

OPINION

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DTCC's Decentralized Platform Composer X: Implications for Korea's Digital Asset Infrastructure

On February 4, 2025, the Depository Trust & Clearing Corporation (DTCC), the central securities depository (CSD) of the US, officially launched Composer X, a comprehensive platform for managing the full lifecycle of digital assets. Composer X is an end-to-end solution that supports all stages of the digital asset lifecycle, from issuance and distribution to administration and reporting. DTCC, one of the world's leading CSDs, has developed this decentralized platform in response to the rapid expansion of blockchain networks fueled by the growing global digital asset market. The platform aims to bridge blockchain networks with traditional finance (TradFi) systems and promote the global standardization of distributed ledger technology (DLT).

Composer X represents a decentralized finance (DeFi) model designed for institutions, combining elements of DeFi with functionalities of TradFi. It offers an innovative infrastructure that addresses long-standing limitations in TradFi, such as slow settlement speeds, lack of liquidity, high intermediation costs, and operational risks in transaction processing. The platform thus serves as a key initiative within DTCC's broader strategy to advance financial market infrastructure (FMI) innovation.

Korea's FMI institutions should establish a clear roadmap for developing integrated digital asset management solutions similar to Composer X. The Korean government, in turn, should take a more proactive role in supporting the development of digital asset market infrastructure and enhancing accessibility for domestic digital asset innovators.

With delayed legislative progress on the digital asset market, Korean digital asset businesses are gradually losing ground to global competitors. In this context, a "Korean-style Composer X" is expected to address the capability gaps of domestic digital asset players in technical infrastructure, tokenization effect verification, stakeholder integration, and regulatory compliance.

* All opinions expressed in this paper represent the author's personal views and thus should not be interpreted as Korea Capital Market Institute's official position.

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Introduction

Following President Trump's inauguration on January 20, the administration has adopted an aggressive policy stance aimed at reinforcing US leadership in the global blockchain network and preserving the dominance of the US dollar. On January 23, the administration issued an executive order entitled Strengthening American Leadership in Digital Financial Technology,¹⁾ establishing a crypto asset policy that prioritizes US national interests. The order also revoked Executive Order 14067, which had been issued under the Biden administration. In further support of this agenda, the administration has appointed pro-crypto officials to key positions, including the White House Crypto Czar, the Secretary of the Treasury, and the Chairman of the Securities and Exchange Commission (SEC), all of whom have since advanced a crypto-friendly regulatory approach. The Republican-controlled Congress has also provided strong legislative support by introducing bills regarding the comprehensive crypto asset framework and stablecoin regulation. A central institution in executing the US digital asset strategy is the Depository Trust and Clearing Corporation (DTCC).

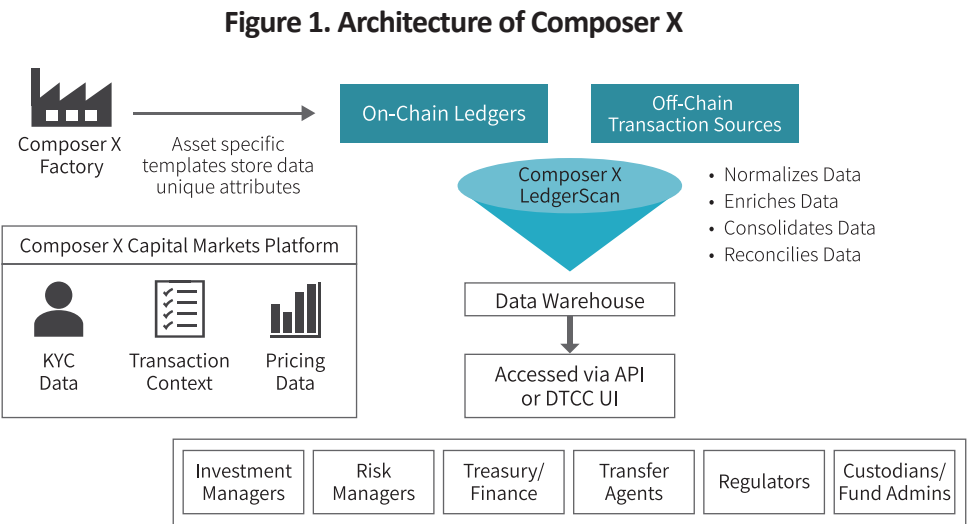
Initially skeptical of distributed ledger technology (DLT), DTCC has gradually embraced it, implementing a range of DLT-driven initiatives. These include the launch of a Digital Securities Management (DSM) platform for private securities markets in 2019; Project Ion, initiated in 2020 to enhance equity settlement using DLT; and Project Lithium in 2022, designed to enable atomic settlement through central bank digital currencies (CBDCs) as the primary settlement medium. In December 2023, DTCC acquired Securrency, a digital asset infrastructure provider, thereby strengthening its capabilities as a security token offering (STO) platform. Integrating these accumulated capabilities, DTCC officially launched Composer X on February 4, 2025, a comprehensive platform designed to manage the full lifecycle of digital assets. Against this backdrop, this article provides an analytical overview of Composer X, exploring its conceptual foundation, structural architecture, and the function and usefulness of its core components. It further examines real-world applications of the platform and presents relevant policy implications for Korea.

