Real Estate Use Cases for Blockchain Technology

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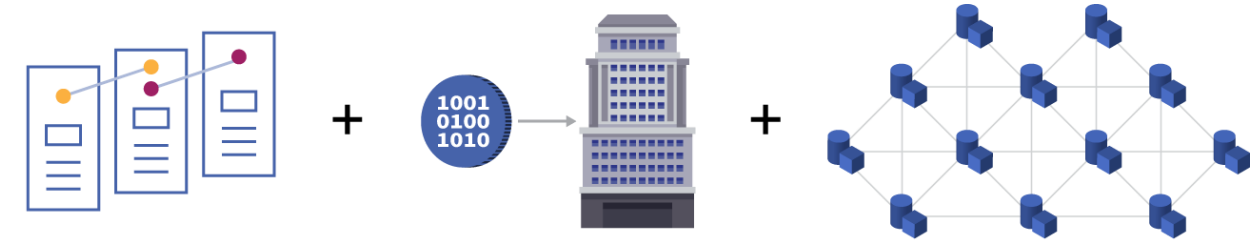
Introduction

The commercial real estate market makes up a significant economic global segment both in terms of asset base as well as transactional activity. According to an MSCI report, the size of the professionally managed global real estate investment market increased from $7.4 trillion in 2016 to $8.5 trillion in 2017. [1]

The investment market for real estate, while immense, has been dominated by a relatively closed network of firms and organizations able to shoulder big, chunky, illiquid investments. It is also hindered by a significant amount of transactional friction and opacity. While there have been improvements in the digital age – especially as it relates to information flow and transaction set up and completion – we are only at the initial few steps in terms of digitization. There is still a significant amount of improvement that can be made in real estate when it comes to the use of digital technology and the representation of physical assets in digital forms.

This advancement will be driven largely by the digital securitization of real estate properties (also known as “tokenization”) and improved transaction processing that make it easier to buy and sell properties and/or shares of properties, process revenue streams, and record and perfect property transactions.

The future of real estate is one where purchases and investments become much more liquid, much more available, and far more easily documented and managed. These changes will be driven largely by blockchain technologies. These technologies include decentralized and immutable transaction ledgers, asset tokenization, and owner entity and land title registries and, as a result, the benefits will open up markets for new investors and let a greater number of parties manage ownership, liquidity, and risk much more effectively.



Decentralized and Immutable Transaction Ledgers

Asset Tokenization

Decentralized Land Title and Owner Entity Registrations

Blockchain as an Enabling Technology

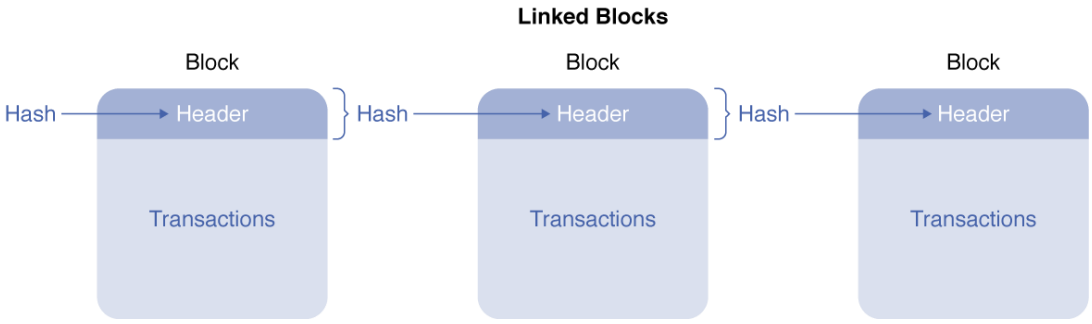
One of the benefits of blockchain technology, and security tokens in particular, is that it offers a way to buy and sell properties in more granular pieces. A property, for example, can be divided intp individual investment units each identified and embodied via a security token (via the ERC 20 or ERC 721 specifications or a variant thereof). These tokens will identify ownership, provide a mechanism for transactional processing, and serve as the property identifier to allow for trading on regulated secondary markets.

It's all too common to hear that blockchain technology "will change everything" but in this case we believe it is not far from the truth – especially when one views the technology as a complete transactional recording and processing system – and along with the generous passage of time.

At its core, a blockchain is essentially a shared and distributed database or ledger. Transactions are processed and bundled in blocks and the blocks encrypted and cryptographically linked in a chain. The processing takes place within a network of nodes – either public or private – with a consensus design intended to decentralize authority such that no single source is the sole decider of transactional integrity. Rather authority is decentralized across the operators of the nodes, with each node validating and maintaining verified copies of the ledger.

By recording and combining transactions into a decentralized, secure ledger, a blockchain network creates a "chain" of chronological data that no one party has control of or can change and such that each block and individual transaction can be verified via cryptography. The transaction records are further protected by the replication of the data across nodes allowing for multiple and verifiable sources of truth.

