From Art and Cultural Heritage to Supply Chain: Numeraire Future Trends and the Creation of Digital Object Identity

Numeraire Future Trends

Dr. Thomas Hardjoino
Technical Director, MIT Connection Science & Engineering;
Senior Research Fellow, ADIA Lab;
CTO & Co-Founder, Numeraire Future Trends

Dr. Marsha Lipton
CEO & Co-Founder, Numeraire Future Trends

As tokenization moves from concept to implementation, the art and culture sector finds itself at the forefront of a much broader shift of embedding real-world assets into the digital economy raising urgent questions of trust, authenticity, and regulation. Yet while blockchain provides a secure infrastructure for recording ownership, it remains disconnected from the physical world it seeks to represent. The challenge lies in verifying objects' authenticity and identity with precision and trust. Addressing this gap is essential not only for enabling regulatory compliance, such as under the EU's MiCA framework, but also for preserving the integrity of cultural and economic value in an increasingly digital marketplace.

Challenges in Validating Tokenized of Real-World Assets

The recent EU regulation, Markets in Crypto Assets Regulation (MiCA), represents significant progress in establishing a multi-jurisdictional framework for digital assets. Such a framework would promote greater consumer participation in the digital assets industry, including by those in the art and culture sectors, where tokenization of physical objects is increasingly gaining traction. One type of token recognized by MiCA is the asset-referenced token, which refers to (references) a physical asset located in the real world. For artworks and cultural objects, this presents a powerful opportunity: to preserve their identity and history through secure digital representation.

While progress in blockchain technology, today, there is still a lack of interoperability between the blockchain world and the world outside the blockchain. Smart contracts, while effective for managing blockchain-native data, are inherently limited to data on the same blockchain. A smart contract cannot "see" the world outside the blockchain.

In addition to limitations due to limited interoperability, new types of data-rich services are needed to bridge the gap between the blockchain world and the tangible world where artworks, artifacts, and collectibles reside. Numeraire is an example of such a new generation of services that provide *provenance data* to back MiCA-compliant asset-referenced tokens by anchoring them in verifiable provenance data and object-specific identification technologies.

A key aspect of Numeraire's offering is the combination of two essential components: the object's "personality", captured through its microscopic surface features using Object AI Fingerprinting, and the provenance, exhibition history, artist statements, and ownership records, custodianship, essential life moments, and transitions over time. Together, these components establish a trusted digital identity for cultural and other valuable assets, ensuring that their value, authenticity, and historical significance are preserved as they enter the digital economy.

Fingerprinting the Personality of an Object

Each object, even mass-produced ones, carries inherent physical characteristics that at the micro level distinguish it from its peers. To capture these object-specific characteristics, Numeraire has developed fingerprinting technology based on proprietary AI algorithms and image processing techniques.

While Numeraire retains this fingerprint data within its secure databases, a redacted version of the fingerprint data is utilized to create a unique "Passport" for the object, compliant with the EU Digital Product Passport (DPP) initiative. This unique per-object fingerprint data is extremely valuable throughout the object's lifecycle, particularly in instances where the identity of an object is called into question. An option exists to record the cryptographic hash of the DPP onto the shared ledgers of a blockchain, in order to enable the smart contacts on that blockchain to "see" the hash-value and use it for tokenization purposes (e.g. minting asset-referenced tokens compliant to MiCA).

Authenticity Verification

In the context of art and cultural heritage, managing provenance data requires the ability to verify, at any point in time, the authenticity and historical origins of a physical object. As the global market faces growing challenges from increasingly sophisticated counterfeiting, the reliability of provenance information becomes increasingly critical, not only for preserving economic value, but also for safeguarding cultural integrity.

As a provenance register, Numeraire employs advanced image processing techniques to perform multi-stage recording of an object's unique physical characteristics. Our technology is specifically designed for artworks and cultural objects, whose surfaces reflect intricate details shaped by craftsmanship, history, and handling. We recognize that over time, as cultural objects change hands and are physically handled, they naturally acquire signs of wear-and-tear. Rather than diminishing value, this evolving material history becomes a central part of the object's identity, enriching its story and reinforcing its authenticity within the cultural record.

Scaling-Up Verification Services

The value of the Numeraire-managed provenance data for objects of value becomes evident when artworks and cultural objects transition from static storage to active circulation—whether in exhibitions, collections, auctions, or daily interaction with their custodians.

To solve this problem, Numeraire utilizes high-resolution smartphone imagery. Today's mobile devices offer sufficient image quality to enable reliable remote identification. Using images captured by advanced smartphone lenses, Numeraire's platform can confidently recognize and verify most objects in the field without the need for specialized equipment.

For rare and high-value cultural assets, such as paintings, sculptures, photographs, artifacts, and one-of-a-kind memorabilia, Numeraire's verification services reduce the workload on the part of stakeholders, like auction houses and insurance firms. By providing fast, secure, and non-invasive authentication, we help streamline workflows, especially for contemporary artworks accompanied by artist-signed certificates of authorship.

In cases where such certificates are unavailable, our technology can quickly eliminate "false positives", allowing human experts to focus their time and resources on more targeted, in-depth investigations. This enhances efficiency while reinforcing the trust and transparency essential to the art ecosystem.

Supporting the Supply Chains of Authentic Goods

For batches of objects whose value lies in their manufacturing cost rather than rarity (e.g., car parts), the Numeraire verification services can be utilized at various points in the supply chain of these objects to assist in quality control and counterfeit detection. Examples of crucial points in the supply chain include the point of shipment (e.g., from the factory floor) and the points where the products are distributed to customers.

Customers who purchase large quantities of goods on a regular basis have the option to automate the verification of received batches of goods.

Conclusion

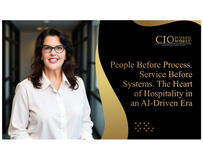
As the tokenization of real-world assets becomes more mainstream, the need for verifiable, object-specific data becomes not just a technical necessity but a cultural imperative. Numeraire's approach, rooted in AI-based object fingerprinting and provenance authentication, offers a model for how the physical and digital worlds can converge without compromising historical truth or artistic integrity. Numeraire not only supports regulatory innovation but also re-establishes trust in the digital representation of some of our most valuable and meaningful cultural assets.

PREVIOUS
Why Every U.S. Business Needs a Free VPN t...

NEXT
Global Business Trends: How Consumer Be...

Releated Post

Strategy in Attracting and Retaining Top Performers in 2025's Global Talent Market



People Before Process. Service Before Systems. The Heart of Hospitality in an AI-Driven Era

Copyright © 2025 CIO Business World Media Tech LLC