1) Executive Order, 2025, Strengthening American Leadership in Digital Financial Technology.

Conceptual framework and architecture of Composer X

Composer X is an end-to-end platform designed to support all stages of the digital asset lifecycle, from issuance and distribution to compliance, administration, and reporting. As one of the world’s leading central securities depositories (CSD), DTCC has developed this decentralized platform to connect growing blockchain-based networks, fueled by the expansion of global digital asset markets, with traditional finance (TradFi) and to promote DLT standardization on a global scale. Composer X enables interoperability across multiple blockchain protocols while facilitating integration with legacy financial systems. This architecture provides both flexibility and scalability in the rapidly evolving digital asset landscape, while maintaining the level of reliability expected in traditional capital markets. By using smart contracts, the platform automates transactions and regulatory compliance, significantly reducing transaction costs, mitigating legal risks, and enhancing operational efficiency.

Composer X consists of three core components that function within an integrated ecosystem: Capital Markets Platform (CMP) managing the full lifecycle of tokenized financial instruments; Factory serving as the engine for issuance of self-describing smart tokens; and LedgerScan analyzing and reporting the data of transactions and positions. These three modules are interlinked to form a cohesive ecosystem for digital asset management. Figure 1 illustrates the architecture of Composer X.



Source: DTCC, 2025, Data and Analytics, DTCC Digital Assets

Composer X Factory

Composer X Factory serves as the tokenization engine designed to generate self-describing smart tokens²⁾—digital tokens embedded with asset metadata (supplementary data about the underlying asset) and compliance rules—and manage the tokens across multi-chain environments in an automated manner. Factory performs four key functions.³⁾ First, it issues asset tokens based on smart contracts that enable issuance, burning, redemption, and freezing. The tokenized assets issued by Factory possess both advantages of the scalability of Ethereum standards (ERC-3643, ERC-20, etc.) and compatibility with the Ethereum Virtual Machine (hereinafter 'EVM'). Second, it enables the creation of smart contract oracles by integrating external data sources (e.g., interest rates, credit ratings). These on-chain reference oracles enable Composer X to connect with existing financial infrastructure, allowing for integrated processing of traditional financial market data and digital asset data. Third, it uses metadata embedding technology that directly stores assets' legal rights, ownership records, regulatory information, etc. in tokens to enhance the utility of self-descriptive smart tokens.⁴⁾ This allows real estate tokens to contain registry information and bond tokens to contain interest payment terms in a computer-readable format. Additionally, it implements RBAC (Role-Based Access Control) permission settings that allow access to sensitive data fields (investor identity information, etc.) to be granted only to designated authorities, enabling privacy protection. Fourth, it provides tools for structuring complex financial instruments, such as multi-layered digital securities or automated collateral management systems. These tools, built on EVM-compatible architecture, enable the execution of conditional logic, allowing for automated payments or distribution of proceeds upon fulfillment of predefined conditions.

