

# Blockchain and the Future of the Commercial Real Estate Industry

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## **About the Author**

In June 2019, Jason Turetsky received his MBA with Distinction from NYU Stern with specializations in Real Estate, Quantitative Finance, and Business Analytics. During the program, Jason was awarded the W. Edwards Deming Award for a distinguished student demonstrating excellence in Statistics and the merit-based Franck A. Ruimy Scholarship for a student specializing in Real Estate. Jason received a B.A. from Princeton University's Woodrow Wilson School of Public and International Affairs and earned an M.A. in Middle Eastern Studies from the University of London's School of Oriental and African Studies (SOAS).

This paper was submitted as his final paper for the Spring 2019 semester of Professor David Yermack's class "Digital Currencies, Blockchains, and the Future of Financial Services."

## **Introduction**

As an MBA student at NYU Stern, I serendipitously enrolled in “Real Estate Transactions” and “Digital Currencies, Blockchains, and the Future of Financial Services” in my final semester. While I did not expect the classes to have much, if anything, in common, I was surprised to find attending these classes each week felt like an ongoing conversation. “Real Estate Transactions” would put forth a problem and “Blockchains” would surprisingly respond with the innovations that may soon provide the solution. The former often described the challenges and complexities of an industry with high transaction costs, too many intermediaries, difficult due diligence, and more fraud than I expected. The latter presented how blockchain technology offered an immutable, distributed ledger that will soon revolutionize the financial services industry as we know it, replacing many trusted third parties with a peer to peer network that offers increased “transparency, traceability, accessibility, and enhanced security.”<sup>1</sup> Many standard practices in commercial real estate have felt antiquated for some time now, but the industry is notoriously slow to integrate new technologies. Is blockchain the technology that will bring commercial real estate to the 21<sup>st</sup> century? Will blockchain provide incremental improvements in efficiency or a total disruption of the space as we know it?

These questions will be addressed by first discussing the potential for disruption in the commercial real estate industry, then defining blockchain, next examining some of the major ways blockchain is prone to disrupt the industry through more efficient property search; faster more accurate due diligence; cheaper, more transparent property management; and simpler, more secure title management. Finally, the paper will look at some of the obstacles to the implementation of blockchain-enabled technologies in real estate.

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<sup>1</sup> Agoni, Hazel. “Blockchain Set to Change the Face of Commercial Real Estate As We Know It.”

## **Potential for Disruption of the Commercial Real Estate Industry**

While there are many aspects of financial services that will look very different in the near future, the potential disruption of the real estate industry may have one of the most significant impacts on the U.S. economy specifically but the global economy more generally, due to both the tremendous size of the real estate sector as well as the surprising inefficiencies in all commercial and residential real estate transactions.

Real estate constitutes an almost unfathomable proportion of global wealth. As of 2015, global real estate was estimated to be worth approximately \$217 trillion. Compare this number to \$150 trillion in global equities and debt securities, \$74 trillion in global GDP, and the \$6 trillion “total value of all gold mined, ever,”<sup>2</sup> and this number becomes even more mind-boggling. Real estate also makes up a significant component of individual assets and liabilities: as of 2014, residential and commercial real estate make up between 60 and 70 percent of individual wealth and mortgages are the largest component of individual debt, constituting almost three-fourths of household liabilities.<sup>3</sup> Clearly, any technological innovation that disrupts the way real estate is transacted and securitized would have a major impact on the financial system as a whole simply due to the surprising scale of this sector.

Despite the magnitude and importance of real estate to domestic and international financial systems, transacting in real estate relies on an inefficient, antiquated system of record keeping, necessitating many intermediaries and high transactional costs. In commercial real estate especially, there are high costs associated with the third parties needed to determine questions as basic as who owns the real property, if liens exist against the real property and potentially reduce its value, who are the mortgage lenders, have air rights been transferred to or

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<sup>2</sup> Gupta, Arpit. “Real Estate Capital Markets: Course Introduction and Real Estate Price Dynamics.”

<sup>3</sup> Ibid.

from the property, are there easements, ground leases or other restrictions that limit the use of the property?<sup>4</sup> A buyer of commercial real estate has to commit time and resources to preliminary due diligence before third parties like lawyers and others become involved.

Transferring ownership of real property still involves a physical deed that that must comply with “various formalities...to be legally binding and recordable,” including delivery to the buyer of a written document that contains the notarized signature of the seller.<sup>5</sup> While not legally required, almost all deed transfers are recorded in the appropriate public office, usually the property records office of the county in which the property is located, in order to “make [the deed] a matter of public record...putting the ‘world on notice’ that...the new buyer is the owner.”<sup>6</sup> Other documents, such as mortgage documents, may also be recorded for the same reason.