The value, therein, lies in the system's ability to authenticate and track transactions in real time without the use of a centralized third party, such as a single corporation, bank, clearing house, government entity, or other sole source of authority. The network, the linked transactional records, and the cryptography all serve to provide the decentralized "authority" to effectively establish, record, and serve up a verifiable and trusted source of transactions.



Use Case #1: Token Securitization

Asset management investors are constantly looking for ways to increase or preserve liquidity options thereby allowing them to improve positions and manage risk. A pension fund, for example, might own several large commercial buildings in one city but might want to expand into another city either as part of a diversification or portfolio expansion strategy. They might not, however, have the desire to buy an entire building or an investment block. Instead they might want to buy a smaller securitized portion of a property.

Likewise, an individual might want to invest in real estate but not have sufficient capital or desire to purchase and manage a house or commercial building. And certainly while there are real estate investment vehicles available to investors such as REITs – they do not offer the

specificity that many investors might want. Instead of a set of distant properties collected in a basket, an investor might want to invest in a single property or in a set of buildings in a specific area known to them.

Doing either investment currently, however, is problematic in that the overhead and marketplace to secure portions of properties takes significant time, expense, and mindshare. Token securitization of properties via blockchain, along with token-enabled marketplaces and exchanges, however, can make these types of investments possible.

Old Way of Project Financing

By way of example, let's say an investor makes a down-payment on a penthouse on the 37th floor of a high-rise condominium development in Austin, TX for $200,000, representing 25% of a final purchase price of $800,000. The investor makes this purchase when there is nothing but barren land and a first-phase blueprint for the building, believing in the quality of the investment but with the expectation that they will later be able to sell the option at higher price when the building becomes real. Let's say they are targeting an eventual sale price of $1M, which would result in proceeds of $400,000 (the $1M less the remaining $600,000 owed on the property) thereby doubling their original cash outlay.

The sooner the investor is able to make the sale, the greater their annualized rate of return is. This investor – naturally – is eager to sell their position, reduce their risk exposure, and free up capital for other uses as early as they can. But what if construction delays make the would-be secondary purchaser leery of buying into the project? What if, after making the down payment, interest rates rise? Or what if a competing developer secures the land to build a development one block away?

Our investor could be stuck holding onto a illiquid asset of which they cannot dispose, with the obligation to fund an additional $600K in a unit that may be a decreasing asset. And even if the investor is able to find a buyer in the secondary market, developers typically charge transfer fees, in addition to the other closing-related fees that generally cost several percentage points of the gross sale value. The outcome of speculative investors is not so much the concern, except that these sources provide the investment capital to fund buildings. Greater risks and greater encumbrances to liquidity can thereby prevent builders from raising capital to finance the development of the buildings.

Welcome to a Tokenized World (and a New Way of Project Financing)

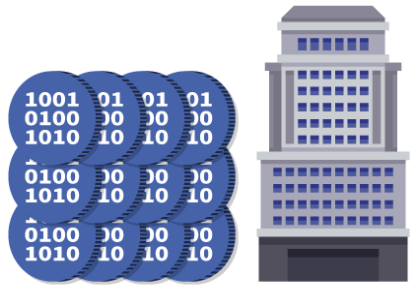
The concept of tokenization – in combination with other blockchain componentry – offers the ability to unlock investment opportunities for individuals and organizations, while lowering the amount of fees and costs typically associated with real-estate transactions.

Most people have heard of the blockchain in regard to cryptocurrencies – turning fiat currency into cryptocurrency as store of value (or for speculative reasons as we have seen). The Ethereum network, however, is an example of a blockchain network that is specifically designed to process transactions in a way that increases speed and enhances security, while at the same time charging smaller fees than traditional financial transaction networks. Note here that we are referring to wire transfers and property transfer networks, not credit card transaction systems.

Of the blockchain networks available, Ethereum is one of the more popular networks for digitizing a variety of transactions, including in real estate. While there may be decentralized ledgers with greater capabilities than Ethereum, in the authors' opinion there are few that can match the amount of assets and transactions recorded nor the size of the community, the decentralized setup, and amount of tooling available for developers – all critical factors when it comes to evaluating blockchain networks.

The future of real estate investment lies in the use of these blockchain platforms, particularly in the concept of tokenization, which allows investors to purchase and sell partial pieces of assets. In the current property development model addressed above, we see the developer put a very small stake in the project, and raise the rest of the money through a combination of equity contributions, bank debt, and unit pre-sales.

Imagine, however, if this same developer were to launch a development project backed by security tokens perfected and administered via a blockchain. Our developer could divide the holding into say 100,000 pieces, and sell the pieces as tokens. An owner of this token would have ownerships rights to 1/100,000th of the whole property development.



