Market Insights

# Digital Assets: Transforming Capital Markets

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# Introduction

**The creation of a new, global capital market powered by digital assets or blockchain-based tokens is one of the most exciting – and ambitious – promises of blockchain technology.**

If they gain enough traction with issuers and investors, tokens hold the potential to create new opportunities for capital formation, liquidity and more efficient asset management in a huge range of markets. When traded on a purpose-built enterprise blockchain platform, these tokens unlock liquidity in previously illiquid markets, creating entirely new tradable assets – such as real estate tokens – and enabling a more standardized form of trading for currently illiquid assets, such as corporate bonds.

The digital asset landscape has matured significantly since the early days of Bitcoin, with asset-backed tokens and native tokens emerging as the clear forerunners for capital markets use cases. The appeal and benefits of raising capital by issuing debt and equity on a blockchain-enabled marketplace has struck a chord throughout the institutional financial services world. Momentum is now being fueled by innovation in areas such as custody, settlement and post-trade – which remain critical functions in regulated financial markets – with providers developing an ecosystem of services that replicate these functions for digital assets traded in a blockchain environment.

Ultimately this promises to drive major improvements in efficiency and cost-reduction for the users of these services, combining trading, settlement and custody services into one seamless service offering for the first time.

## Where it all began— Bitcoin and cryptocurrencies

Bitcoin provided the earliest example of how value could be transferred from one person to another with no intermediaries. Cryptocurrencies compare favorably with many existing financial market infrastructures across:

**SETTLEMENT TIME** - With certain cryptos, settlement can occur within seconds and value can be moved fluidly. Meanwhile, completing the two-step process of settling a stock through a broker then moving funds to a bank account using ACH can take seven or eight days in total.

**GLOBAL LIQUIDITY ACCESS** - Bitcoin is truly a global asset. It may be bought by anyone around the world that can find a means to have a wallet or have someone else host a wallet on their behalf. Many legacy infrastructures offer regional or country-specific access to assets, limiting capital and liquidity. Buying traditional assets overseas, for example, can be expensive and difficult.

**RESILIENCE (OPERATIONAL DECENTRALIZATION)** - Bitcoin presented a new type of extremely resilient market infrastructure. Other types of crypto assets are bearer assets on a collectively operated system – there is no single entity operating or keeping the books of the payment system. The Bitcoin network currently runs 24/7 simultaneously across 9,623 nodes, and the network has only had a total amount of downtime of 14 hours in 10 years. If 9,622 nodes went down, the network would still be operational.

## Limitations for enterprise usage

Despite these innovations, businesses and sovereign entities require assets with settlement finality and tight integration with existing infrastructures. As a result, scalability, governance and data privacy challenges render cryptocurrencies and other digital asset offerings in the public blockchain space inappropriate for most types of asset issuance - particularly at the wholesale level. Additionally, a lack of robust identity infrastructure with Bitcoin and other cryptocurrencies was by intent, but that architecture doesn't map well to regulated capital markets.

The appeal and benefits of raising capital by issuing debt and equity on a blockchain-enabled marketplace has struck a chord throughout the institutional financial services world, and traction is now building among some of the biggest names in finance, including SWIFT, SIX, CLS, DTCC, along with the majority of central banks. This momentum is being fueled by innovation in areas such as custody, settlement and post-trade – which remain critical functions in regulated financial markets – with providers developing an ecosystem of services that replicate these functions for digital assets traded in a blockchain environment.

New market players are also emerging with eyes on disrupting the existing status quo and intending to disintermediate companies that have sat at the center of markets for decades.

# Types of tokens

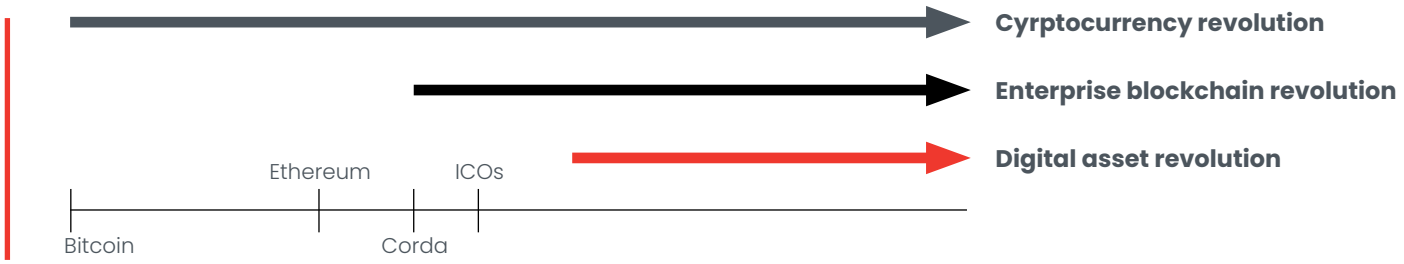
The emergence of cryptocurrencies and the blockchain technology underpinning them has, to date, been marked by two separate but parallel revolutions.

