

U.S. Homebuilding

THEME

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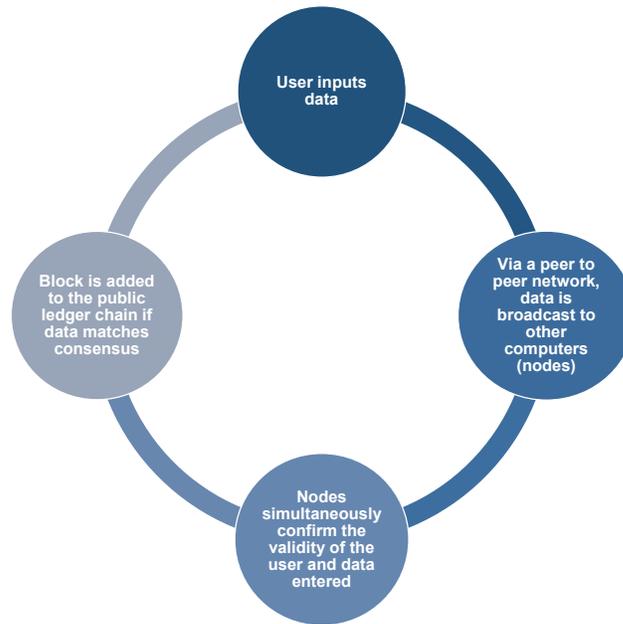
Beyond Bitcoin: Blockchain as a Real Estate Game-Changer

- **What's the Next Frontier? A Primer on Developing Technologies:** Blockchain technology continues to evolve and is becoming a greater focus for governments and companies including those in residential and non-residential real estate. Among the areas this development could revolutionize are: 1) property ownership, 2) increased transparency (including asset prices), and 3) the rising use of smart contracts. Given its ability to reduce costs, remove information asymmetry and increase operational efficiency, we seek to define and better understand what it could mean for the industry. Although we acknowledge that blockchain won't change the course of near-term events, we believe it will play a greater role over time.
- **Real Estate and Blockchain—What Makes Them a Good Fit:** Among the ways this technology differs from legacy processes is its tamper resistant and based on peer-to-peer connections. This, in turn, makes it especially impactful in areas where trust is paramount and deals are more complex and expensive as a result of the number of individuals involved in a given transaction. Over time, blockchain could streamline the purchase and sale of land and buildings as it eliminates human error, prevents data loss, and modernizes an otherwise slow-moving industry. Areas we expect could benefit from its advent include: title registry, land pricing, mortgage payments, and escrow processes.
- **Starting to Put the Blocks in Place:** This report provides investors with an overview of this technology and its ability to transform the real estate sector. We believe it captures the most salient points of the broader blockchain discussion and will help frame the potential impacts it can have. We also provide an overview of our January event, including bios on each of our speakers.
- **Credit Suisse Real Estate Blockchain Seminar:** With this backdrop, we will be hosting a seminar in January on the topic in conjunction with MIT's Center for Real Estate. Discussions will include: 1) an analysis of blockchain fundamentals 2) current issues and inefficiencies in property titles 3) government and legal issues associated with distributed ledger innovation; and 4) new start-up players in tokens and smart contracts.

What Is Blockchain?

Blockchain as defined is a shared ledger requiring consensus to update, designed with tamper-evident properties that make it economically unfeasible for any single entity to retrospectively alter. Said differently, blockchain creates a secure and transparent way to digitally track ownership of assets. The key differentiator of this technology is its elimination of the need for a central database, allowing for the transfer of value in the form of a genuine peer-to-peer connection.