Fractional Ownership via Digital Tokens

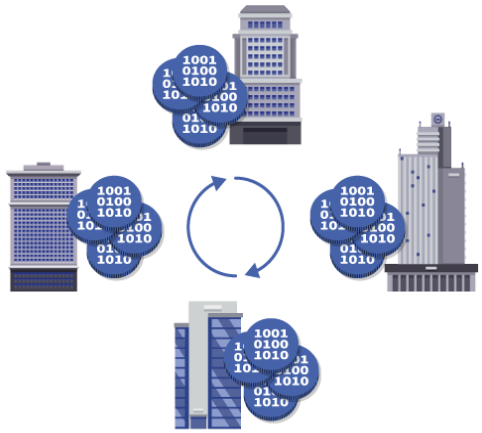
Keeping with our Austin example above, imagine if our speculating investor had been able to purchase 40 tokens at a price of $5,000 apiece, rather than making a $200,000 down payment on a single unit. The developer would raise the same gross amount of capital from this investor, but the net proceeds from the investment would increase, due to lower transaction fees. From the investor's standpoint, they eliminate the obligation to fund $600,000 at a later date – if they are unable to sell their unit in a timely manner – and they eliminate the transaction overhead of selling the unit to a secondary buyer. Further, because their tokens are a liquid investment, they mitigate the risk associated with holding an illiquid asset in a declining market. For both the developer and the investor, tokenization offers an improved transaction process.

In the above scenario, the total capital invested in the project is the same – however the property developer avoids incurring burdensome debt (often with covenants and staged releases of capital that limit his flexibility), and investors can more easily tune the exact amount they want to invest.

After purchasing tokens, an investor can hold the tokens in their portfolio until project completion, at which time they can exchange a certain number for ownership of a unit in the building. Or, if the investor has purchased the tokens as a purely financial investment, they can sell the tokens to other investors via a secondary exchange. (As the project's future cash flow

becomes less risky when it approaches completion, the tokens will presumably have increased in value).

Because the tokens exist on the blockchain, the investor is able to make this transfer without the delays, high costs, middleman and other sources of friction that typically belabor real-estate transactions. And because the tokens are liquid assets, the liquidity discount currently associated with real-estate transactions should be mitigated.



Liquid Marketplaces for Selling and Purchasing Securitized Tokens

Additional Token Securitization Scenarios

Homes

Home equity is a valuable tool for homeowners to tap into, assuming they have low remaining or non-existent mortgages, and enables them to pull out cash against that property based on a bank-appraised property value. Interest rates are generally higher than those of first mortgages but homeowners often make this choice as so to put these funds to use.

Tokenization here could be a streamlined means to accessing more capital from a variety of different sources. Imagine an homeowner issuing a certain number of tokens up for grabs with a specific rate they are willing to pay to whomever might back it. Homeowners could directly find verified counterparties willing to match up and buy tokens at these proposed rates.

This approach could provide a vehicle for family, friends, and other known entities to lend money in ways that are far more formalized (and securitized) than current practice. Providing the opportunity to invest via tokens (with increased transparency and more straightforward settlement arrangements) is certainly an easier approach than using promissory notes that exist outside registries and are expensive and cumbersome to arbitrate in the event of non-payment.

The lenders do not even need to be other individuals. They could be banks, lenders, or others interested in participating in an interest-bearing investment. Having a more formalized way to make and record property investments opens up new markets and opportunities.

Note that regulatory and home lending changes would be be needed to allow for encumbrances such as the ones above to be placed on real estate assets although this is not unlike insurances changes necessary to accommodate Uber, Lyft, and other gig-economy workforce innovations. We by no means wish to discount the challenges involved with adoption of this new technology and economic models. In fact, we include a rather large section on these challenges as the end of this document.

Multi-Family Units

Another example that can benefit from tokenization is with multi-family units. Perhaps a landlord is willing to sell off a percentage of a multi-family property but wants to retain part of the rental cash flow. Tokenization could enable complete partitioning of the property and enable one or more counterparties to purchase tokens and receive rental cash flow distribution rights. As with traditional real estate, having too many investors can color ownership rights and inhibit management but with proper allocation and distribution rights, such a mechanism does open up a competitive new landscape for capital and allows property owners to use the capital to purchase additional properties and/or reduce exposure and risk.

So how would this work practically speaking? Let's take a residential building in Switzerland that consists of 18 apartments and a restaurant worth approximately 15 million CHF (~$15m USD at current exchange rates). If owner had the desire to obtain some liquidity from the building, he typically would have little option except to take out another mortgage or syndicate the deal via a cumbersome and expensive paper process. If he were to tokenize 20% of the building (or approximately 3m CHF), however, he might have an easier prospect both in terms of finding investors and managing the deal.

A set of tokens (so called security tokens) administered via blockchain would provide an easier mechanism for one or more investors to invest in the building and in return receive their 20% share of the rental income (after deduction of typical expenses). The initial investment transaction along with the subsequent rental income payments could be executed completely on-chain. In other words, the owner could receive the 3m CHF 3 payment and the investors their share of the retail income all recorded within a blockchain network via the token with payment to and from their respective wallets. All the above could be done directly between the parties involved with no intermediaries, banks, and long waiting times. The transaction payments and language controlling the investment and payments all included and linked together. This type of transaction is now a reality in Switzerland (learn more).