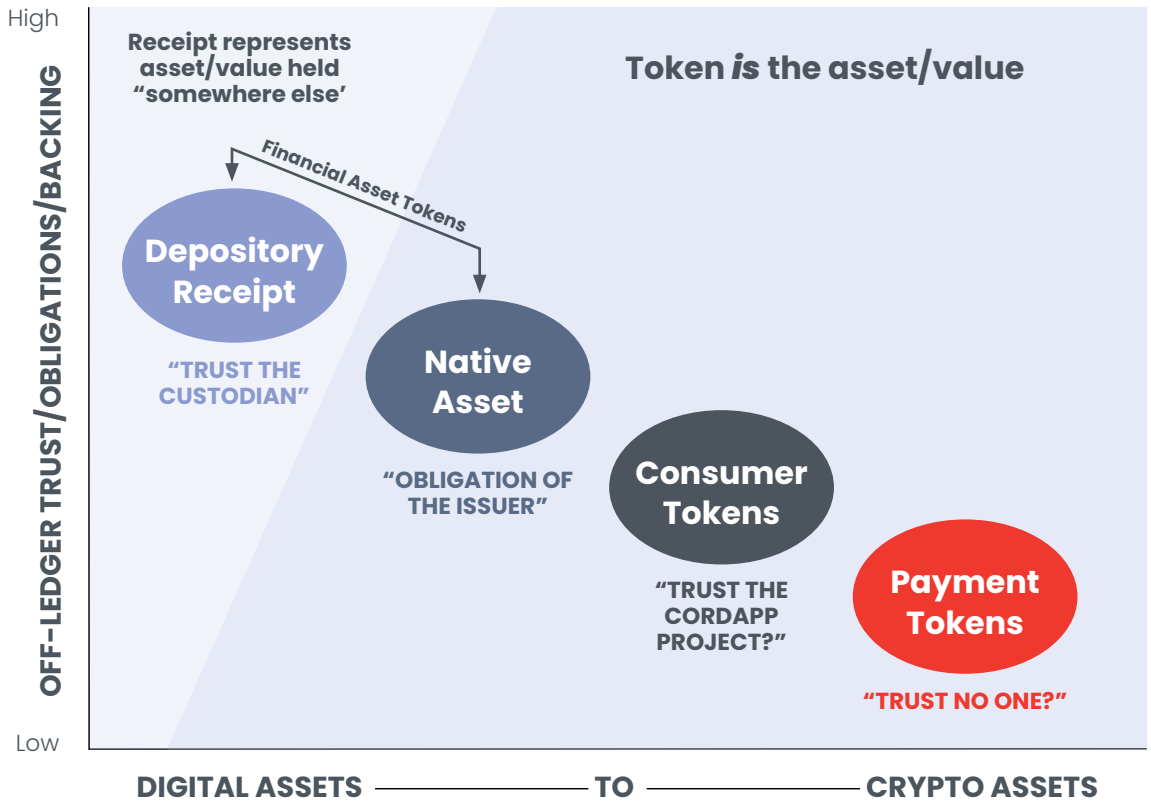
As mentioned earlier, the first—the cryptocurrency revolution— began with Bitcoin and continued through the launch of the Ethereum network, along with the associated tokens built on top. Specifically during the ICO boom of 2017, blockchain start-ups managed to raise a total of more than $5.6 billion. However, the market was plagued with countless instances of scams, fraud or outright Ponzi schemes.

The second revolution is characterized by a new generation of blockchain platforms built specifically with the requirements of business in mind. Corda was built by R3 as an enterprise-focused alternative to traditional permission-less blockchain platforms, in which all data was shared with all parties. It focuses the evolution of blockchain technology on the needs of businesses operating in highly regulated industries, such as privacy and transaction finality. The popularity of enterprise blockchain across all industries – healthcare, insurance, capital markets, trade finance, logistics, to name a few – led to software firms thinking about optimizing entire markets in a truly decentralized fashion.

These two revolutions are coming together in the digital asset revolution, borrowing from both of the previous two revolutions, combining digitaly traded assets with enterprise software. Digital assets allow enterprises to transact in new ways using both new types of assets and old assets represented in new ways. As a result, 2018 was marked by an increased focus on security tokens, which – when traded on purpose-built enterprise blockchain platforms – offer the promise of spurring a new, lower friction method of asset and capital formation.

