic choice advances our vision of a blockchain-powered financial ecosystem that meets regulatory demands while driving innovation and collaboration.

## Primary vs Secondary market considerations

### Primary Market Issuance

Tokenized MMF issuance remains hybrid: tokens are minted/burned alongside off-chain records for NAV, reconciliation, and legal title. Settlement cycles stay T+0/T+1 with cut-off times and batch processing. Blockchain adds automation but doesn't remove off-chain dependencies, limiting scalability while preserving audit trails and compliance.

### Secondary Market Trading

Secondary trading offers potential 24/7 liquidity via smart contract-based DvP within a controlled, KYC-whitelisted environment. Current design restricts trading to approved counterparties, not open retail. OTC trading at latest NAV is possible but requires pre-funded inventory and adds operational costs. Transfers must occur on licensed platforms with on-chain compliance and off-chain reconciliation for audits.

## Overall

Tokenization streamlines processes, but adoption remains incremental. Full 24/7 retail markets depend on regulatory and infrastructure maturity.

# Technical Capabilities and Tools Tested

## Visa Tokenized Asset Platform (VTAP)

VTAP provides a technology platform for fiat currency tokenization and multi-asset blockchain transactions. It enables institutions to create and manage fiat-backed tokens and supports delivery-versus-payment (DvP) settlement with atomicity guarantees.

In the pilot, ANZ used VTAP to issue tokenized HKD deposits following the ERC-3643 standard, providing enhanced compliance controls such as allowlisting and velocity limits. These tokenized HKD deposits were exchanged for ChinaAMC's tokenized money market fund (MMF) units via a DvP transaction executed on the blockchain.

VTAP's API layer simplified integration, allowing ANZ to interact directly with tokenized assets issued by other participants, and demonstrating a potential model for risk-mitigated, efficient settlement in tokenized asset markets.

## ANZ DASChain & DAS Services

DASChain is ANZ's private-permissioned Layer 2 blockchain supporting its Digital Asset Services (DAS), including issuance and management of A$DC. It uses Multi-Party Computation (MPC) for key management, enhancing transaction security.

Customer interaction was enabled through the DAS Portal, ANZ's online digital asset marketplace. Within the pilot, simulated investors accessed the tokenized fund marketplace via the DAS Portal to initiate purchases.

The DAS Services suite managed the complete transaction lifecycle:

- Deducting investors AUD or A$DC balance.
- Acquisition of e-HKD and issuance of wrapped e-HKD (w-e-HKD) managed by DAS Reserve module, as well as issuance of tokenized HKD deposits via VTAP integration.
- Orchestrating the bridging of w-e-HKD to Ethereum Sepolia network using The Chainlink Cross-Chain Interoperability Protocol.
- Interacting with Fidelity's Digital Transfer Agent (DTA) for cross-chain DvP settlement.

## Fidelity & Tokenized Fund

Fidelity International led the tokenization of the underlying MMF in the pilot, serving as issuer and administrator. FIL deployed ERC-3643-compliant fund contracts and OnchainID identity management smart contracts on Ethereum Sepolia, establishing a secure and regulatory-aligned environment for digital fund operations. This involved not only technical implementation, but also governance, compliance, and ongoing management of the simulated tokenised money market fund.

Key pilot activities included:

- Issuance and deployment of funds, as well as onchain Net Asset Value (NAV) updates for transparent pricing and automated share issuance/redemption.
- Leveraging Chainlink's Digital Transfer Agent (DTA) technical solution, which fetches the NAV data and enables the automated issuance of tokenized fund units as part of a cross-chain transaction, reducing operational complexity at the point of issuance.
- Collaboration on enhancing CCIP protocols to support ERC-3643 tokens across multiple networks.

## ChinaAMC (HK) & Tokenized Fund

ChinaAMC (HK) already operates three tokenized money market funds (MMFs) in Hong Kong, issued under its authorized fund structure. The products offer primary market subscriptions and redemptions.

Within the pilot, ChinaAMC (HK) adapted this tokenized MMF framework to test end-to-end fund operations which included enabling the purchase of tokenized MMF units directly with tokenized HKD deposits.

