



Emergence of DLT based Futuristic Market Places

Boosting Liquidity
Through New Asset Types

Executive Summary

Capital and financial markets have existed for more than a couple of centuries now.

However, if you ask the average investor today to go back to 1817 and start trading on the New York Stock Exchange with the help of a bunch of papers, they would rather use that money for something else. Markets that are more free with more influx of money.

However, is it the most optimal state of affairs? Are our markets ideal and secure?

Are we attracting all kinds of investors?

Anyone who doesn't question the status quo would leave money on table.

Internet was able to push the technologies frontier to provide innumerable opportunities to human life including financial markets.

There might be new paradigms such as Distribution Ledger Technologies (DLT) that would push this frontier even further to build trust and enable instant processing.

The solution recommended in this paper will address the issues within the status quo of the capital markets while fundamentally changing the way investors and issuers come together and interact. It's going to change how the markets operate, make them efficient, create an array of new asset types bound only by the imagination, and improve liquidity like never before. Read more to know how DLT will actualize the aforementioned scenarios and how someone can harness this technology.

Re-Imagining Marketplaces

Capital markets are traditionally venues where savings and investments are channeled between those who have excess capital and those who need capital. Current capital markets and market infrastructure have a few drawbacks and limitations such as:

- Complex systems and fragmented data structures
- Large dependencies on intermediaries
- Longer trade-settlement times (typical T+2 / T+3)
- High cost of operations and reconciliation
- Restricted access to trade due to high-value ticket sizes of securities (limited to select institutions and high net-worth individuals)
- Difficulty in trading assets such as illiquid bonds

However, with the advancements in Distributed Ledger Technologies (DLT), it is now possible to create a marketplace which

can do away with these inefficiencies.

Furthermore, a DLT-based marketplace is practically very easy to create and has the potential to offer a range of benefits which will disrupt the current paradigm. Along with solving the aforementioned problems, such a DLT-based marketplace will also:

- Facilitate the creation of efficient secondary markets
- Lead to the removal of intermediaries
- Improve the tradability of high-value assets by breaking them down into smaller units

Beneficiaries of this technology will span across a range of financial market participants including investment managers, asset managers, private equity funds, exchanges, issuers, and investors.

In this paper, we cover the current state of the industry and how DLT will disrupt the existing paradigm.

The status quo

In a traditional trade system (Figure 1), a market maker, broker, or dealer publishes bid/ask prices for various securities. Buyers and sellers send their orders to these brokers and dealers. The broker/dealer trades on behalf of the buyer and seller, leveraging their access to the wider network of orders. Once the order is executed, the trade is settled after the asset and the payment money are transferred to the respective custodian. There are a lot of processes, carried out by the intermediaries, that occur between the trade and settlement date to ensure that trade details match between the two parties and assets are made available.