Recordation solves some problems but creates others that would be easily solvable with technology. For example, in most states, “the party who is the first to record a deed generally have priority over the party who later files a deed from the same seller for the same property—even if the first to file is not actually the first to have closed on the purchase of the property.”<sup>7</sup> This represents an unsatisfactory solution to the problem of a seller mistakenly or purposefully selling the same real property to multiple buyers, similar to the “double spend” problem already solved in the world of digital currencies like bitcoin through blockchain technology.<sup>8</sup> Furthermore the recordation process “presents opportunities for abuse and mistakes” with the clerk at the local governmental office performing only a “very cursory review” as the office

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<sup>4</sup> Calderon, Jeanne and Friedland, Gary. “Real Estate Transactions: Title, Title Insurance, and Closing Costs.”

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

<sup>8</sup> Khatwani, Sudhir. “What Is Double Spending & How Does Bitcoin Handle It?”

likely has “no method to detect forgeries” beyond simply “checking that a grantor’s signature was notarized.”<sup>9</sup> The lack of security and potential for abuse in this step of the process are also likely to be addressed by blockchain technologies in the near future. Matters are further complicated by the fact that “title condition or status of the real property is not based solely on the deed” as there could be other “current claims or liabilities against the property held by someone other than the fee owner.”<sup>10</sup> These encumbrances, including liens, easements, and deed restrictions generally reduce the value of the property and must also be recorded in the relevant local government office. Unpaid liens “run with the property” and become the responsibility of subsequent owners but are sometimes difficult to track. In addition to the obvious recordable mortgage lien, many other types of liens exist including but not limited to real property tax lien, mechanic’s liens, broker’s liens, judgment liens, and federal tax liens.<sup>11</sup> This additional layer of complexity provides further potential for unintentional mistakes and abuse.

Not only does recordation provide a far inferior solution to problems plaguing the real estate industry compared to a technology like blockchain, but it is also an unnecessarily expensive solution. For example, to record a mortgage in New York City, between the buyer and seller, there is a mortgage recording tax of 2.175 percent for residential mortgages above \$500,000 and 2.8 percent for commercial properties.<sup>12</sup> This represents a substantial amount when considering how large the price tag is for commercial properties (e.g. \$280,000 mortgage recording tax on a \$10 million dollar commercial property). As mentioned, this price for recording does not solve all the buyer’s problems. Significant title research is still necessary

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<sup>9</sup> Calderon and Friedland. “Real Estate Transactions: Title, Title Insurance, and Closing Costs.”

<sup>10</sup> *Ibid.*

<sup>11</sup> *Ibid.*

<sup>12</sup> “The Mortgage Recording Tax in NYC.” *Hauseit.*

during the due diligence process as is title insurance, another real estate expense that appears a prime candidate for disruption.

In property law, title refers to the bundle of rights in which a party may own an interest in a piece of real property. Title insurance is typically purchased by the buyer and/or lender to “indemnify the insured against financial loss from defects in title existing as of the closing date; to indemnify an insured that is a lender against the invalidity or unenforceability of the mortgage; and to defend against a lawsuit attacking the title—title insurance company pays the attorney’s fees to defend an action.”<sup>13</sup> Title insurance for a commercial property represents another inefficient third party expense in a real estate transaction. Title insurance essentially protects against claims that will likely no longer be as much of a risk once the industry innovates. With blockchain technology, many of these title issues would not exist in the same way, including but not limited to: someone owning an undisclosed interest in the sold property, the deed not being properly notarized, an existing unpaid mortgage not disclosed, a defect in the chain of title even before the current seller sold the property, etc.

Compared to title issues in many other countries, however, these issues for the U.S. real estate industry may seem small. Most countries lack a robust system of rights when it comes to real property.<sup>14</sup> For example, in India, “land titles are presumptive rather than conclusive,” creating major public policy issues that affect society at large, not just the real estate industry. Without a trustable land registry, two-thirds of pending cases in India’s courts consist of disputes related to property.<sup>15</sup> Transactions in real estate in India require bribes to move transfers through the system that can take up to three months to navigate.<sup>16</sup> These types of time and cost

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<sup>13</sup> Calderon and Friedland. “Real Estate Transactions: Title, Title Insurance, and Closing Costs.”

<sup>14</sup> Auxledger. “Rajasthan To Roll Out Blockchain Technology For Land Records.”