This section will define the different types of digital assets that can be represented on enterprise blockchain platforms. Two clear categories of token are emerging as the front runners for enterprise usage: asset backed tokens and native tokens.






Note: this graphic derives from a chart drawn by Todd McDonald for his blog post, "The Emergence of Enterprise Tokens". This report will focus on native assets and depository receipts, and points to specific examples built on Corda.

# Asset-backed tokens

The value of these digital assets is defined by the value of the underlying asset. For example, a token could be used to represent a square foot of real-estate, a joule of energy or a piece of art. In the financial services space tokens can represent the value of an asset that is ultimately held elsewhere, such as a Central Securities Depository (CSD) or in a commodity warehouse.

This interplay of a regulated custodian linked with an on-chain digital representation is critical to enabling digital assets to unlock new ways for markets and marketplaces to transact and expand. It also offers a way for enterprises to begin to iterate and implement enterprise-friendly digital assets, as the model builds out from an accepted regulatory base, with the assets held at a regulated custodian.

USE CASE

## Depository Receipt

An early example of this interplay between new technology and established institutions is R3's collaboration with Bank of Canada, Payments Canada and others in 2016 under the name Project Jasper. The project leveraged the depository receipt model, where a token called CAD-COIN represented collateral held by the central bank (in this case, represented by Bank of Canada). Project Jasper demonstrated the potential for an on-chain token that is a digital representation of a type of asset or some form of value held elsewhere by a custodian. The token moves from owner to owner on the ledger based upon the appropriate rule set, while the underlying asset remains with the regulated custodian.

The project demonstrates the potential of blockchain in uniting disparate services. The project used Corda to "loosely couple" existing financial market infrastructures. It allowed for integration of the Canadian TMX equity settlement system with the Payments Canada interbank cash payment settlement system. Tokenization of both cash and equities on a shared ledger resulted in new types of asset interactions during settlement relative to the currently siloed clearing and depository services system and large value transfer system (LVTS). Settlement was able to occur without a large increase in the number of LVTS transactions. This was achieved without a rebuild or tight integration of the current systems. It was also accomplished while maintaining each system's separate governance, i.e. without compromising the control of either authority over its system or assets.

It is easy to see how extending this approach of bridging existing market participants to the various central securities depositories globally could enable more seamless asset exchange on-ledger, without necessarily requiring the "big bang" creation of a new financial system from scratch. Tokenization can deliver major efficiency benefits for almost any asset by creating new liquidity pools, thereby driving price discovery and beginning to eliminate liquidity premiums.

USE CASE

### Real Estate

Perhaps one of the most headline-grabbing real-world use cases for asset-backed tokens is real-estate, especially with reports of multi-million dollar condo developments and high-end ski resorts seeking funding via blockchain.[1]

Currently, a piece of property is a very illiquid asset – selling it is not a straightforward or standardised process, and there are costs associated with the sale, with no guarantee of buyers. The only liquidity in today's property market is generated by real estate investment funds (REITs), which can be both publicly traded or non-traded, and special purpose entity (SPE) equity investments that have a much longer holding period.

Tokenisation provides benefits when a property is divided up into multiple stakes, as each token represents digital ownership in the underlying asset. These tokens can then be freely and easily traded with anyone around the world on a digital exchange underpinned by a platform such as Corda. To the end investor, purchasing a real-estate token reflects the process of a traditional real estate investment, however it would rely on a blockchain based system, rather than a third party custodian, to establish ownership and safe transfer of the asset. For a property developer, this opens up a major new channel for gaining funding. As in any market, the key to liquidity is instantaneous access to buyers and a simplified, standardized transaction process.

Aditionally, each token can be time stamped and contains the history of the property including past transactions, income generated, and other pertinent information crucial to the property. This makes the sale faster, cheaper and far more efficient than the cumbersome processes used today, especially considering if investments are to be fractionalized to a greater degree.

## Native tokens

Whereas asset-backed tokens are digital representations of assets held elsewhere, native tokens exist purely on the ledger. No physical goods move when native tokens are bought or sold. Instead, all exist as data on a shared ledger. This ledger keeps track of all the transactions and is checked and verified by computers – or "miners" – around the world.

Similar to the asset-backed token this can also be a conventional financial asset like a bond or equity,

[1] https://www.forbes.com/sites/rachelwolfson/2018/10/03/a-first-for-manhattan-30m-real-estate-property-tokenized-with-blockchain/#755dac048957

which may have a wide range of traditional issuers and end investors. However the major difference is that the native token – similar to a cryptocurrency – is not a representation of an asset held somewhere else. The token itself is the asset, so it is both entirely dematerialized, and not custodied by a third party elsewhere.