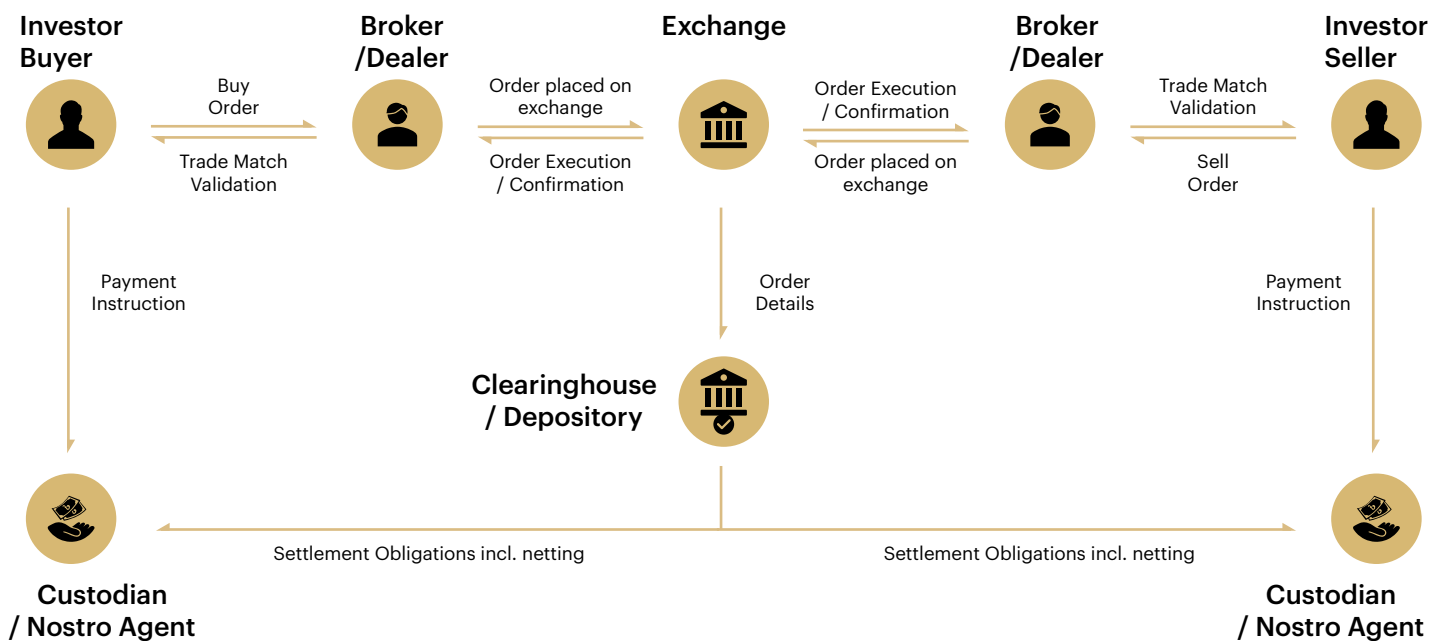


Figure 1. Traditional trade process flow

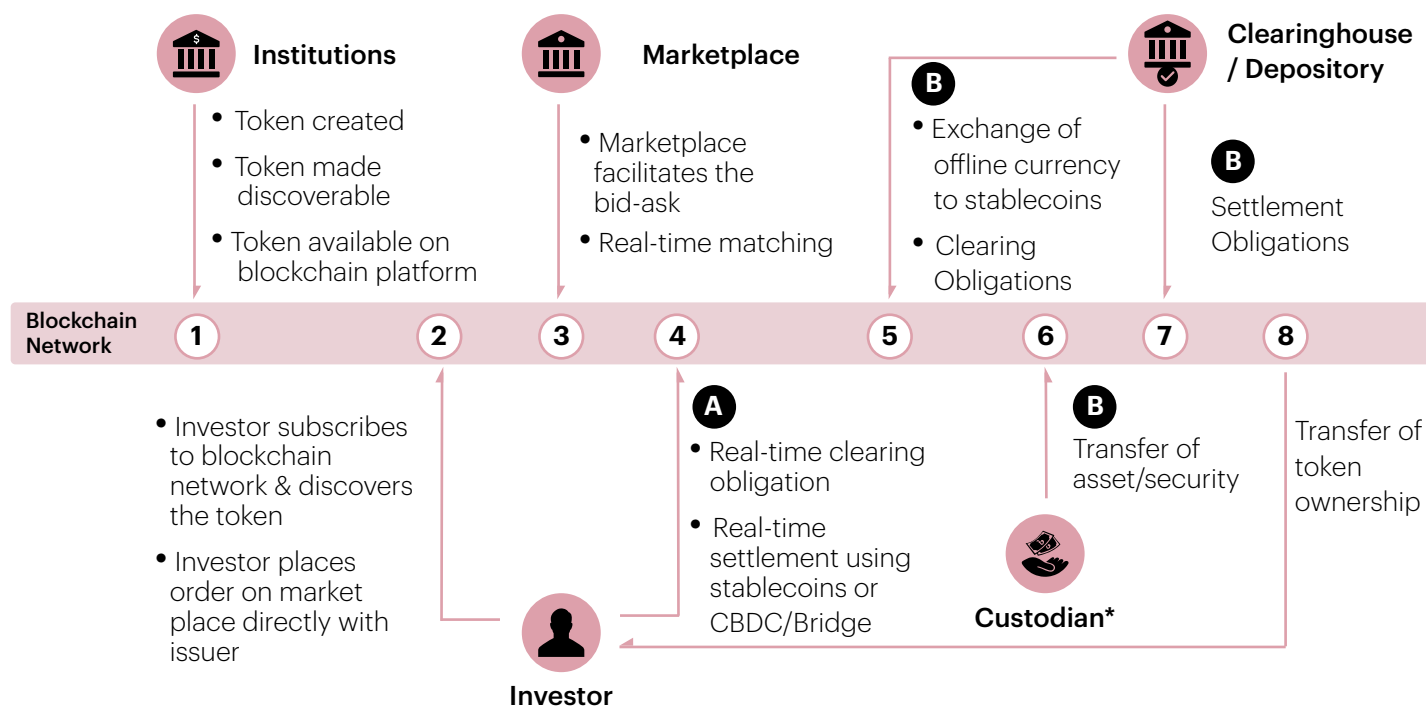
A novel integrated solution using blockchain, as detailed below, is bound to disrupt the online trading process for its betterment and help alleviate the shortcomings of the trade-processing network.

How DLT can reshape the mechanics of trading

DLT built on blockchain enables real-time trade processing and settlement without the need of any intermediaries. The use of blockchain guarantees immutability and security.