Syndication

Syndication is another area where tokenization could come into play. Syndication is a method of pooling capital from multiple investors for the purpose of acquiring real estate. Investors in syndications are thereby able to participant in investment vehicles that might might not be able to afford on their own. Purchasing assets using syndicated funds, whether it's one or more house, a large residential building, or one or more commercial properties would become much more streamlined than currently.

Every investor's ownership of the asset, represented through a token, would be immutable and, in theory, more easily transferable, pending, of course, the syndication rights. This improved funding and management mechanism is a dream for anyone who sources capital from outside investors as it helps with the transparency issues that usually plague these deals.

Additional Work

Obviously this is a broad picture but one that should provide a view as to the potential impact of blockchain technologies. Future work might explore the process of creating a digital ownership structure (in this case represented via a set of tokens) which reflects rights and value associated with the property. These rights and values might be comprised of the cash flow the property generates, the value of the property itself, the mortgage on a property, or a combination of all them.

Other work might explore protections for lenders, such as smart contracts that could be installed such that additional tokens (representing the remaining value of the property) could be collateralized. For example, were a syndication to default on its lender payments or other covenants, these tokens could then be automatically transferred to the various financial providers to preserve and protect their ownership interests. While there are some unknowns here, the capabilities to move forward in a number of directions are here and now and the future possibilities are certainly visible and explorable.

Blockchain as a Disruptive Force

The benefits outlined above – increased liquidity, more open markets, and reduced friction – all become magnified when one looks at it across cities, state, and country borders. Establishing a common language around real estate property registration and securitization and providing for mechanisms for digital purchase will reduce a tremendous amount of overhead and special knowledge needed in order to participate in real estate transactions across the world.

By utilizing smart contracts, the whole agreement can be automated and payments can be sent and received instantly. A smart contract (deployed on a decentralized blockchain network) can make it possible to write, authenticate, and audit agreements in real-time. This can be done on a global scale and without the need for intermediaries, thus keeping the value between the main parties involved in the deal.

Within the smart contract (which is typically publicly available for anyone) the instructions and dependencies are clearly defined so payment can only be executed as long as these conditions are fulfilled. This gives greater transparency to the parties involved and theoretically reduce the number of disputes. Smart contract processing also has the potential to reduce the risk of fraud, as digital identity verification will be a step in the process and only allowed parties can interact with them using their private keys. Every node within a blockchain network is continually validating all transactions in the blockchain thereby reducing the likelihood of a fraudulent transaction.

A final note here is that blockchain transactions are processed 24/7, with no business hour or holiday cutoff times and transactions are also confirmable in a matter of minutes. While this continual and near-real time process poses some challenges for traditional business and banking practices, it does eliminate trading biases imposed by geography markets and in the nature of blockchain and cryptocurrency brings the world a bit closer and more universal.

Use Case #2: Land Registries and Cadastrals

The land registries in most countries and regional authorities are historically challenging to access, as most of the information is kept offline. Blockchain registries have the potential to shorten a normally lengthy process of recording and transferring titles while offering transparency and eliminating the need to trust a centralized party.

In order to make many of the use cases in this and in future documents possible, land registers should be moved on-chain, meaning that land titles should be recorded and preserved within a blockchain network. This is so that ownership of properties and transaction records can be more available, visible, and accrue the benefits of being in a more verifiable and digital form.

As an example, Ethereum's running ledger of transactions provides transparency of asset ownership and control, mitigating the significant problems with titling and land-ownership claims that can plague development projects in many countries. Titles certainly need to be verified prior to being included within a blockchain registry, but once there, there is greater assurances of ownership based on the immutable transaction record. Many state governments and countries are already looking to move their land registries into blockchain networks and thus provide ways to store and easily access historical title records. Vermont is moving in this direction as is Ukraine, in part added by Propy (see below).

MARKETS | PROPERTY REPORT

A Vermont City Tests Blockchain Technology for Property Deals

South Burlington doing a small trial run to test to the technology on recording real estate sales

Wall Street Journal, March 28, 2019

MARKETS | PROPERTY REPORT

An Entire Real Estate Deal Takes Place Online, Using Cryptocurrency Technology

Propy startup conducted a transaction in which cyber-currency was used to buy an apartment and the title was registered on a cyber-ledger

Wall Street Journal, Sept 26, 2017

This movement does seem inevitable when one considers the current condition of most government software systems. A recent set of news articles detailed the woeful state of city and