Key activities included:

- Tokenization of MMF units with adherence to the CMTA Token (CMTAT) and ERC-3643 standards, incorporating compliance features such as whitelisting, freezing, and transaction pausing.
- Enabling onchain subscription and redemption via smart contracts, with off-chain NAV alignment and registrar coordination.
- Testing on fund operations across both primary and secondary market frameworks, including simulated 24/7 workflows in the secondary market

# Key Learnings

## Reduction in Settlement-Related Counterparty Risk

Tokenization enables smart-contract-based atomic settlement, eliminating the time lag between cash and asset legs and significantly reducing counterparty risk. This is only achievable when both money and assets are tokenized. Blockchain's immutable and transparent records enhance trust and regulatory compliance, while process automation through smart contracts reduces operational errors and reliance on intermediaries.

## Client Sentiment and Digital Money Adoption

Clients often struggle to distinguish between hypothetical e-HKD and tokenized deposits, though they generally prefer tokenized deposits because bank deposits are a familiar and trusted medium. Sophisticated investors remain highly rate-sensitive, and tokenization can improve yields by lowering Total Expense Ratios (TER), positioning tokenized products as attractive alternatives within the evolving digital money ecosystem.

## 24/7 Settlement and Operational Challenges

Smart contracts allow near real-time settlement, but daily NAV updates limit intra-day pricing flexibility. Multiple NAV updates could better support a 24/7 trading model. While continuous secondary market trading is technically possible, current constraints require market makers to pre-fund inventory and operate beyond standard hours, creating significant operational and cost burdens.

## Design Considerations for Blockchain Interoperability

Interoperability between public and permissioned blockchains is critical for combining regulatory controls with broader distribution and transparency. Both hypothetical e-HKD and tokenized deposits should be designed with interoperability in mind, enabling asset managers and distributors to leverage private-chain compliance features alongside public-chain accessibility.

## Market Requirements for Privacy in Token Standards

ERC-20 dominates DeFi, but ERC-3643 offers compliance features such as wallet whitelisting and transaction controls. No single token standard fits all use cases, so introducing hypothetical e-HKD or tokenized deposits for retail will require a taxonomy that addresses varying risk profiles and privacy needs across asset classes.

## Compliance and Governance for Tokenized Funds

Tokenized funds can broaden investor access but demand new tools and standards for compliance when distributed through non-traditional networks. Clear governance structures, defined roles, and regulatory alignment are essential to prevent liability disputes and compliance gaps, ensuring scalable and secure adoption.

# Participant Reflections and next steps for the industry

## ANZ:

"Our e-HKD pilot findings continue to demonstrate how tokenised forms of money and assets can operate securely and efficiently across both public permissionless and private permissioned blockchains. A valuable insight has been the continued challenge of designing infrastructure that meets institutional requirements for compliance, privacy, and performance, without compromising on interoperability.

Enabling near real-time settlement across blockchains was complex, particularly when dealing with wrapped token representations (wrapped e-HKD) and identity-linked fund tokens. The use of Chainlink's CCIP to bridge DASChain and Ethereum Sepolia was a critical enabler, but also highlighted the need for robust cross-chain governance, performance optimisation, and transparency requirements that require further exploration to support broader ecosystem readiness.

The pilot also reinforced the importance of token standards that embed compliance logic – relevant to the specific asset class - from the outset. Whilst the ERC-3643 proved effective in supporting identity verification and transfer restrictions for tokenised funds, it is unlikely to be suitable for all tokenised asset types (ERC-20 remains the most widely integrated standard across existing infrastructure). For tokenised finance to scale, we need standards that are not only technically sound but also aligned with regulatory frameworks and operational realities.

Ultimately, the e-HKD pilot has continued to validate that the foundational components of a future-ready digital asset ecosystem are programmability, interoperability, and compliance by design. ANZ will continue to explore how multiple forms of tokenised money can co-exist to help our customers move trade and capital around the region"

**Robert Porter**
Head of Digital Asset Service (Business), ANZ

## ChinaAMC (HK):

The e-HKD pilot has demonstrated the transformative potential of regulated digital currency in fund management. From ChinaAMC (HK)'s perspective as a fund manager, this project provided a timely opportunity to apply our experience in tokenized fund structuring, and blockchain integration to a real-world cross-border use case. Throughout the pilot, it became increasingly clear that while tokenized funds offer compelling benefits, realizing their full potential requires a nuanced approach tailored to both market readiness and regulatory constraints.