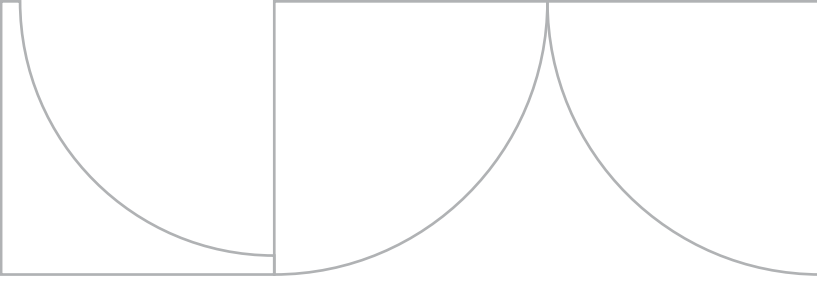
In order for the assets to be traded on DLT, they are converted into a digital form known as Non-Fungible Tokens (NFT) using blockchain. This paradigm shift in tokenization of real assets by creating digital tokens enables the creation of new asset types such as private debt, illiquid bonds, large value investments, and direct investments in alternative assets including private equity, hedge funds, and real estate. The creation of these new asset types will eventually lead to an increase in capital creation and liquidity. The concept of tokenization is theoretically unlimited as any asset can potentially be added on the blockchain.

These digital tokens are then traded on the DLT network (network and platform mentioned intend to mean the same). At the heart of the network, smart contracts govern responsibilities, policies, and the flow of information. Smart contracts are used to track ownership of the tokens (explained in Figure 2 below).



A On-chain settlement – real-time using stablecoins/CBDC Bridge

B Traditional, off-chain settlement – optional feature in DLT based trade solution

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While traditional securities operate well in established trading infrastructure, DLT could be best suited for trading tokenized assets such as illiquid bonds and non-traditional assets which are not usually traded in traditional exchanges or venues.

The following three facets of the new frontier help reimagine the financial ecosystem :

- **Tokenization:** Creation of tokens for any security (such as bonds, MFs, stocks, MBS, and ETFs).
- **Trade processing network:** A network that facilitates trading tokens and enables the creation of several marketplaces to bring issuers and investors together.
- **Clearing or settlement process:** Real-time settlements made possible through digital currency on the blockchain. The traditional settlement can happen off the blockchain as needed.



1. Tokenization

Asset ownership can be converted into units of smaller denomination, known as digital tokens, through the tokenization process.

As shown in Figure 3 below, this process involves various institutions pooling different assets together to create NFTs that can then be stored in an institutional vault.

These newly minted tokens can be made discoverable or tradable for other institutional or retail investors via a third party service or middleware, known as an oracle. Accredited investors could subscribe to various oracles for different NFTs.

In addition to this, governance needs to be developed through staking algorithms and tokenomics to ensure participants are compliant with the rules and policies of the network

The discoverability of tokens enables certain kinds of flexibility that are not available in the traditional securities market, such as:

- Institutional firms and investors can choose not to create tradable NFTs for their entire asset portfolio and may instead choose a staggered or selective approach to release the NFTs.
- Institutional firms or investors can limit the buyer population for certain NFTs to enable private trades on the network.