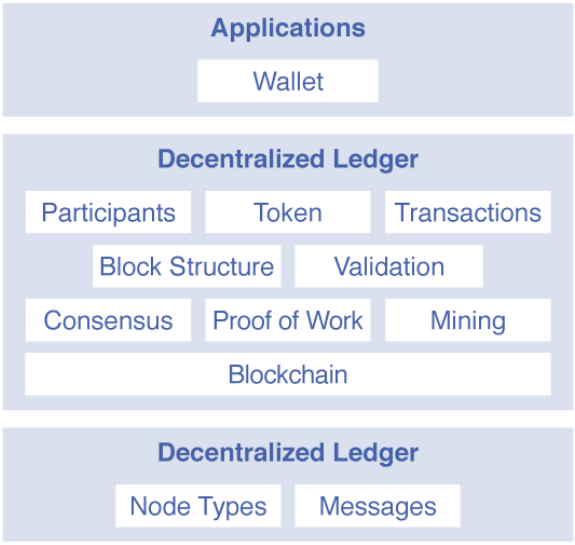
state software systems in the US[2]. While such systems are likely to last for a long time, it's not inconceivable, and in fact most likely in our opinion and those of others, that the next move will not be new form of the same system (i.e. centralized database with forms and data entry) but rather one that makes use of ledger-based systems as well as tokens and other ways to represent digitally represent physical assets in ways that increase fidelity and ease of use in digital systems. Using a non-fungible token to represent real estate properties and land parcels seems like a logical step, and almost inevitable, step.

Note that there may be some middle steps in moving from a centralized form to a fully decentralized form. It may be the case that this is one area where a real estate interests could begin adopting elements of blockchain technologies and profiting from its benefits without fully moving to a new economic paradigm (i.e. decentralized nodes managing and persisting the data). In other words, the data could be more closely managed (i.e. via a private or permissioned and controlled ledger) as opposed to a publicly managed and operated network.

Blockchain: Why Ethereum

Blockchain technology was initially mostly associated with Bitcoin, understandable because Bitcoin was the first digital currency issued on the blockchain. The creator of Ethereum, Vitalik Buterin, started his blockchain journey through an initial interest in Bitcoin back in 2011. He studied and made several attempts to build applications on top of the Bitcoin blockchain without being successful. He realized that building an application on the Bitcoin blockchain is only possible when one would build an entire original blockchain for each application, as this is highly complicated he realized that core elements of the blockchain had to be changed. And so the Ethereum blockchain came to life (from the specifications on paper in 2013 to launching the blockchain itself in 2015).

Simply put, Ethereum is a decentralized platform that has all the advantages of blockchain technology yet in addition allows for the creation of decentralized applications (DApps). Similar to Bitcoin, Ethereum also has its own currency (called Ether) which can be mined, bought, traded and sold just like Bitcoin. Although they seem similar they have different purposes, goals and capabilities. As an example, Bitcoin was created as a digital currency with the ultimate goal to replace conventional fiat currency. Ether, on the other hand, is much more than just a digital currency, it enables developers to create decentralized applications (DApps) through the use of smart contracts.



Blockchain Architecture Diagram

There are many reasons why entrepreneurs, builders and developers chose to build on Ethereum, some key reasons are:

- There is already a very high degree of decentralization, once the change to proof-of-stake happens this will only increase.
- An estimate of over 200,000 developers are actively working on many real live products with many important tools / framework in place.
- Ethereum is under continuous development by the open-source community, a good example is the upcoming Constantinople upgrade,
- The Ethereum core dev team are working on implementing "Casper" which aims to make transactions more efficient.
- With a market capitalization of more than US $13B, Ethereum is the 2nd largest blockchain network in the world (liquidity is important).

Use Case 3: Token-Enabled Marketplaces

Tokenization can do more than represent properties and allow for distribution of revenue streams. It can also facilitate the creation of more liquid and transparent commercial real estate exchanges. Such exchanges would allow for improved trading capabilities, perfection of ownership, and management of the properties and portfolios.

For investors who have invested in smaller, yet still significant stakes in a property, it is not easy to liquidate these assets. By implementing Blockchain technology this problem can be solved, as the process to liquidate a token is much easier and cheaper. A regulated marketplace created for secondary offerings could allow accredited investors to more easily trade their shares (i.e. tokens) amongst each other. The sales and purchases of the interests would be

recorded via decentralized ledgers, and together with a clear underlying legal framework, the transfer of ownership established and made verifiable.

Such a secondary market will reshape the real estate market into a much more dynamic and competitive trading situation than it currently is. It will allow what is largely a set of illiquid assets to become much more liquid, the result of the offerings being more easily to market (being in a more universal offering form i.e. via a token with a more stand purchase contract being it) and to effect (more cost-effective). It would also in theory reduce the amount of parties involved in transaction as the offering and purchase could be done directly as opposed to via high-cost/high-friction intermediaries. Additionally, owning interests in real estate (via real estate tokens) rather than entire buildings will give property owners and investors greater flexibility in allocating and re-allocating capital.