Figure 1: How a Block Is Added to the Blockchain

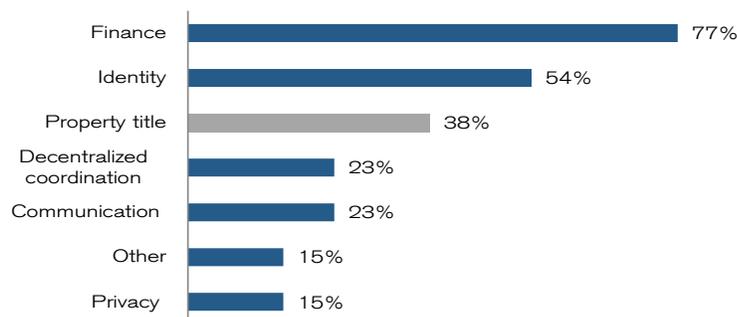


Source: Credit Suisse

Based on the [work done](#) by Credit Suisse’s global software team, translating this to industry applications suggests areas that will be most impacted are those in the business of selling trust and those with the greatest transactional friction. This goes on to imply that the technology can allow for:

- Reduced costs, greater efficiencies, and new revenue development opportunities
- Disintermediation of incumbents
- Other possible avenues that have yet to be thought of or created

Figure 2: Blockchain Thought Leaders’ Expectations for Impact

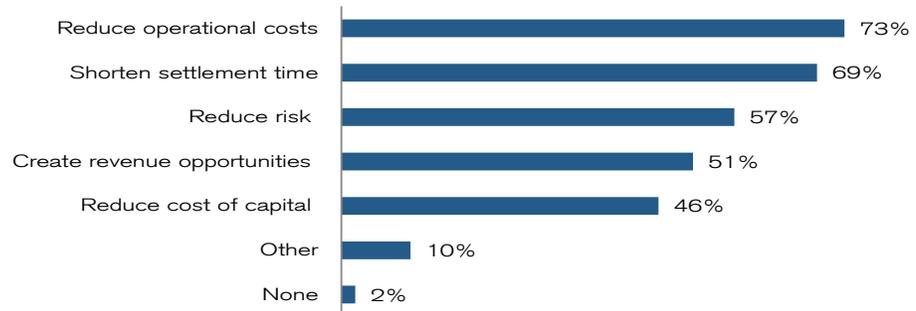


Source: Bitcoin and Blockchain Thought Leaders Annual Survey, Credit Suisse

Blockchain and Real Estate

Applying these factors to real estate—an industry that has undergone little change to date—suggests significant new ways of operating could be on the horizon. Although we readily acknowledge that this won't change the course of near-term events (and adaptations within residential construction are likely to come even later), we believe blockchain will play a greater role over time. Our view is formed by the need for businesses to adjust for higher land and input costs as well as to adapt to secular shifts in the construction labor force, notably in specialized trades where an aging workforce is most apparent.

Figure 3: Main Benefits of Blockchain Technology



Source: Greenwich Associates 2016 Blockchain Adoption Study, Credit Suisse

With this backdrop, researchers at MIT's Center for Real Estate have identified several ways blockchain is poised to revolutionize real estate:

- **Property ownership**—Data can be easily discovered and verified, helping to eliminate information asymmetry. It can also provide greater assurance around transfers, deeds, and liens and removes the need for redundant databases.
- **Increased transparency**—We view this as one of the most important changes, as this technology can break through today's very opaque markets. In turn, asset prices—including land—as well as title registrars can become clearer, resulting in smoother and more trustworthy transactions.
- **Smart contracts**—Allows for the elimination of contractual clauses by facilitating, verifying and enforcing performance of agreed upon actions. In turn, things like escrow processes can be automated reducing costs, time and risk, while also providing greater assurance. Said differently, these can be considered "if-then" type situations, with an action automatically taken once certain conditions are met and recorded in the blockchain. Certain obligations are easily replicable, meaning possible uses could be extended, in time, to things like mortgage payments.