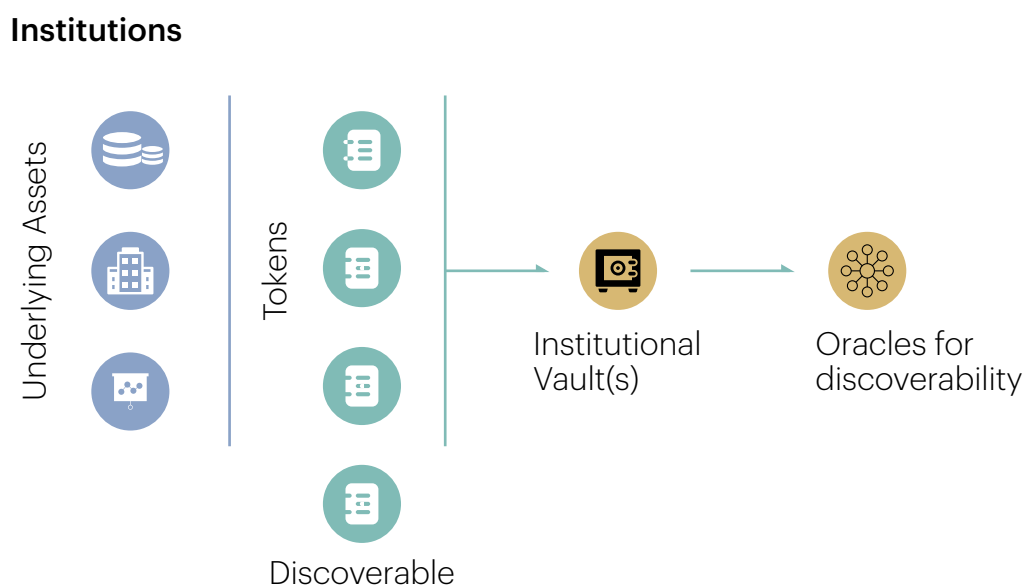


Figure 3. Creation of discoverable tokens

2. Trade processing networks

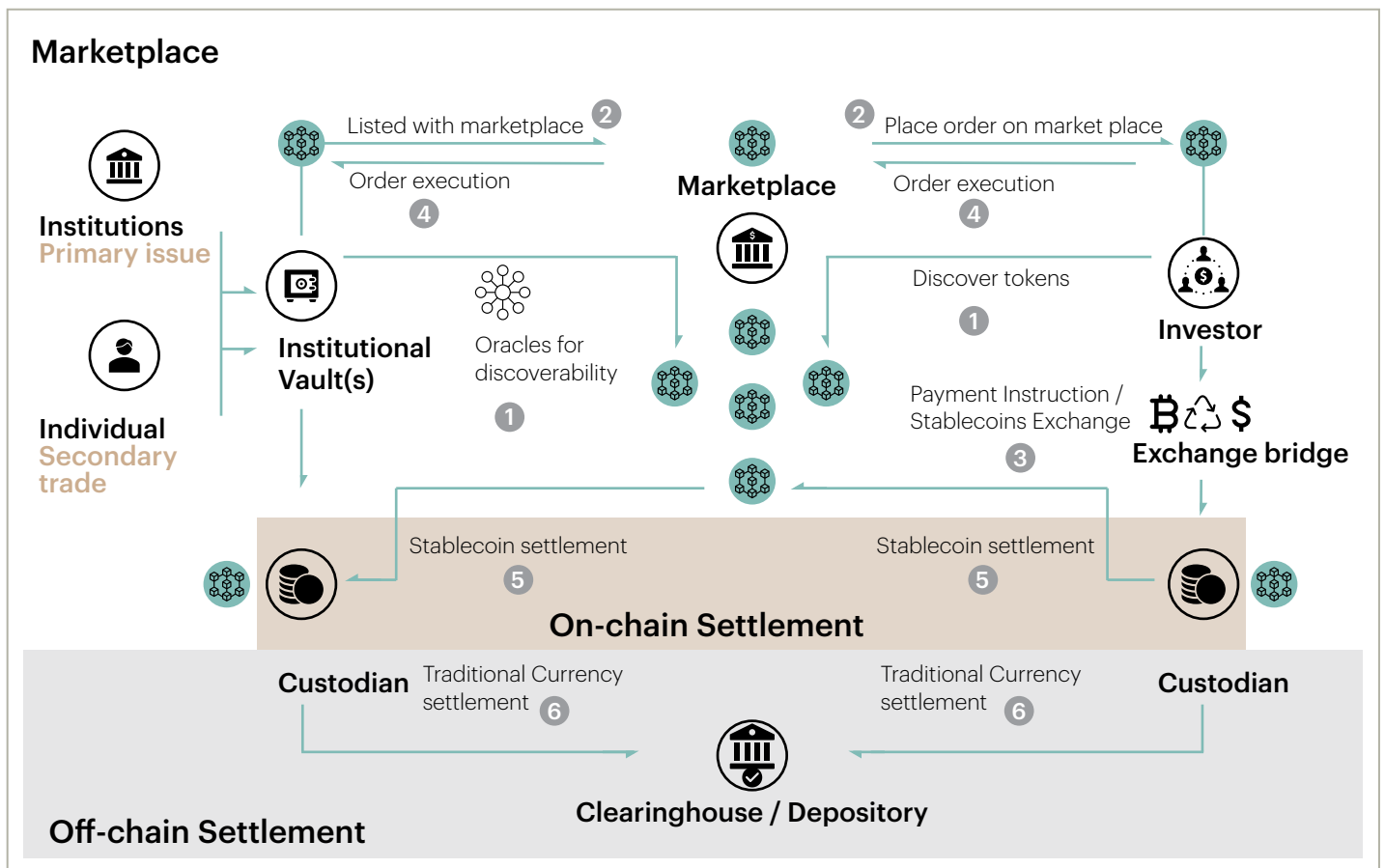


Figure 4. DLT based trade processing network

Major functions in a DLT-based trade processing network (Figure 4 above) include:

- **Manufacturing or minting:** Creation of tokens through the tokenization process as explained earlier.
- **Creation of a marketplace and order execution:** The marketplace acts as the aggregator and trade facilitator. The tokens created by the institutions are discoverable through oracles, and get automatically listed on the market dashboards. The accredited investors who have paid to subscribe to the marketplace can then see and trade these tokens. Investors can also make their tokens discoverable to other interested investors.
- **Order execution:** The marketplace performs real-time matching of buyers with sellers, executes the order, and proceeds to clear and settle in real time (on-chain settlement) or interacts with the clearing house and custodians for regular settlement (off-chain settlement).