Use Case 4: Standardized Property Data

Today's global ecosystem consists of many isolated and disparate real estate networks with little to no interoperability between them or other systems. Even though access to property data is the basis of the sale, lease, price and the many other comparisons a buyer uses when deciding on a property, and a seller uses to attract them to the right property, it is a struggle for agents and firms to get exposure for their property listings via the range of systems used internally within a firm, as well as external services locally, regionally, nationally and internationally. Listing exposure is step one in executing a transaction. Without good data to work from, few offerings or deals can take place.

Looking at just the United States, there are over 88,000 real estate firms, of which 90% have a website with listings profiled. Currently, these websites do not share a common communication data format or any type of data interchange tools. In order to share property data, firms can do one of three things:

1. Download the listing as a PDF and email it.

2. Share the listing via a customer relationship management system (CRM).

3. Syndicate the data to a regional Multiple Listing Service (MLS) or to a national portal.

The latter two are vast improvements over the first, but in these scenarios, the firm gives up control of its data, manages multiple data-sharing procedures, opens itself up to data inaccuracies endemic to proprietary data server models, and pay subscription fees on a service-by-service basis. It adds up to spending a fair amount of time and money to take the first step toward a listing an offering. And that's in the U.S. Compound it across the globe and it is a huge data standardization problem.

This current state of affairs makes for a kind of a chicken-and-egg situation. Did the real estate industry settle on a centralized model to handle distribution because of a lack of trust among stakeholders and an absence of standardization among operators? In short, there was no incentive or path to universally accessible good data. Or was it the absence of a technology with which to design natively interoperable systems that left us without a way to do business digitally, safely and accurately? So we kept building on the familiar centralized service-provider pattern.

Either way, standardized data is elemental to sharing data, and sharing data is elemental to transacting.

Blockchain networks and technologies provide a foundation to process, exchange, and control the downstream flow of data in a way that allows independent, unaligned, and even competing stakeholders to share with one another, without ever giving up ownership or control of their data to a central operator and its interests. The data standardization process comes about via two factors – one is a simple entity-attribute model and the second is via global adoption of shared ledgers and data schemas.

With respect to the first – entity-attribute model – the entity is represented by the property address (or ID) and the attributes are represented by the property's details, such as the number of beds or baths. The blockchain ledger itself is not designed to handle large records of data and so therefore it is necessary to separate the property address or ID (the entity) from its description (the attributes).

By way of example, if Firm A wants to share property data with Firm B regarding 123 Apple Street, Firm A could encrypt the data for the property and post it within a blockchain network. Firm A can then share the encryption key with Firm B, giving Firm B read-access to 123 Apple Street. We now have a mutual exchange of data that does not involve the infringement by third-party, centralized organizations. This process can be replicated between two or among thousands of networks.

In addition to data exchange, we can resolve idiosyncratic property data by indexing fragmented property data to a single identifier. In the above example, 123 Apple Street may have three bedrooms on Application A and two-bedrooms on Application B. Using the property's identifier, we can resolve the dispute programmatically or quarantine the conflict until it can be resolved with additional resources.

Likewise, the adoption of decentralized ledgers and registries – where the data is accessible to all in the same format – will eliminate the current situation where each organization has its own database thereby creating the need for integration software and custom coding within each organization. All organizations tied to a blockchain solution will be using the same schema, sharing the same or similar transaction processing mechanisms, and otherwise leveraging the same compute, storage, and communications layer.

The result will be systems that can communicate on an international scale, saving firms time and money in subscription fees and data procedure process management, while providing a reliable identifier for later transaction execution. Standardized data will pave the way to increase access to markets, reduce transaction friction, and make markets more transparent.

Blockchain Challenges: Issues with Adoption and Use

The tokenization of real world assets opens up channels to entirely new financial instruments and new liquidity source but it is a challenging concept to expect mass adoption to happen quickly.

Conceptual Challenges

Working in a decentralized Web3 world is a conceptual from our current state. In many cases, there is no central authority and there are many layers and components. There's immutable ledger, wallets, zero-knowledge proofs, proof-of-work, proof-of-stake, mining, decentralized storage and much more. This is a conceptual leap from current practice and current technological understand that takes time to understand, learn, and safely be able to put into practice.

For example, the current user experience in working with cryptocurrency and crypto assets (i.e. CryptoKitties and other collectibles) is still daunting. Users need to install browser plugins and find and decide on a wallet. They need to become familiar with using private and public keys, not to mention making sure to get long hexadecimal addresses correct. A single transcription error or a cross currency transaction (sending ETH to a BTC address, for example) can send a transaction awry, putting the funds in the transaction at risk.

This problem isn't new necessarily. The early Internet days had similar challenges with people trying to understand what a URL was and how to safely make credit card payments. It happened with adoption of mobile phones with challenges in representing data on a small screen or making it easy to key in data. The current blockchain interface challenges aren't insurmountable, developers and users just need time and lots of trial by errors and experiments in order to improve the process and turn what is now a conceptual leap into a subtle shift into doing things a bit differently.