One of the most important findings from the project is the critical role that digital currencies , specifically **e-HKD and tokenized deposits**, play in enabling **atomic settlement** for buying and selling tokenized money market funds. These types of funds operate on short durations and require high-frequency, low-risk liquidity management. By using tokenized money for trading fund tokens, investors can transact in **near real-time** with finality, even outside traditional business hours. This structure reduces the lag and risk typically associated with T+1 or T+2 cash settlement cycles, thereby **enhancing fund liquidity, improving treasury operations**. The pilot confirmed that when both the fund tokens and digital money are natively operable on the blockchain, the end-to-end investor experience becomes significantly more efficient and transparent, a particularly valuable advancement for MMFs, where intraday access and operational certainty are key performance drivers.

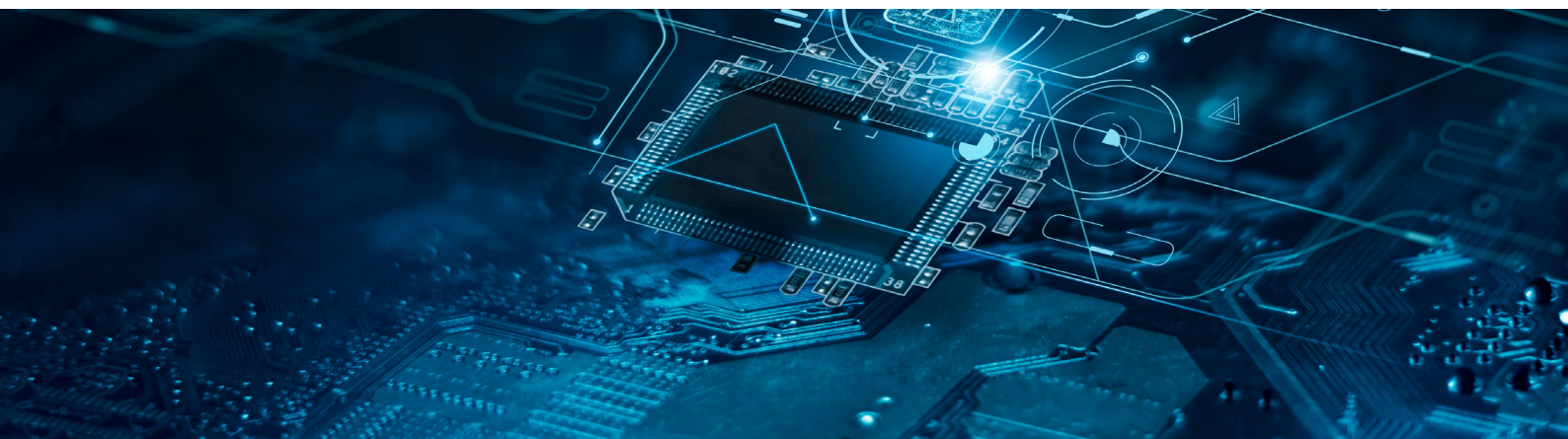
On the other hand, another key learning is the contrast between the primary and secondary markets. In the primary market, many of the envisioned efficiencies, such as instant issuance, real-time NAV calculation, and full on-chain recordkeeping, remain difficult to achieve. Constraints around off-chain asset management, registrar requirements, and legal finality of tokenized units mean that most core functions must still follow legacy processes. This structural friction limits the extent to which tokenized fund units can be managed end-to-end on the blockchain under current regulations.

By contrast, the secondary market proved far more feasible, offering immediate, tangible benefits. The closed-loop market structure deployed during the pilot enabled atomic delivery-versus-payment (DvP) of fund tokens using e-HKD and tokenized deposits, effectively eliminating settlement risk and enabling 24/7 fund trading under a compliant framework. While broader access and liquidity will require further regulatory development, the pilot demonstrated that a smart contract-based secondary market is operationally viable and offers a meaningful step forward for tokenized fund distribution.