2) A self-describing smart token is a digital asset that embeds all essential information required for transactions (ownership records, regulation data, etc.) directly within the token itself. These tokens contain both metadata and executable code. The structure of a self-describing smart token comprises three core layers: the asset layer holding the intrinsic value, the rules layer including transaction restrictions, and the state layer with transaction history.

3) DTCC, 2025, Asset Tokenization, p. 2.

4) Metadata embedding is executed using the Ethereum-based ERC-3643 standard, allowing asset-specific data schemas (dividend payment schedules, rights exercise periods, etc.) to be encoded within the token's metadata. A data schema is a structural definition of how data is organized and stored. It is essential for clearly defining data structure and enabling efficient data management.

Composer X CMP

Composer X CMP functions as the operational hub of the platform, managing the full lifecycle of tokenized assets while serving as a bridge between digital asset systems and TradFi systems. CMP carries out four core functions.⁵⁾ First, it manages the issuance, distribution, administration, and redemption of tokenized assets across distributed ledger networks in a transparent and comprehensive manner. Examples of management automation include the automation of corporate actions such as dividend payments, while examples of management integration include unified investor onboarding management (including KYC, AML, etc.). Second, it enables real-time atomic settlement by utilizing tokenized payment instruments, such as stablecoins. It establishes escrow mechanisms for tokenized assets and payment instruments, executing smart contracts that ensure both tokenized assets and payment instruments are exchanged simultaneously. Such real-time, automated settlement can enhance both the stability and scalability of settlement processes and facilitate cross-border transactions. Third, it performs integrated reporting and analysis functions by structuring on-chain data into an account structure, augmenting blockchain (on-chain) data with external (off-chain) additional information. This architecture allows CMP to serve as a bridge between Web3 and TradFi systems. CMP also effectively embeds TradFi's middle- and back-office functionality into the on-chain digital asset lifecycle management process. Fourth, it incorporates the patented Compliance Aware Token Framework (CATF), which facilitates real-time, automated compliance verification and enforcement across multiple jurisdictions for each transaction. CATF ensures that transactions occur only when wallet credentials satisfy the regulatory and transactional conditions embedded within a token. This mechanism mitigates regulatory risk and prevents unauthorized activity. In addition, it supports decentralized identifier (DID) protocols to ensure compliance with data protection regulations, including the EU General Data Protection Regulation (GDPR).

5) DTCC, 2025, Asset Tokenization, p. 2.

Composer X LedgerScan

Composer X LedgerScan is a SaaS (Software as a Service)⁶⁾ data analytics platform that integrates on-chain transaction data from tokenized assets with off-chain data from TradFi systems. It supports data aggregation, analysis, reporting, and integration. LedgerScan enables operators to monitor account holdings and transaction volumes in real time, while offering comprehensive tracking of token value and liquidity. LedgerScan performs four key functions.⁷⁾ First, it monitors and reports digital asset activity across multiple blockchain networks. Designed to align with 24/7 trading in global digital asset markets, it retrieves transaction data from all EVM-compatible blockchains in real time, allowing for immediate verification of asset ownership and valuation. Second, it consolidates on-chain data recorded on blockchains with off-chain data (including transaction context) and integrates both data into a cloud data warehouse. This capability enables real-time reconciliation of discrepancies between on-chain and off-chain infrastructures. It also links blockchain wallet addresses with the actual legal owners of the assets, thereby enabling asset managers to maintain a “good control location” for digital assets. Third, it normalizes non-standard on-chain data into standardized financial formats and organizes on-chain data in account structures, enabling integrated financial reporting and analysis. It translates digital asset data into formats that existing accounting systems can understand, facilitating the reconciliation and joint management of digital and traditional financial records. Additionally, it incorporates external price feeds from third-party data providers to track both real-time and historical token prices and to evaluate tokenized assets.⁸⁾ Fourth, it generates and stores audit trails that include immutable timestamps and execution entity information for all tokenized asset transactions and corporate activity events occurring on-chain and off-chain. This audit trail data is integrated into a cloud-based data warehouse, where it is aggregated and normalized in real-time and utilized as reliable records for regulatory reporting and system recovery.