Most native tokens in circulation today exist to power features of decentralized applications, including CorDapps—applications built on top of the Corda platform. Often, these digital assets provide a utility, facilitating services or units of services that can be purchased. They can be compared to API keys, used to access a service. While the type of security token used in an ICO would be considered one particular example of a native token, this use case has decreased in popularity as regulators have stated they should fall under the jurisdiction of the 1934 Security Exchange Act.

Since CorDapp developers don't have to create their own blockchain to take advantage of a native token, the use of Corda delivers huge efficiency and cost benefits. They can benefit from Corda's proven security and scalability attributes and its established network of users.

Moving forward, digital assets are far more likely to experience widespread adoption on a shared, global blockchain that supports an ecosystem of different applications rather than a single, weaker and mostly-centralized blockchain.

USE CASE

## Corporate Bonds

Projects focusing on the corporate bond market have been able to model the entire lifecycle of the bond within a blockchain platform. For example, coupon payments can be made directly to bondholders through pre-arranged contracts. Similarly corporate bonds can be traded on the secondary market that exist within the same blockchain network.

Representing a corporate bond directly on a blockchain platform reduces the time involved in both discovery and settlement of a particular bond. For example, an investor looking for automotive sector debt no more than five years from maturity could simply enter these criteria into the blockchain-based registry and find all the relevant bonds currently in circulation. Additionally, bonds traditionally settle T+2, with additional delays for payments, but if all aspects of the bond live on the ledger, all information can be updated and seen by relevant parties in real time.

Bonds – and corporate bonds in particular – have attracted particular focus from firms experimenting with asset-backed tokenization because of their endemic illiquidity challenges. Since the financial crisis there has been a huge shift towards more electronic trading in the less liquid parts of the bond markets, but despite this, the corporate bond markets remain extremely low-tech compared to most other asset classes. Tokenization would ultimately increase the potential investor base, which would help promote further growth in liquidity in corporate bonds. A tokenized bond is by its nature more accessible across borders and different investor classes, breaking down the barriers that have traditionally prevented certain types of market participants from trading with each other and making true all-to-all trading a reality in this market.

Blockchain would also add resiliency to a currently fragmented corporate bond market. Tens of thousands of corporate bonds are in circulation at any given time, with hundreds of dealers providing prices across multiple different electronic platforms. To a trader, the end result is millions of data points per day flashing in front of their eyes, most of which are of questionable quality. In order to trade certain corporate bonds, a portfolio manager must go to a primary issuer or know who is trading them in the limited secondary market. This task can be so challenging that some corporate bonds are rarely traded. Tokenization would allow corporate bonds to be fully standardized and listed on a digital asset registry with fully transparent pricing.

# Issuing tokens on Corda–an enterprise blockchain

Token investors, issuers and service providers face a series of important choices when selecting which blockchain platform to use. Ultimately participants will gather around the platform that best suits their needs and which gives them access to the widest ecosystem of counterparties and a solid suite of services such as settlement and post-trade.

R3's Corda platform has emerged as the frontrunner in the enterprise blockchain space because it was built alongside the world's leading financial institutions to ensure that the platform met the requirements for highly regulated financial institutions. Core design decisions, such as Corda's peer-to-peer data privacy approach is unique in the blockchain space and provides a proven solution that can handle the scale and privacy requirements of complex business transactions. For example, a recent report from the DTCC validates the choice of Corda for these projects, claiming that Corda has high enough performance to handle peak trading volumes in the US equity markets – roughly six thousand trades per second. Currently, public blockchains operate at single or double digit transactions per second.[2]

Further, Corda is the only one that addresses enterprise-critical requirements such as the need for transaction validity, data privacy, consensus and the ability to scale.

Tokenization of real-world assets is now happening on Corda, with participants and service providers taking advantage of its broad ecosystem of participants spanning a diverse array of different industries and markets across the globe.

Many of the world's largest financial institutions, who helped design Corda in the first place, are deploying production-quality Corda nodes, meaning Corda is the platform that bridges seamlessly from the old world to the new. In addition, traditional financial firms and non-cryptocurrency new entrants are already building out a new secondary market infrastructure on Corda.