3. Clearing and settlement process: on-chain and off-chain

Trade settlements can be processed in any of the following ways:

On-chain settlement: The clearing and settlement process is a real-time process initiated on the network when an investor makes the payment in digital currencies such as stablecoins. It can be built in a staggered manner to initially support the existing digital currency payment gateways using stablecoins such as USDT or USDC for stablecoin, and later support central bank digital currencies (CBDC) as they are rolled out.

Off-chain settlement: In the case of payments in traditional currency or fiat currency, conventional intermediaries such as clearing houses and custodians need to be integrated directly with the network. Tokens are held in escrow at the time of settlement. After the payment is successful, settlement obligations are facilitated by the clearing house and the payment amount is transferred by the custodian.

Hybrid settlement (extension of off-chain): If the payment currency is fiat currency, conversion to digital currencies such as stablecoins is achieved through central bank digital currency (CBDC) bridges built on the network. Once the currency is converted, the assets enter the on-chain settlement process.



Unlocking new advantages for stakeholders



Removal of reconciliation process: Since the trade data is distributed on the network and it is the golden copy of the truth, there is no need to reconcile between any two parties.



Granular accessibility of data: Trade data lineage is tracked at a very granular level for disparate asset classes.



Democratized access (securitized tokens): The network allows anyone to participate, create tokens, and trade.



Increase in liquidity: Tokenization of assets into smaller ticket sizes increases accessibility and affordability for retail investors.



Enablement of cross-border trade processing: Blockchain enables trading across geographies, breaking the boundaries to comply

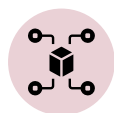
Key considerations

With assets being democratized on the DLT platform, players in traditional capital markets need to consider the following during adoption:



Technical complexity

- Data security and privacy will be the main concern for tokens stored in institutional vaults.
- Although blockchain knowledge and tools are readily available, technological governance is still a nuance.
- With technology evolving at such a fast pace, seamless adoption to change will be a key priority.



Resistance to implementation

- Running parallel operations for certain asset classes or processes
- Enforcing data standards across the network



Regulatory and compliance

- Fragmented and incomplete regulatory landscape
- Lack of experience in validating and auditing smart contracts

Developing future-ready capabilities

A clear understanding of the key capabilities of the proposed solution will help ensure that the shift is not only beneficial but also feasible. It could provide support to trade processes to enable token creation, trading, and settlement. The support could be in the form of:

- Real-time KYC, AML, and due-diligence.
- Better, faster, and cheaper trade processing including clearing and settlement to resolve the ‘delivery vs payment’ problem.
- Automated non-trading corporate actions and processing of dividends and income.
- Shareholder voting with accuracy, transparency and speed.
- Real-time clearing and settlement that potentially eliminates the need for external clearing agencies, central depositories, and custodians.

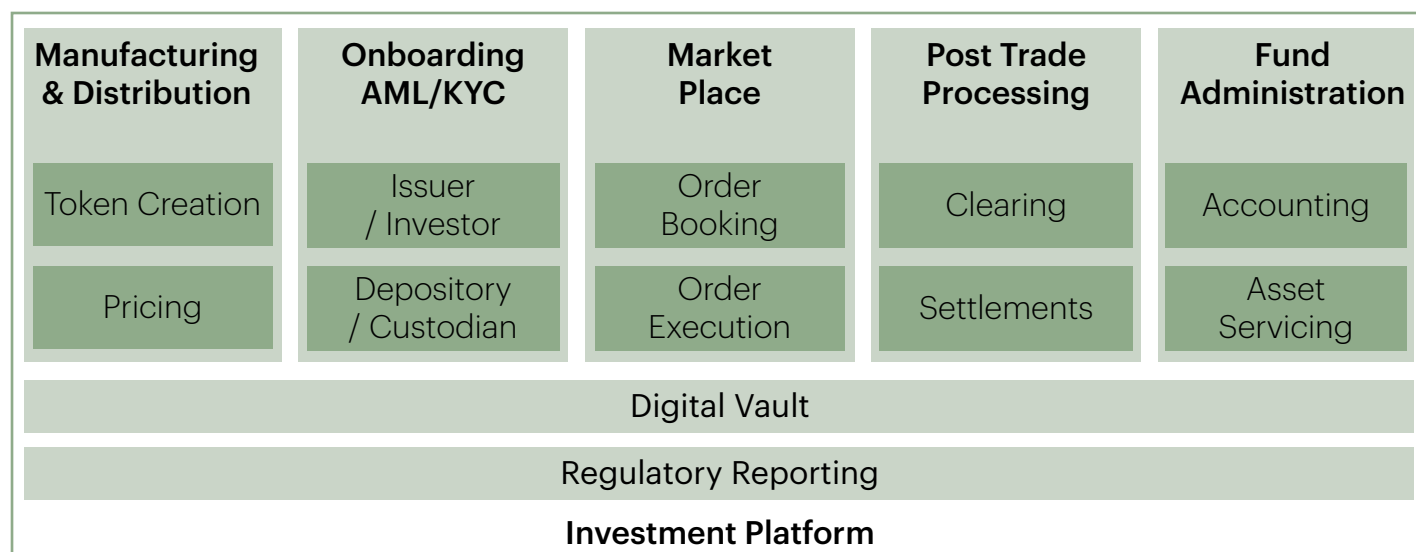


Figure 5. Representation of the business architecture for traditional financial services technology firms