Applications Are On the Rise

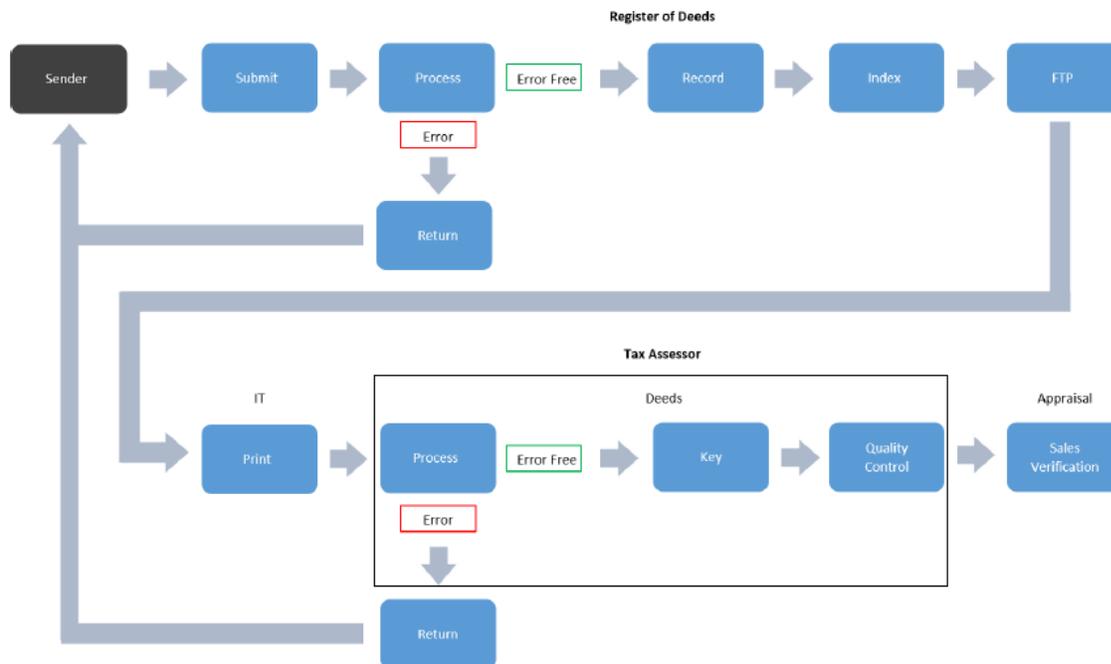
Given the potential benefits, in September 2016 the Illinois Office of the Cook County Recorder of Deeds (CCRD) along with several partners (including the International Blockchain Real Estate Association) announced a pilot program to better understand how it could implement blockchain technology into current law and practice. More specifically, it was designed to study how the department could address problems and inefficiencies related to property records, such as:

- **Complexity of transactions**—The acquisition of a commercial or residential real estate title requires the involvement of a buyer, seller, lawyer for each party, appraiser, lender and counsel, and title insurer. Following the housing market crash in 2008-2009, the federal government enacted additional regulations

intended to protect consumers prior to closing but which also increase a purchasers' dependency on experts to sift through the complexities. As such, the high cost of title insurance premiums reflects the number of employees involved in the process rather than actuarial risk.

- **Human error**—Recording and indexing transactions at the CCRD requires manual employee labor, specifically the examination and retyping of information found on a scanned image. Mistakes in this process, or in the original submission, can render a document, which represents a valid claim to property, useless and impossible to search for in the public record.
- **Loss of data**—Not all Recorder of Deeds Offices possess the resources to back up their databases. Fires, natural disasters and direct database failures can cause the loss of entire recorded title claim histories. Further, as cyberattacks grow in number and severity, the real estate sector faces mounting security pressures. Altered or stolen records could potentially erode trust in the government system.
- **Technological stagnancy**—Many counties across the country still operate on a paper-only recording system. The most advanced offices have adopted a hybrid system that combines handwritten material and paper documents with image scanning and typing of information. These operating models are inefficient and have failed to keep pace with modern times.

Figure 4: Sample Current Workflow for Recording Titles at a Recorder of Deeds Office



Source: Avi Spielman - "Blockchain: Digitally Rebuilding the Real Estate Industry"

Although it remains early, the CCRD has been able to successfully use elements of this technology to streamline the property records system and will continue to work to implement it into a new land records system being put in place. Blockchain forms a secure and immutable transaction history on a decentralized database, allowing for disaster recovery and eliminating human error through transaction consensus.

