

Blockchain in Real Estate

Useful Application Areas

Audience

This white paper is intended for the following audiences:

- REALTORS interested in future technologies
- MLS Executives
- Application developers (programmers)
- Technical Management
- Product/Marketing Managers

Executive Summary

A new information management technology called blockchain ^[1] has the potential to significantly affect the real estate industry in the coming years. Blockchains manage data differently than traditional databases. Understanding the advantages and disadvantages of blockchains is important to developing effective strategies for addressing the technology. This is particularly true given that systems used by practitioners, MLS, county recorders and title plant operators may soon begin, and in some cases already are, using this technology to enhance operations.

Many people confuse blockchains with digital currency like Bitcoin, which implements blockchain technology to manage transactions ^[2]. This is because Bitcoin was the first high-profile application to use blockchain in practice. Skepticism surrounding digital currency often leads people to ignore the beneficial aspects of blockchain technology. However, non-financial industries implementing blockchains, like supply chain management, recognize its benefits and are actively involved in exploring the technology. Real estate applications have more in common with supply chain than digital currency, so we should begin to take notice of blockchain and its potential to transform the real estate industry.

Background

Blockchain is a data management approach that has the same goals found in traditional information management, but does not rely on centralized databases. Blockchains use a technique called distributed ledgers to store information.

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The most recognized blockchain system today is Bitcoin, a digital currency application released in 2009. The evolution of the technology for non-financial companies led to a new name. In 2014, the press started calling the updates “Blockchain 2.0”. One of the important features of Blockchain 2.0 is the ability to support a “Smart Contract”.

A smart contract is a mini-application that captures a business agreement between parties. Agreements operate and execute on any of the distributed nodes of the network. What is important about Smart Contracts is not that they represent an agreement between parties, but that they execute outside of a central location.

There is no standard body governing blockchain, but there is a sizable Open Source effort called HyperLedger ^[3] which has the backing of large industry players.

What makes blockchains different from databases

The characteristics that differentiate blockchains from traditional database architectures are:

- Distributed Ledger – Information is not centralized
- Smart Contracts - Automated execution
- Immutable Information State – Changes are permanent
- Transparency – Information is visible to all users

Distributed Ledgers create a copy of the data in multiple locations. Each location uses a technique called a consensus model to ensure that information is consistent. Blockchains are constantly using resources to keep copies “in sync”, making it difficult to match the processing speeds of traditional, centralized databases.

A good example of a distributed system is the Internet. Who controls the Internet? Certainly, the names are controlled by ICANN ^[4], but the flow of messages is a controlled by servers operated by thousands of parties. If one of the servers is disabled, other servers take over. Distributed design makes the Internet difficult to “kill”. Many call this behavior “self-healing”.

Smart contracts allow for digital execution of agreements. They capture general (compensation and cost formulas) as well as special conditions (payment conditions and penalties) of an agreement. All relevant data must be available for a Smart contract to be effective. Many systems today are really indicators of contractual condition, whereas smart contracts attempt to be a legal document.