Trust Issues

Similar to the conceptual challenges is the issue around trust of this new technology, specifically when it comes to converting cash/fiat into cryptocurrency and trading in this new form of money. Many people are able to see the value in making real estate investments via tokens but they also get stuck when they actually go to convert their hard-earned cash into something that is largely foreign to them, unsure whether they actually want to make the investment due to its nascency and perceived risk. Situations such as the DAO hack, Mt. Gox missing funds, or the Parity wallet fiasco do not invoke confidence for most people, which is a partial explanation as to why crypto custody solutions are such a hot topic these days and a potential pivotal piece of the puzzle.

Additionally, we should note that while blockchain technology, security tokens, and cryptography help ensure the state and veracity of the transaction records, it does not eliminate the potential for fraud, especially at the entry points or edges of the system. As an example, suspect properties could somehow make their way into title registries – that is if there were not sufficient checks and balances at this gateway. Another security issue resides with private keys in that they could be stolen thereby giving an unauthorized user the ability to sell or buy properties – that is if there were not sufficient controls in wallets/accounts at the purchasing end. As with above, time as well as improved/safer interfaces and custodial solutions will help alleviate these hurdles.

Regulatory Challenges

Despite the talk of globalized markets and increased access to investment opportunities, regulatory hurdles put up barriers at national and even state and regional levels. In many jurisdictions, the tokenization of an asset is synonymous with the securitization of an asset, meaning its the process by which an illiquid asset is turned into a security. The process must meet regulatory approval and any resulting transactions (and transacting parties) must be guided by securities laws and regulations.

In the US, that means token purchases might need to be accredited investors, placing inhibitive limits on who can actually purchase the tokens and effectively reducing the supply of investors. Token offerers might also need to abide by security regulations that might include custodial arrangements – which at this point in the US are often limited to banks, registered brokers, registered dealers, and certain other individuals or entities.

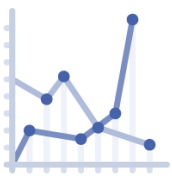
Complexities and Dependencies

Because of the intricacies and linkages in real estate data and regulatory necessities, changing the way transactions are handled and recorded is not a simple matter. It's one thing to paint the future – i.e. let's digitatize the entire process to actually make it as immutable and transparent as it should and could be – it is another leap to be able to implement it without significant coordination with local institutions.

To create a token for a tangible asset – a home or a rental property – one will need to create a digital intangible record of it, detailing ownership history, liens, property taxes, and other related information. But this digital blockchain-based record will need to have a link to current records and/or official recognition as legitimate by parties involved in a transaction and authorities that might rule on the legitimacy of the transaction.

Some countries and regions or states are taking active actions to move in this direction and in these cases, the critical first step of digital representation can be accomplished. For other jurisdictions, however, users will largely be creating a parallel records of properties that duplicate those held within the land registry. This means additional overhead and maintenance and potential confusion in the event of conflict between the records.

Volatility and Market Risks



One last challenge has to do with market volatility. One only has to look at swings and flash crashes in the stock market to see how investors can sometimes overreact to information and market downturns. Cryptocurrencies have show this bull and bear market behavior in significant and noteworthy ways. Real estate has not typically reacted with the same speed to changes in market sentiment, likely due to the fact that it is currently so illiquid. Of course, housing and commercial real estate markets "heat up" and "cool down", it is still over the course of months and years, and only directly impact people active in a market in a particular country

and region. (People who own a house, while disappointed in any drop in value, are likely to be able to absorb a downturn because they have no immediate intention to sell their house.)

When fractional property ownership is tokenized, it is bound to increase the number of active real estate investors, and when these token can be traded in minutes, the potential for large swings, enabled by the reduced transaction friction and increased speed, could be dramatic. And while we certain expect to see high volatility in the beginning, often for unexplainable reasons, we would expect to see volatility match that of individual stocks and correlate much more closely with general economic trends.

Active Real Estate Projects

Here are four examples of companies in the spacing, including a number of members of the Enterprise Ethereum Alliance (EEA).

- Investment / Land Register: blockimmo
- Global Marketplace: Imbrex
- Investment / Lease Management: Meridio
- Transactions / Management: Propy

blockimmo

blockimmo is a blockchain powered startup on the verge of becoming the go to marketplace for real estate tokenization. blockimmo's regulatory compliant ecosystem enables fractional property investments and ownership. Properties are officially and legally represented as security tokens on the Ethereum blockchain. blockimmo partners with financial institutions and other strategic partners in different countries to enable and grow the cross-border market. Operating out of Switzerland, blockimmo is focused on facilitating an accessible, streamlined real estate market, while delivering value to our users one step at a time. Ultimately resulting in a global real estate market far more efficient than the stock market today.

Imbrex

Imbrex is a global marketplace that provides stakeholders greater control over their real estate listing and transaction data in addition to the downstream flow of that information. The result is data that can travel fluidly between disparate systems, decreasing duplicate listing entry while increasing transaction efficiencies and direct lead generation.