At the same time, the pilot reaffirmed that DeFi applications, such as open liquidity pools or algorithmic market making, are not yet compatible with SFC-regulated funds, primarily due to the need for strict KYC/AML compliance, suitability enforcement, and centralized oversight. While programmability and transparency are valuable, such features must be implemented within regulated structures that uphold investor protection and control token circulation.

Going forward, our strategy is to enhance tokenized products within the existing regulatory framework rather than wait for full legal reform. That means continuing to optimize hybrid models, where on-chain functionality is layered onto traditional fund structures, and selectively extending programmability in areas such as compliance logic, automated redemption cycles, or wallet-based controls.

**Tian Gan**
CEO of ChinaAMC (HK)



## Fidelity International

"Fidelity International's participation in the e-HKD and tokenised money market fund (MMF) pilot marks an important milestone in exploring the convergence of digital currencies and tokenised investment vehicles. Acting as fund issuer and administrator in this pilot, we led key activities such as deploying ERC3643 fund contracts, enabling wallet-level identity management via OnchainID, and integrating on-chain NAV oracles to support transparent and compliant fund operations.

Our key learnings reaffirm that compliance-aware token standards are foundational for institutional-grade tokenisation, while interoperability protocols are vital for scalable, multi-network ecosystems. Yet, practical constraints remain: NAV oracles still update daily, portfolio assets continue to settle through traditional market rails, and liquidity fragmentation risks persist across multiple digital currencies. There is also an inherent trade-off between compliance and adoption: while ERC3643 supports regulatory controls through identity management and transfer restrictions, ERC20 remains the dominant standard across existing DeFi infrastructure. Market maturity will ultimately determine how these standards converge, balancing compliance assurance with broad ecosystem compatibility.

This highlights a fundamental challenge: most current tokenisation models are digital twins of traditional funds. They replicate legacy structures on chain rather than reimagining them for a 24/7 digital economy where settlement occurs in near real time. To fully realise the potential of tokenisation, fund structures must evolve into digital natives, designed to embed multiple NAV calculations, dynamic liquidity windows, and automated yield accrual directly within smart contracts.

Such evolution will depend on a broader ecosystem involving custodians, transfer agents, liquidity providers, and oracle operators. Establishing clear roles and harmonising industry standards for data, operations, and governance will be essential to achieve commercial scale.

Ultimately, investor needs will guide the next phase of innovation. Some may prioritise efficient on-chain access to MMF yields, while others may seek intraday liquidity opportunities. Digital native funds, with programmable flexibility and on chain settlement, hold the key to unlocking a new era of transparency, inclusivity, and operational efficiency in asset management."

**Emma Pecenicic**
Head of Digital Proposition and Partnership, APAC ex Japan Distribution

## Visa

"The e-HKD Pilot Programme marks a pivotal moment in the evolution of digital assets and programmable money across Asia Pacific. At VISA, we believe that the interplay between regulated digital currencies and tokenized assets will fundamentally reshape how value moves across borders—unlocking new efficiencies, transparency, and opportunities for investors and institutions.

Through this pilot, we demonstrated how programmable, compliant digital money can enable, near real-time settlement of tokenized fund units, reducing counterparty risk and enhancing operational resilience. Our work with leading partners and regulators in Hong Kong underscores the importance of open standards, robust governance, and cross-chain interoperability in building a future-ready financial ecosystem.

As the digital asset landscape matures, VISA remains committed to driving innovation, supporting regulatory alignment, and delivering scalable solutions that empower growth and inclusion in the global digital economy"

**Nischint Sanghavi**
Head of Digital Currencies, Asia Pacific

## Chainlink:

"By working with ANZ, Fidelity International, and other leading institutions under the Hong Kong Monetary Authority's e-HKD Pilot Programme, we have proven how Chainlink powers real-world financial applications within existing regulatory frameworks and across public and permissioned blockchains. Using the Chainlink platform to coordinate identity, compliance checks, and asset issuance across networks in a single transaction flow offers a clear path forward for more advanced tokenized fund and cross-border use cases."

**Fernando Vazquez**
President of Capital Markets,
Chainlink Labs

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