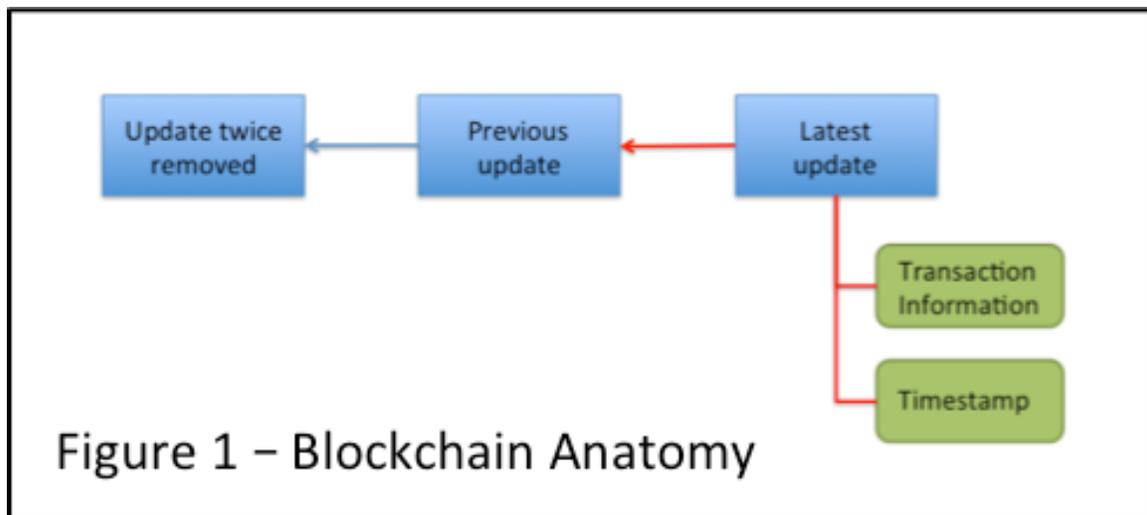
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Blockchain transaction information is immutable, which means that data is in a form that can't be changed. Each change is mathematically "locked" and previous versions are linked in a chain-like manner. *Figure 1 – Blockchain Anatomy* depicts each update, pointing to the previous update to form a "chain" of events.

Disruption of a blockchain can be mathematically detected. Disrupted chains, which are considered unreliable and thus untrustworthy, are discarded. Servers replace discarded, flawed transactions with trusted transactions residing elsewhere on the network.

Early blockchain efforts (digital currency) exposed all transactions to the public. This was not sufficient to entice other industries (supply chain) to adopt the technology. However, recent non-currency implementations are being created as private blockchains, which require membership in order to be viewed.



Current blockchain usage in real estate

There are early uses of blockchain in the industry, but most of the efforts were started before the advent of Blockchain 2.0. *Figure 2 – Early Real Estate Blockchains* presents a few of the early efforts.

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Company	Approach	Blockchain
Consensys	Solar Energy Contribution	Ethereum
Factom	Land Title Registration	Ethereum
TrustStamp	Secure Identity	Ethereum
RexMLS	Token-based Compensation	Ethereum
Ubiquity	Ownership and Transfer	Bitcoin

Figure 2 – Early Real Estate Blockchains

Two of these efforts, RexMLS ^[7] and Ubiquity ^[9], were rolled out in August 2016 with base compensation (commissions) paid with tokens instead of traditional currency. It is too early to gauge their progress toward adoption.

Factom ^[6] was installed in the summer of 2015 to supplement the existing land record system in Honduras^[11], but it's claimed success has been controversial^[12]. The original intent was to improve the dispute resolution process.

TrustStamp ^[8] uses blockchain to combine multiple references and is used to ensure the identity of a user. As the user presents sources, they are documented and preserved in a blockchain.

Consensys ^[5] uses blockchain to help account for solar energy contributions from members of a community project called Brooklyn Microgrid ^[13]. This project uses Smart Contracts to keep track of member energy contributions.

Potential Blockchain applications

Potential industry-specific blockchain applications are presented in this section. There are industry players with substantial investments in these areas, and blockchains will not necessarily affect their products. The discussion is intended to explain blockchains by using familiar terminology as a point of reference, and includes potential pitfalls of each application.

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Cooperative Compensation Offers

Compensation offers are a point of differentiation between the MLS and third party listing information providers. Brokers post offers of compensation on each listing in the MLS, and offers are made available to all members of the MLS.

Blockchain's smart contracts might approach the compensation offer differently. Smart contracts do not store offer information in a centralized location. If the compensation blockchain is private, only those who have access are aware of the offers.

However, in private blockchains, each node agrees on who has access. In a supply chain scenario, the buyer sponsors the blockchain and controls distributed node operators. The operator of each node is trusted to maintain the integrity of the system (because their customer sponsors the system) by providing limited access to the system. Violating trust could result in the sponsor eliminating distributed nodes. At this point, real estate does not have a similar supply chain trust network.