6) SaaS (Software as a Service) refers to a cloud computing model in which software is provided as an on-demand service over the Internet. Traditionally, users had to purchase software and install it on their own computers or servers, but with SaaS, users can access the software directly via the Internet without local installation.

7) DTCC, 2025, Asset Tokenization, p. 2.

8) These functionalities of LedgerScan provide a comprehensive view necessary for investment decision-making, risk management, and collateral optimization.

Interconnected functions and utility of Composer X's core components

The core components of DTCC's Composer X (Factory, CMP, and LedgerScan) are interconnected to automate the full lifecycle of tokenized assets and enhance regulatory compliance. The platform operates through a coordinated workflow: Factory configures conditions for the token issuance and transaction; CMP manages investor onboarding, token distribution, and corporate actions; and LedgerScan aggregates transaction data and facilitates integrated reporting. The strategic utility of Composer X lies in its role as an infrastructure that bridges TradFi and decentralized finance (DeFi), unlocking synergies between the two systems. Despite its innovation, DeFi faces structural limitations, including regulatory uncertainty, technical constraints, and immature market infrastructure. Composer X addresses these challenges by offering a hybrid infrastructure model that integrates the functionalities of DeFi and TradFi, as outlined in Table 1.

Table 1. Composer X solutions to key DeFi challenges

DeFi Challenge	Composer X Solution	Composer X Component
Liquidity fragmentation	Integration of multichain liquidity pools, utilization of tokenized payment instruments (such as stablecoins), integration with traditional financial settlement systems, atomic settlement via hybrid DvP engine	Platform-wide solution
Regulatory uncertainty	Real-time automated compliance across multiple jurisdictions, enforcement of role-based access control (RBAC)	CATF, CMP
Lack of data transparency	Issuance of self-describing tokens, data normalization and reconciliation, management of digital subledgers	Factory, LedgerScan
Smart contract vulnerability	Compliance-embedded token design (via CATF), real-time monitoring and adjustment of transactions for abnormal transaction detection to support incident response	Factory, LedgerScan
Data silos ⁹⁾	Integrated data management (including on-chain and off-chain consolidation, multichain data normalization, linkage with legacy systems, and support for data warehouses, APIs, and subledger structures), interoperability based on a DLT-agnostic approach, comprehensive end-to-end platform architecture	Platform-wide solution

Multiple use cases illustrate the effectiveness of Composer X's solution. For instance, the Japan Securities Clearing Corporation (JSCC) partnered with DTCC on a proof-of-concept (PoC)

9) A data silo in blockchain networks refers to a state in which different blockchain networks or DeFi protocols store and manage data independently, resulting in isolated and unconnected datasets. Data silos represent a chronic challenge in DeFi, stemming from a lack of interoperability between platforms.

project that utilizes tokenized assets issued across multiple blockchains as collateral. Conducted via Composer X's digital launchpad, this project has demonstrated the platform's capability to enable interoperable collateral exchanges via DLT-based smart contracts, while mitigating data silos.¹⁰⁾

Use case of Composer X: WisdomTree's tokenized funds

Composer X serves as the foundational infrastructure underpinning the expansion of WisdomTree, a global asset management firm, into the real-world asset (RWA) segment. Leveraging the platform's core components, Factory, CMP, and LedgerScan, WisdomTree has fully automated the tokenization process and achieved integration between its on-chain and off-chain systems, implementing an advanced sophisticated asset management model.

Through the Factory tokenization engine, WisdomTree has tokenized funds into a self-describing format and enhanced interoperability across tokenized funds within the same platform. As of April 3, 2025, WisdomTree had launched 13 tokenized funds via Composer X Factory, with these tokens trading across five blockchain networks (Ethereum, Arbitrum, Avalanche, Base, and Optimism).¹¹⁾ This multi-token architecture differentiates WisdomTree's approach, which utilizes self-describing smart tokens, from single-token models such as BlackRock's BUIDL.