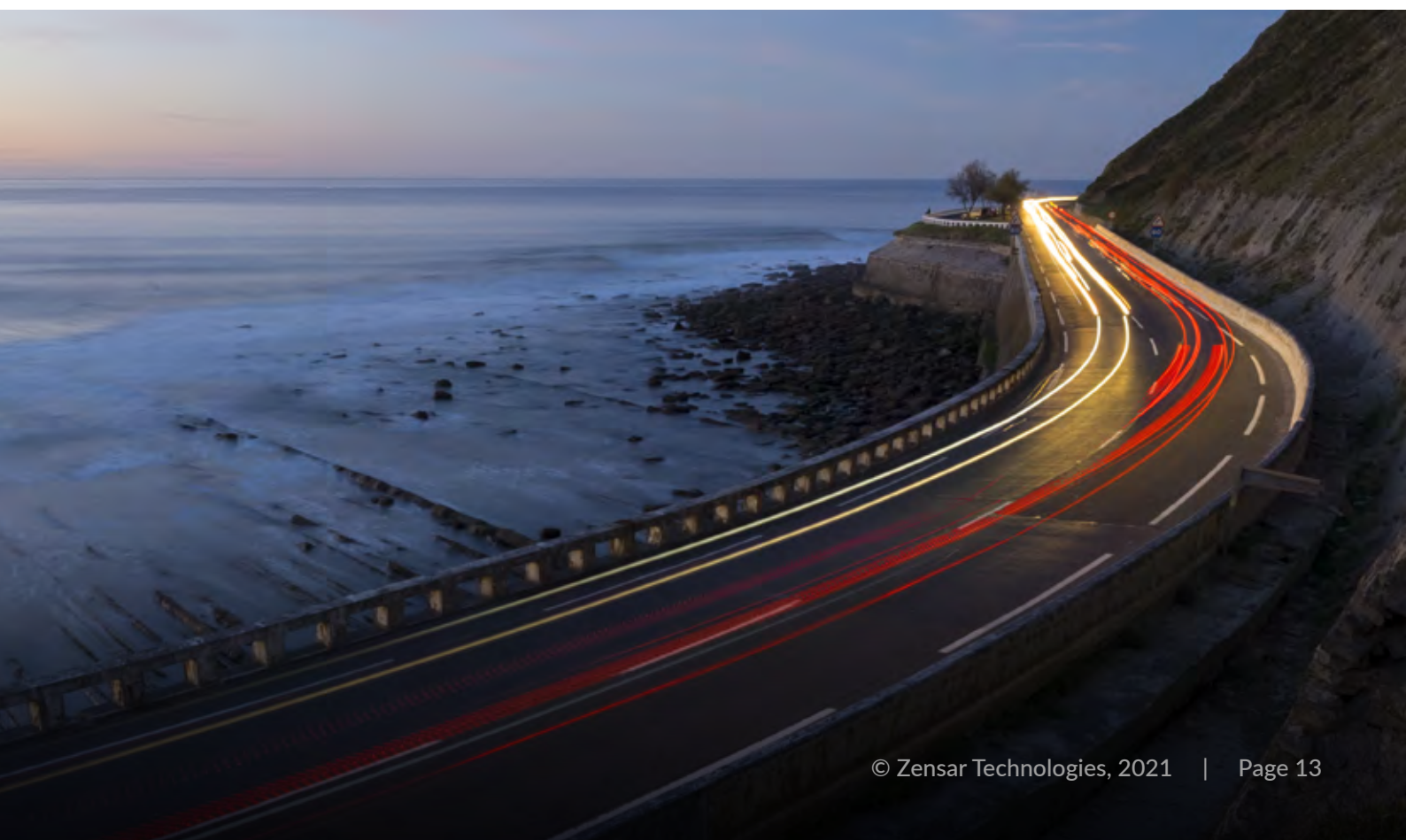
In order to create an investment platform, institutions will need to adhere to the following design principles:

- Ensure that the NFT complies with ERC721 standards.
- Leverage oracles to abstract NFT data from marketplace dashboards.
- Provision a bridge to the stablecoin/CBDC platform.

- Leverage staking and tokenomics (admin tokens) to maintain governance of the platform.
- Provision an L2 Platform to host all the components.
- Build integration points to support any off-chain processes such as clearing.

Logical extensions of the platform could include:

- Enabling the creation of vaults for the strategic partners and institutional investors.
- Enabling private transactions that need not be viewed by the original host of the network.
- Allowing various third-party development pods to support future enhancements and improve tokenomics.
- Creation of a scalable and expandable infrastructure by allowing other marketplace contributors to come together to build a a Distributed Automated Organization (DAO).