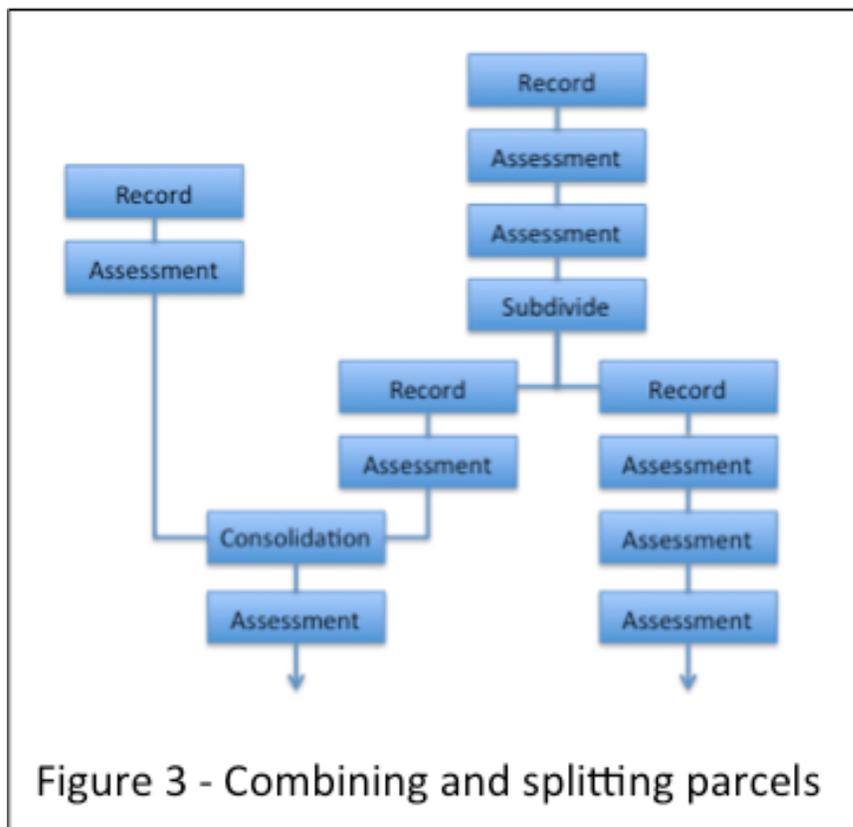
Furthermore, there are dangers with using blockchains for offers. Since the complexity around defining universal real estate compensation contracts and the lack of a standards organization impacts real estate, the general dangers behind flexible data models (presented earlier) could lead to the rise of "compensation clubs". More detail about this caveat is presented in the next section "Blockchain Adoption in Real Estate".

Title Plants and County Recorders

Blockchains are exceptional at capturing changes. Today, title plants and county recorders capture changes using traditional database technologies. They struggle with parcel splits and combinations. In *Figure 3 – Combining and splitting parcels*, it's easy to see how complex parcel splits and combinations can become over time. For this reason, title search could be an excellent blockchain application. Blockchain data is organized as a historical thread. Results are both authoritative and safe from tampering. There are no underlying mechanisms (such as database "joins") that can miss important information.

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That said, converting existing databases to blockchains would be expensive and time consuming. In many cases, established players may not have the economic wherewithal to be successful with the conversion. This has the potential to open the door to new players, which could start building a parcel system for housing (starting with new housing units).

Listing Information

There are two ways that blockchains can improve listing systems: provide an accurate, fast status of the listing and collect events in the lifecycle of the listing.

In terms of the first improvement, changes to listings occur infrequently (compared to high speed systems like financial trading or real time monitoring), and websites that depend on listing information require high availability. Traditional data storage technology has resulted in brokerage websites operating on copies of the MLS database, rather than the MLS being the source.

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Blockchains are designed to be fault tolerant. In other words, availability is a design feature instead of a process that needs governance. Today, API adoption discourages copying, but this is still a process solution.

In terms of the second improvement, a significant advantage to using blockchains for listings is the ability to capture a holistic view of “events” in the lifecycle of the listing. Blockchains are designed to “walk through history.” For instance, in a blockchain approach we could capture:

- Tour information (time, duration, temperature, humidity, etc.)
- Lockbox access
- Offers
- Web access

This data is difficult, if not impossible, to acquire and aggregate in the current environment. The lack of uniformity and consensus on how to collect this data makes today’s approach impossible to contrast with a blockchain-based approach. Blockchains capture a more holistic view of events resulting greatly improved analytics in real estate markets. One could even envision applications that help the agent develop more effective showing strategies based on traffic patterns from showings with similar layouts.