Utilizing CMP, WisdomTree has integrated investor onboarding (including KYC and AML), rights transfers,¹²⁾ and automated settlement processes for its tokenized funds. The platform also performs real-time verification of embedded regulatory requirements through the automated compliance program CATF. Both the WisdomTree Prime application for retail investors and the WisdomTree Connect platform for institutional clients operate on CMP, enabling automated processing of large-volume institutional trades and smaller retail transactions within an integrated market ecosystem.

10) DTCC, 2024, Transforming Collateral Management with Digital Assets: A DTCC Digital Launchpad Collaboration with Japanese Securities Clearing Corporation (JSCC).

11) WisdomTree, Apr. 3, 2025, WisdomTree Connect™ now offers 13 tokenized funds across Ethereum, Arbitrum, Avalanche, Base and Optimism, Press Release.

12) Records of rights transfers for WisdomTree's tokenized funds are managed through a dual ledger structure: off-chain official ledgers maintained by the transfer agent, WisdomTree Transfers, and on-chain auxiliary ledgers maintained on blockchains such as Stellar and Ethereum. WisdomTree uses Composer X LedgerScan to reconcile the dual ledger system and align legal ownership records.

WisdomTree utilizes LedgerScan to enhance the transparency and reliability of CMP-based trading activity through integrated data visualization and analysis. LedgerScan integrates and standardizes transaction data occurring across various blockchains and provides real-time price information by linking with Chainlink oracles, thereby implementing sophisticated data reporting systems such as real-time net asset value (NAV), ESG reporting, and customized portfolio analysis. Furthermore, LedgerScan automatically reconciles on-chain and off-chain records, minimizing data discrepancies and ownership mismatches, while strengthening audit trails and regulatory reporting capabilities.

With the support of Composer X, WisdomTree's total assets under management (AUM) in tokenized funds surged from USD 31 million at the end of 2024 to USD 132 million by the end of the first quarter of 2025, representing a more than fourfold increase.¹³⁾

Conclusion

In response to the emergence of the decentralized token economy, DTCC has leveraged its institutional status and longstanding expertise as a CSD to develop the Composer X platform. Composer X supports the US strategy of reinforcing dollar dominance in blockchain-based finance through three key mechanisms. First, its hybrid delivery-versus-payment (DvP) mechanism via CMP accelerates the global adoption of US dollar-denominated stablecoins as a digital payment medium. Second, CATF automates regulatory compliance, supporting a US-centric financial framework in cross-border blockchain transactions. Third, enhanced transparency in real-time transaction data, enabled by Composer X, helps prevent circumvention of the dollar-based financial system.

Composer X represents an innovative DeFi model designed for institutions that blends the strengths of DeFi and TradFi. It addresses persistent limitations of TradFi, such as slow settlement speeds, lack of liquidity, high intermediation costs, and operational risks in transaction processing. It is evaluated as part of the Financial Market Infrastructure (FMI) innovation that DTCC has consistently emphasized. With its open architecture supporting the issuance and distribution of diverse tokenized assets across multiple blockchains, Composer X also offers high potential as an infrastructure for small and mid-sized digital asset innovators.

13) WisdomTree, May 2, 2025, Presentation: Earnings release (Q1 2025), p.13.

Korea's FMI institutions should establish a clear roadmap to develop integrated digital asset management solutions modeled on Composer X. As demonstrated by Japan's JSCC's collaboration with DTCC's Digital Launchpad project, Korea's FMI institutions should also strengthen international cooperation and take an active role in shaping global standards for digital asset infrastructure. Additionally, the Korean government should support the development of domestic digital asset market infrastructure and devise measures to improve domestic digital asset innovation companies' infrastructure accessibility.

With delayed legislative progress on digital assets, including tokenized securities and crypto assets, domestic players are increasingly losing ground to global competitors. In this context, a "Korean-style Composer X" is expected to address the capability gaps of domestic digital asset players in technical infrastructure, tokenization effect verification, stakeholder integration, and regulatory compliance.