How the rules of the game change

Representation of likely disruption for various capital market players

For issuers

Manufacturing and minting:

Issuers can create tokens for any type of asset — traditional assets such as equities, illiquid assets such as bonds, or alternate assets such as digital art, real estate, and private equities.

Institutional vaults:

Issuers can create a vault of tokens to make them discoverable at their discretion.

Direct access:

Issuers can directly trade tokens with accredited investors, thereby eliminating traditional distribution channels.

For investors

Larger outreach:

The investor community will expand and assets will be easily accessible to retail investors along with institutional investors.

Real-time trade:

Investors can discover and trade tokens in real time on the platform's marketplace.

Real-time settlement:

Investors can choose to settle the transaction in real time through digital currencies instead of traditional currencies.

For other market players

Disintermediation:

The creation of a marketplace and DLT will replace traditional functions such as clearing, settlement, and reconciliation.

Changing roles:

Certain roles of custodians will undergo changes to handle digital asset-based tokens.

Newer roles and entities:

Oracles will enable the discoverability of tokens and bridges to CBDC/cryptocurrency networks to enable real-time settlement.

How the industry is navigating disruption



Industry Initiatives:

Increasingly, banks are experimenting with the shift that can eventually revolutionize the industry, with the adoption of new technologies such as DLT. The leading financial institutions recognize this as an opportunity for turning legacy asset classes into vibrant digital markets. Several initiatives like asset tokenization could lead to emergence of new asset types that can be traded on blockchain based trade value chain. Several initiatives like asset tokenization (discussed earlier) could lead to emergence of new asset types (explained in figure below) that can be traded on blockchain based trade value chain (discussed earlier). Institutions find it much easier to communicate with investors using this technology. Moreover, institutions could also save money on fees charged by trading venues and allow deals to be negotiated by giving access only to accredited investors. By lowering barriers to participation, blockchain technologies could eventually open them to much smaller players and retail investors.



Private Equity

- Shares in Tech Unicorns
- Shares in Startups
- Pre-IPO investment Opportunities
- Mid-stage unlisted companies



Private Debt

- Corporate Bonds
- Illiquid Bonds
- High value Bonds
- Project Financing



Alternate Investments

- Exclusive investment funds
- Hedge funds
- Private Equity funds
- Venture capital funds



Non-traditional Investments

- Asset- backed securities (ie. gold, real estate)
- Crypto ETFs
- Structured notes
- Digital Art

Figure 7. Representation of new investment avenues



Crypto assets:

Traditionally considered high-risk, asset managers have started including crypto assets in their portfolios. The industry is slowly realizing the importance of tokenization and tokenomics in liquidating illiquid assets that are otherwise inaccessible. By August 2020, assets worth around \$8 billion were locked up in DeFi protocols and crypto asset management is expected to grow at 30% CAGR from 2020 to 2030.



Trading venues:

Incumbent US and European exchanges are all developing tokenization offerings. The Singapore Stock Exchange has announced plans to explore utilization of blockchain to improve the speed and efficiency of the settlement process for its securities and to execute real-time trades.



Issuers:

Recently, the European Investment Bank has freshly raised \$121 million for a two-year bond registered in the public Ethereum blockchain network. It is one of the earliest instances of a syndicate of banks managing such a sale.



Integration networks:

SWIFT, provider of secure financial messaging services, now gives blockchain platforms access to instant payments. SWIFT has built a proof of concept, which it claims to be one of the most extensive Hyperledger Fabric 1.0 implementations.



Brokers, dealers, and asset servicers:

Large firms are expanding their service offerings by venturing to create marketplaces. A leading asset servicer recently launched a DLT-based repo platform.



The Journey Forward

For the past many years, this industry has not witnessed any major disruptions that radically change the basic premise of security creation, trade processing, and settlement. However, as we have outlined in this paper, smart contracts and DLT technologies have the potential to disrupt the industry by practically securitizing any asset and creating a marketplace.

The blockchain implementations in the industry so far focus only on certain asset classes and specific parts of the trade lifecycle. The concept in this paper envisions a higher maturity for the ecosystem and the stakeholders including issuers, brokers, dealers, and market makers. Firms can use this concept to build an integrated system that tokenizes assets, manages trade, and facilitates real-time trade processing and settlement.

Firms which have invested or are planning to invest in blockchain-based trade systems can accelerate their journeys using this integrated approach to trade lifecycle management. However, for firms that haven't begun leveraging blockchain, it is imperative that they start experimenting with pilot projects, keep realistic expectations, and build the right technology partnerships in case internal competencies are lacking. This will help forward-looking firms stay ahead of the blockchain adoption curve and reap the benefits of being early movers.