Blockchain Adoption in Real Estate

Real estate will not embrace blockchains as quickly as other industries. There are several reasons behind the delay:

- It takes time to recover system development costs
- No single technology is ideal for every business situation
- It is human nature to fear change

Companies may ignore blockchains because they may be reluctant to “rock the boat”. Implementing new technologies requires new skillsets and business processes, and investments have already been made in systems that meet customer demands. Furthermore, companies may think that systems do not need to change until new situations arise that force them to change (i.e. competition, feature requests, or the like).

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Real estate blockchain implementors will experience high profile poor implementations at first. All early adopters have suffered through this painful, yet educational period. These failures will complicate adoption. Poor implementations result from:

- Not understanding the technology, thus applying it incorrectly
- Rushing implementation to claim superiority over competitors
- Unanticipated industry reaction caused by the technology

For instance, misunderstanding a feature, such as “transactions that last forever”, can create a horrible mess. This can result when shortcuts are taken when determining the data the system will manage. Data changes from a transaction permanent after they are committed. If data fields are added at a later time, “old” transactions may become difficult to reconcile with “new”, expanded transactions.

Furthermore, there is the potential that real estate blockchains will prey on the ignorance those who do not know what they are buying. In the long run, this behavior leads to erosion of confidence because what is being sold does not match what is being advertised. In this age of social media, the speed at which bad news travels is faster than ever, making this consideration more critical than it was even a decade ago.

Another unanticipated effect of blockchains could be accelerating the creation of “buying clubs”. When inventory gets tight, closed groups form to keep inventory off of the open market, undermining the cooperative spirit of the MLS. Three features of Blockchain 2.0 could lead to more “buying clubs”:

- Private blockchains,
- flexible data models
- smart contracts

These factors make derivatives easier to create with blockchains than with traditional databases. Very little software needs to be created to deploy a new compensation model. When deployed in a private blockchain, only invited participants need to know about it.

Though change is difficult, and there will be challenges in implementation, it will be difficult for traditional approaches to match the operating characteristics of blockchains for some applications. Successful early adopters will drive the market.

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Overcoming blockchain fear, uncertainty and doubt

New technology has to overcome negative perceptions to be adopted. Here are some talking points that can be used to overcome negative perceptions of blockchains in real estate:

All digital currency is blockchain, but not all blockchains are digital currency

Reluctance to embrace digital currency has slowed the adoption of blockchains because practitioners are not enthusiastic about receiving “tokens” in lieu of cash for commissions. Focusing on technology characteristics such as lifecycle tracking and instantaneous status cast blockchains in a more positive light.

All digital currency is public, but not all blockchains are public

Digital currency systems are public by definition. That is, open participation is welcomed. Not all blockchains need to be public though. For this to work in real estate, blockchains need operate as a private, closed network.

Digital currency is proprietary, but not all blockchain are proprietary

There is a slightly different context to this point from the public versus private point discussed previously. A system can be open and public to participants while keeping the contents proprietary. Participants cannot change the definitions used by the system.

When new technologies are introduced, there is a rush to create proprietary solutions. Digital currency experienced this phenomenon because of the monetary aspects of their solutions. Advocating that open standards govern blockchains improves long-term acceptance and usage.

Blockchains are decentralized

There are two different points of view in the industry regarding centralization. You are either for it or against it. Blockchains are decentralized, but without the downsides that decentralization bring using today’s approaches.

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The problem with decentralized data models today is keeping them “in sync” with each other. Any autonomy or convenience advantages need to be weighed against integrity concerns. Timeliness and accuracy concerns are founded in reality.

Those fearing centralization cite distrust of the operating party as a concern. Choice is a freedom that diminishes in a centralized system. Centralized systems work well if the information structure is less likely to change and there is no pressure to innovate.

Blockchains have the innovation elements of decentralization while maintaining the integrity of centralized solutions.

References

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Acknowledgements

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