<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

inefficiencies are already starting to be disrupted. Looking beyond India, the magnitude of this problem from both financial and public policy perspectives becomes clearer. Innovation in this area could help unlock the approximately \$20 trillion in what Hernando de Soto calls “dead capital.”<sup>17</sup> Much of this wealth is in real estate “not reliably registered or secured by a robust legal system.” Not only does the absence of property rights “deprive people of access to wealth and credit,” but it also “increases vulnerability of property when political regimes change.”<sup>18</sup> Innovating in how real estate is transacted will likely have some of the most powerful impacts on the lives of those where legal protections related to property rights are the weakest.

Another friction for real estate transactions is that up to 80 percent of home buyers use an intermediary to find their home and are charged up a fee of up to 6 percent for this intermediation.<sup>19</sup> This represents an additional \$60,000 in fees to a third party required on a million-dollar home. Commercial brokerage fees are a lower percentage than for residential properties despite being more complex because purchase prices are generally so much higher that the fees still come out to a large amount in absolute terms.<sup>20</sup> Even without blockchain, finding a home without the assistance of a broker has become easier with online resources like Zillow and CoStar. However, even with the increase in digital resources, much of the information is “hosted on disparate systems, which results in a lack of transparency and efficiency, and a higher incidence of inaccuracies...[and] fraud.”<sup>21</sup> Big players in the commercial real estate industry are incentivized to keep certain information secret, such as “comparable lease rental rates, property prices, and valuations, to create a possible competitive advantage.”<sup>22</sup>

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<sup>17</sup> Yermack, David. “Digital Currencies, Blockchains, and the Future of Financial Services: Blockchains in the capital markets.”

<sup>18</sup> Ibid.

<sup>19</sup> National Association of Realtors Research Department. “Real Estate in a Digital Age: 2017 Report.”

<sup>20</sup> Calderon and Friedland. “Real Estate Transactions: Role of Brokers.”

<sup>21</sup> Deloitte Center for Financial Services. “Blockchain in Commercial Real Estate.” p. 2.

<sup>22</sup> Ibid.



Another challenge for the real estate industry is fraud. Despite the U.S. legal system being relatively well equipped to deal with fraud compared to many other countries' systems, the industry is "rife with fraud," with an increase of 480 percent in "real estate fraud complaints filed in 2016" with the FBI's internet crime complaint center.<sup>23</sup> Fraudulent activity targets all players in real estate transactions, including buyers, sellers, brokers, lawyers, title companies.<sup>24</sup> Such criminal activity is "aided by the rarity of trusted platforms where real estate documents can be verified,"<sup>25</sup> and such fraud represents another additional cost and misuse of the status quo in this industry.

### **What is Blockchain?**

Blockchain is a distributed database in which irreversible "transactions are broadcast, and every node is creating their own updated version of events."<sup>26</sup> While blockchain is most closely associated with digital currencies such as bitcoin, the technology could prove revolutionary for any financial system that necessitates trusted series of records, that is, not just payment systems but also securities, real estate, commodities, and more. As a "decentralized, open network [that] allows economic agents to interact directly on a peer-to-peer basis," blockchain operates without trusted third parties to verify transactions.<sup>27</sup>

The primary inefficiencies in real estate markets distill down to problems with the "trusted third party," exactly the challenges blockchain addresses. Ultimately, trusted third parties are corruptible, charge monopolist transaction fees, are able to change the ledger to

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<sup>23</sup> Agoni. "Blockchain Set to Change the Face of Commercial Real Estate As We Know It."

<sup>24</sup> Federal Bureau of Investigation (FBI). "Business E-mail Compromise: The 5 Billion Dollar Scam."

<sup>25</sup> Agoni. "Blockchain Set to Change the Face of Commercial Real Estate As We Know It."

<sup>26</sup> "What Is Blockchain Technology?" *CoinDesk*.

<sup>27</sup> Yermack. "Digital Currencies, Blockchains, and the Future of Financial Services: Emergence of Digital Currencies and Blockchains."

rewrite history, serve as a single point of failure, control customers' data, and can unfairly ration access.<sup>28</sup> Blockchain addresses many of these issues, not limited to within real estate transactions.