Other cities and states, including those with top 20 housing markets, are also in various stages of passing, implementing, or studying blockchain laws. Among them are:

- **Arizona**—In March, the governor signed a groundbreaking bill (HB 2417) aimed at clarifying some of the enforceability issues associated with blockchain and smart contracts, especially as it relates to the sale or transfer of goods, leases, and some documents of title. Said differently, it establishes blockchain as a usable format for smart contracts. The legislation allows local municipalities to use this technology in place of conventional methods for recording property ownership and sales.
- **Nevada**—Similar to Arizona, this state passed a law in June recognizing blockchain technology as a type of electronic record.
- **Vermont**—The state enacted a law last year allowing for the authentication of a blockchain real-estate transaction. Local towns are now exploring ways to incorporate this into their operations.

Other states are also doing work on the subject in a range of areas and ways. In turn, this could place the traditionally slow-moving real estate industry at the forefront of innovation and efficiency.

CS & MIT Real Estate Blockchain Seminar

On January 16, we will be hosting a half-day Real Estate Blockchain Seminar along with MIT's Center for Real Estate, providing investors with insights to the practical applications of this technology. Our line-up includes practitioners, innovators and thought leaders:

- **Avi Spielman**—Mr. Spielman is an author and frequent lecturer specializing in the evolution of blockchain technologies and their applications for the real estate industry, including the white paper *Blockchain: Digitally Rebuilding the Real Estate Industry*. He also serves as an advisor to Ubitquity LLC., the first blockchain platform intended for real estate recordkeeping. Currently, he oversees development and property management interests in middle Tennessee as the Founder of Joon Properties. He holds a bachelors in Philosophy from Vanderbilt University and a Master's of Science in Real Estate Development from the Massachusetts Institute of Technology.
- **Sandy Selman**—Mr. Selman is the co-founder of CryptoProperties LLC (*CPROP*) which has a stated long-term goal of using blockchain to end transactional inefficiencies, improve the title documentation process, and reduce risks associated with inaccurate or fraudulent mortgage related documents. In addition, he is the co-founder and CEO of Sanus Connect Inc. which uses disruptive cloud-based technology to enhance the operating efficiency of large, multi-tenant properties. He holds a bachelors in Mechanical Engineering from Worcester Polytechnic Institute and a MBA in Finance & Investments from The George Washington University.
- **Lewis Cohen**—A Partner at Hogan Lovells LLP, Mr. Cohen concentrates on International Structured Finance as well as disruptive technologies including blockchain, distributed ledgers, smart contracts and cryptocurrencies. He provides unique insights on the legal issues domestic and foreign government's stand to face as blockchain is more widely adopted. Mr. Cohen holds a bachelors in Philosophy from Clark University and a JD from the Cardozo School of Law.
- **Drew Hinkes**—Mr. Hinkes is a Partner at Berger Singerman on the Dispute Resolution Team, an adjunct Professor at New York University, and a cited authority on Virtual Currency issues. He has written more than 20 articles on blockchain and associated technologies, including *Blockchain and Title: The Distant Frontier* for the American Land Title Association. Mr. Hinkes is also a member of Blockchain Beach, a non-profit focused on cultivating entrepreneurial attention to bitcoin and blockchain. He holds a degree in History from Washington University in St. Louis and a JD from the University of Miami.

- **Steve Weikal**—As the Head of Industry Relations at the MIT Center for Real Estate, Mr. Weikal is responsible for managing relationships between the Center and its network of industry partners and nearly 1100 alumni across 43 countries. Mr. Weikal is a lecturer and researcher on innovative real estate technology as well as the founder of MIT Real Disruption, a successful series of conferences discussing the impact of emerging technology on the industry. He holds a Master's of Science in Real Estate Development and a Master's in City Planning from the Massachusetts Institute of Technology, along with a JD from Suffolk University. Mr. Weikal is a licensed attorney and real estate broker as well as an advisory board member of three real estate tech start-ups.
- **Emmanuel Aidoo**—As a Director in the Global Markets Division at Credit Suisse, Mr. Aidoo leads the Blockchain and Distributed Ledger Practice. In his 18 years of experience at the bank, Mr. Aidoo has established himself as an intrapreneur capable of building a variety of complex platforms. His prior roles include Global Head of Debt Capital Markets Technology, Global Head of Leverage Finance Technology and Global Head of Fixed Income Solutions Delivery. He holds a Computer Science degree from Brunel University in London.

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