**This is happening because some specific aspects of Corda's design make it an attractive target for such issuances. Specifically:**

- Settlement finality, which enables the real-world issuer to demonstrate compliance with associated finality regulations as well as reduce their own risk stemming from blockchain 'reorganizations' that can occur on other platforms.
- Strong identity layer, which enables firms to know who is holding or has held digital assets they have issued and is an important step in ensuring compliance.
- Universal interoperability design, which allows issuance of multiple different assets on the same network, enables sophisticated transaction types (for example, DvP) as well as meaning ecosystem providers (such as digital exchanges) need integrate only once, just like the public Ethereum network but without that platform's downsides.

Just like in the public blockchain space, this new infrastructure can be 24/7, real-time, supports complex business logic, facilitates multiple different types of assets on the same platform, and offers broad-access.

# Financial Market Infrastructure Integration

R3 is now working with a range of companies and financial management institutions (FMIs) seeking to support the issuance of digital assets on a blockchain platform, developing the required infrastructure and other integral elements such as standards, software development kits, mobile wallets and more.

[2] http://www.dtcc.com/news/2018/october/16/dtcc-unveils-groundbreaking-study-on-dlt

Existing exchanges are beginning to integrate into Corda. For example, Leading Swiss stock exchange SIX recently stated they expect digital exchanges on blockchain platforms to completely replace traditional ones within ten years. SIX is building its own digital exchange, SDX, that will be completely overseen and regulated by the Swiss government and the country's financial market regulator, FINMA, and will facilitate trading in stocks, bonds and exchange-traded funds. In addition, Singapore Exchange (SGX), along with the Monetary Authority of Singapore (MAS), have successfully tested the use of blockchain for tokenized assets settlement, including R3's Corda platform. The trial was conducted in partnership with U.S. stock market Nasdaq and Deloitte.

Corda also integrates with key financial infrastructure. For example, Corda Settler is an open source application purpose-built to allow for payment obligations raised on the Corda blockchain platform to be made through any of the world's payment systems, both traditional, such as SWIFT GPI, and blockchain-based. XRP is the first globally recognized cryptocurrency to be supported by the Settler, but the potential for all types of digital assets to be settled on the platform is vast. Uniquely, the Corda Settler verifies that the beneficiary's account was credited with the expected payment, automatically updating the Corda ledger and removing the risk of double spending. In the next phase of development, Corda Settler will support domestic deferred net settlement and real-time gross settlement payments.

# Looking ahead

## Blockchain technology is driving an unprecedented period of innovation across capital markets and other industries.

The pace of innovation is increasing and digital technologies are beginning to be used in conjunction with each other, while more segments of the capital markets ecosystem are moving towards shared platforms. The trading landscape is likely to look unrecognizable to its current form, with current assets fully digitized and new types of digital assets being traded in markets that don't even exist today.

The blockchain platform issuers and investors choose is a critical decision. Platforms like ethereum have shown the potential for tokenization. They solved the challenge of tapping a new capital market, demonstrating the possibility of building a parallel post-trade infrastructure and demonstrating the catalyzing effects of interoperability and standards.

However, they have failed to integrate existing assets onto these new rails. A major problem arises when attempting to take codebases designed to facilitate the primary issuance of cryptocurrencies such as ether and transform them to support a true secondary market infrastructure. Platforms such as ethereum were simply not built for this type of use case.

Enterprise blockchain are more suitably designed to address the complicated challenges of enabling transaction finality, regulatory compliance, investor protection, integration with existing systems and, perhaps most critically of all, providing a path for the world's existing investor base who use today's existing financial system to participate. However, as of now, they do not have full exchange integration, a range of interoperable wallets or the mindshare of some of the innovative firms driving this new approach to capital raising.

R3's ecosystem is working to bridge this gap. It already connects a vast global ecosystem of diverse participants. To accelerate the adoption of digital asset trading, continued collaboration is required from banks, law firms, exchange groups and buy-side firms to develop and support shared standards and regulatory approaches around digital assets.

In the coming months and years platforms like Corda will provide participants and service providers in an ever-growing number of markets with more tools to tokenize and issue assets even more easily. These digital assets, with legal underpinnings and support from real-world custodians and asset issuers, will enable 24/7 transactions, settlement with finality and full regulatory compliance, unlocking valuable liquidity and delivering efficiencies for issuers and investors across the globe.

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## About this publication



## About R3

R3 is an enterprise blockchain software firm working with a broad ecosystem of more than 300 participants across multiple industries from both the private and public sectors to develop on Corda, its open-source blockchain platform, and Corda Enterprise, a commercial version of Corda for enterprise usage.

The Corda platform is already being used in industries from financial services to healthcare, shipping, insurance and more. It records, manages and executes institutions' financial agreements in perfect synchrony with their peers, creating a world of frictionless commerce. Learn more at r3.com.