Meridio

Meridio is a real estate blockchain marketplace to create, manage, and trade fractional ownership shares in real estate. Via the use of blockchain technology, they are striving to increase both efficiency and liquidity what is a historically inaccessible asset class. As part of their work, they have tokenized one of the

first real estate assets in the world and have a robust pipeline of assets coming to market. Meridio is a ConsenSys formation. ConsenSys is a leading global blockchain venture production studio.

Propy

Propy is a global real estate marketplace with decentralized title registry. They are working to solve the problems facing international real estate transactions by creating a novel unified property store and asset transfer platform for the global real estate industry. Propy lets buyers, sellers, brokers, and escrow/title agents/notaries come together through the utilization of a suite of smart contracts on blockchain to facilitate transactions. They provide a network for these parties to connect with each other and conduct real estate purchases online. The culmination of the transaction is a digital transfer of ownership on the Propy Registry.

Additional Use Cases

The following use cases touched on just a few of possibilities in the real estate market. Here are few other use cases and areas where blockchain technology can be applied. The group hopes to explore these and other related topics in future publications.

Tokenization of Real Estate

- Dividend (yield) Payouts to Token Holders
- Voting Rights for Token Holders through a DAO
- Tokenization of REITs
- Enhanced Liquidity with Secondary RE market
- Tax-Optimized Vehicles

Sales Process Optimization

- Middlemen Support & Optimization
- Smart Contract Integration with Existing Legal Documentation
- Tax Impact and Implications

Real Estate Management

- New Ecosystems and Incentives for Tenants, Landlords, and Service Providers

Property Identification, Listings, and Data

- Benefits for a Cadastral System + Blockchain technology

- Interaction and Integration with Governmental Systems
- Jurisdictional Issues
- Standardized Property Data and its Impact on RE Transactions and Sales

Future Outlook

It is a common saying in the tech community that technological progress is overestimated in the short-term and underestimated in the long term. This is likely the case here as blockchain technology is more than just a single technology – and in fact – it is more than just technology in that it is a movement from centralized processing to decentralized process and consensus. New protocols and layers plus new economic and business models in combination with this shift in authority will take time to propagate through industries and with consumers.

It's not unlike the Internet 1.0 and the calls for the demise of newspapers and magazines. It has finally happened (or is far along its way) but it certainly took a decade or more after the initial projections. The same with predictions on the paperless office in the 1990s. Only much much later than originally forecast have digital documents and forms taken precedence. Paper still had a long run, much longer than the digital adherents had foretold.

When the shifts in the technologies above started happening, though, they were quick and significant. The reasons are many but a big part is that it takes multiple technologies along with significant work in adapting to new approaches. Getting news on your mobile is vastly different than getting it from a newspaper or magazine. The timeliness, the sources, the format – all are drastically changed.

Tokenization of real estate assets may seem far-fetched to those not firmly seated in the blockchain space. We firmly believe, however, that blockchain networks and blockchain technologies will alleviate many of the issues and barriers standing in the way of the average investor, and significantly open up new investment paths for real estate developers. The safety, security, liquidity, and earning potential unlocked by these tokens will greatly increase the opportunities for those who wish to benefit from having real estate investments in their portfolio.

Just like the Internet opened up a new way to transact and communicate, blockchain networks and technologies promise to transform real estate property funding, development, ownership, and investment management.

Stay updated and keep following us as we're working on Part 2 of the real estate use cases publication where we will go into depth how dividend payouts (yield) can be optimized, how voting for investors (token holders) through a DAO will work and how a new ecosystem for tenants and landlords might evolve – all powered by blockchain technology.

About the Enterprise Ethereum Alliance (EEA)

The Enterprise Ethereum Alliance (EEA) is a global standards organization that is creating and maintaining an open, standards-based architecture and specification for accelerating the adoption of Enterprise Ethereum. The goal of the EEA's Enterprise Ethereum Client Specification and forth-coming testing and certification programs is to ensure interoperability, multiple vendors of choice, and lower costs for its members. Contact the EEA Member Support team at membership@entethalliance.org for more information.

About the EEA Real Estate Special Interest Group

The EEA Real Estate Special Interest Group is helping to drive exciting changes in the real estate industry via the adoption of blockchain technologies. Here are a few of the advantages of joining the EEA and becoming a member of this industry group.

- Learn and collaborate with other Real Estate members
- See how your business can adapt and make use of innovative technologies
- Help build blockchain requirements and specifications to power changes in the industry
- Influence the changes in regulations that needed to secure this future

Notes

[1] MSCI Inc. Real Estate Market Size 2017

https://www.msci.com/www/research-paper/real-estate-market-size-2017/01032786497

[2] San Francisco, Other US Cities Still Using Aging Software for Municipal Needs

https://www.slashgear.com/san-francisco-other-us-cities-still-using-aging-software-for-municipal-needs-03568140/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