Zensar's Experience

We at Zensar are well-positioned to collaborate with leading market makers, brokers, and dealers to develop such a marketplace and can demonstrate a working prototype that emulates various aspects covered in the paper. We bring our think velocity approach to every problem that we encounter and provide a simplistic, innovative and holistic solution to our clients. We have engaged with customers to build DLT-based solutions such as:

NFT creation for digital art

We are the blockchain partner of choice for a leading global auction house in setting up an NFT platform for digital assets. The platform is created for minting ERC721 open zeppelin standards-based token for digital art on behalf of the auction house, for its customers. The NFTs can replicate the properties of uniqueness, provenance, and proof of ownership, thus enabling digital art to be traded digitally. The newly built NFT accelerator is designed to implement ERC721, 1155, and 2918 tokens, and can be customized easily for a new asset class.

Global capacity management

We have implemented a capacity management system for United Nations Development Programme (UNDP) for global capacity mapping and creating visibility into local pools. The blockchain-based system allows individual country offices to have control over local skill capacities while having discoverability for specific global capacities across the world pool. The solution has been deployed across multiple countries, impacting the onboarding of 8,000+ staff and 27,000 contractors on the UNDP roster. The solution resulted in savings worth ~\$2 million in efforts for skill normalization.

Hire-to-retire subcontractor lifecycle

We have internally implemented a subcontractor lifecycle management system (ZenConfluence) to track the procurement, approvals, and policy compliance for subcontractors across the heterogeneous enterprise landscape. The blockchain-based system connects to all enterprise systems and covers the entire hire-to-retire lifecycle for subcontractors. The system helps in capturing approval cycles and making informed decisions on margins expected on every contractor. It also helps in reducing cost leakages, enabling us to save ~\$5 million in subcontractor expenses in FY20, which is a 300bps reduction.

Glossary

Non-Fungible Token (NFT)	An NFT is a unique token representing the ownership of an asset. It is a social contract between its creator and owner secured by the community of the blockchain network.
ERC721	A token standard defined in the Ethereum blockchain that defines how an NFT should be built.
Distributed Ledger Technology (DLT)	A database maintained by a distributed set of nodes.
Blockchain	An NFT is a unique token representing the ownership of an asset. It is a social contract between its creator and owner secured by the community of the blockchain network.
Blocks	Transactions/data are committed to blockchain in batches called blocks.
Central Bank Digital Currency (CBDC)	A digital form of currency issued by a central bank.
Stablecoin	A cryptocurrency pegged to a low volatile asset like US dollars.
US Dollar Coin (USDC)	A stablecoin issued through a central consortium (cof-ounded by Coinbase and Circle Internet Financial Limited) backed by fully reserved assets (promised) held by the issuer, and capable of being purchased and sold on a 1:1 basis for US dollars (defined in Coinbase as s-1).
US Dollar Token (USDT)	A stable coin issued by Tether Limited (controlled by Bitfinex) backed by fully reserved assets (promised), held by the issuer, and capable of being purchased and sold on a 1:1 basis for US dollars.
Token	Tokens represent a tradable asset or utility that resides on its own blockchain, and allows the holder to use it for investment or economic purposes. Crypto assets do not have their own blockchain. BTC is native to the bitcoin blockchain. Ether is native to Ethereum blockchain. But these blockchain can also hold other assets such as USDC and Uniswap.

Oracles	Third-party services providing secure outside-world data to blockchains. It consists of data for storing transactions, their value, and provide a middleware for discoverability of transactions to retail investors.
Decentralized Autonomous Organization (DAO)	An organization whose rules are defined by a computer code and isn't influenced by central authority. It encompasses ember-owned protocol-led organizations and communities on the internet and blockchains.
Smart Contract	Software that digitally facilitates rule-based transactions and interactions between two parties.
Ethereum	A decentralized open-source blockchain with smart contract functionality.
Layer 2 (L2)	A secondary protocol built with dependence to an existing blockchain system (layer 1) mainly to solve scalability and transaction-speed issues with layer 1.
Tokenomics	A subset of crypto economics where the economics of token projects are studied instead of the economics of the blockchain.
Staking	An activity where users locks their funds, assets, tokens, or cryptocurrencies in a wallet or smart contract to participate in the protocol.
Crypto economics	Economic study of protocols that govern the production, distribution, and goods and services in a decentralized digital economy or blockchain.
MBS	Mortgage-backed securities — a bond issued over a bundle of home loans bought from the banks that issued them.
ETF	Exchange-traded funds are investment funds that track an index, sector, or commodity that can be purchased or sold on a stock exchange.

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We conceptualize, build, and manage digital products through experience design, data engineering, and advanced analytics for over 130 leading companies. Our solutions leverage industry-leading platforms to help our clients be competitive, agile, and disruptive while moving with velocity through change and opportunity.

With headquarters in Pune, India, our 10,000+ associates work across 33 locations, including San Jose, Seattle, Princeton, Cape Town, London, Singapore, and Mexico City.

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