The technology was originally devised to address the problem of how to create a “digital time-stamping of...documents so that it is infeasible for a user either to back-date or to forward-date his document even with the collusion of a time-stamping service” in a way that maintains “complete privacy of the documents themselves, and requires no record-keeping by the time-stamping service.”<sup>29</sup> Haber and Stornetta’s eloquent solution was applied initially to “intellectual property matters, [as] it is sometimes crucial to verify the date an investor first put in writing a patentable idea, in order to establish its precedence over competing claims.”<sup>30</sup> Satoshi Nakamoto built on Haber and Stornetta’s work, incorporating the idea of crowd sourcing through a network that anyone can join where “network members compete to create new blocks” and are rewarded for doing so faster than others.<sup>31</sup> However, “securing property rights in digital assets” by “sequentially arranging records in a chain using hash codes” to construct “an indelible ledger” that through “crowdsourcing via wide distribution of the ledger” as an “alternative to a trusted third party”<sup>32</sup> has the potential to address analogous challenges for real property rights. Furthermore, because of the relatively small number of transactions for each piece of real property, incorporating blockchain technology into the real estate space “does not have the proof-of-work problems found in areas such as payments.”<sup>33</sup>

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<sup>28</sup> Yermack. “Digital Currencies, Blockchains, and the Future of Financial Services: Emergence of Digital Currencies and Blockchains.”

<sup>29</sup> Haber and Stornetta. “How to Time-Stamp a Digital Document.” p. 0.

<sup>30</sup> Ibid. p. 1.

<sup>31</sup> Yermack. “Digital Currencies, Blockchains, and the Future of Financial Services: Blockchains and Mining.”

<sup>32</sup> Yermack. “Digital Currencies, Blockchains, and the Future of Financial Services: Emergence of Digital Currencies and Blockchains.”

<sup>33</sup> Yermack, David. “Digital Currencies, Blockchains, and the Future of Financial Services: Blockchains in the Capital Markets.”

## **Where can Blockchain Disrupt Commercial Real Estate Transactions?**

Blockchain technology has the potential to transform not just one aspect of the real estate transactions process, but rather the entire industry wholesale. Because the potential for disruption of the real estate industry is so great, it is helpful to look at specific aspects of the property lifecycle and where blockchain could have the biggest impact. When it comes to commercial real estate transactions, blockchain-based technology has myriad applications in both leasing and purchasing/selling properties.

### *Blockchain and the Leasing of Property*

The leasing process suffers from reliance on difficult, fragmented property searches, elongated “paper-driven” due diligence processes, inefficiently managing “lease agreements, property operations, and cash flows” and unnecessarily slow decision making due to “absence of real-time rich data.”<sup>34</sup>

Commercial real estate owners can mitigate some of these challenges by employing blockchain technology at five primary points during a leasing transaction. Deloitte identified these five points as improved search through blockchain-enabled multiple-listing services (MLS) system where the property owner and potential tenants list all their requirements; more transparent pre-lease due diligence using smart identities of individuals and properties using the blockchain in which the owner can perform a background check on the potential lessees and the lessee can see the property’s previous transactions and liens; more efficient lease agreements and instant recording utilizing smart contracts to place the key terms of a lease on the blockchain

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<sup>34</sup> Deloitte Center for Financial Services. “Blockchain in Commercial Real Estate.” p. 4.

where the smart contract transfers access to the property in exchange for some initial payment; more automated payment mechanisms through the smart contract in which timely rent payments are sent from the tenant to the owner and upon the end of the lease term, the smart contract transfers the security deposit to the appropriate party; and finally as more and more payments and transactions are recorded on the blockchain along with the digital identities of people and properties, owners and lessees can routinely conduct data analysis in real time.<sup>35</sup>

### *Blockchain and the Purchasing and Selling of Property*

Similarly, the purchase and sale of commercial real estate also is plagued by reliance on inefficient, fragmented property searches and elongated “paper-driven” due diligence processes. However, buying and selling properties has the additional complexities and inefficiencies of high costs related to title and lien recording difficulties, risks related to fraud, and “slow, expensive, and opaque financing mechanisms and payments” especially in international transactions.<sup>36</sup>

Commercial real estate owners can mitigate some of these challenges by employing blockchain technology at five primary points during a purchase and sale transaction. Deloitte identified these five points as improved search through a blockchain-enabled MLS; more reliable data from a property’s digital identity on the blockchain to perform more accurate underwriting and financial modeling; more transparent due diligence for the buyer and mortgage lender through blockchain-based digital identities and title registry, including everything from environmental risks, relevant zoning regulations and air rights, chain of title, etc.; and final review, signing, and execution of a smart contract between buyer and seller as well as a digitally associated contract between buyer and mortgage lender in which the lender transfers sale

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<sup>35</sup> Deloitte. “Blockchain in Commercial Real Estate.” p.6.

<sup>36</sup> Ibid. p. 7.

proceeds to an escrow account, sale proceeds from the escrow account are transferred to the seller, the property's title is transferred to the buyer, a mortgage lien is placed on the property, the transfer of title from the seller to the buyer is recorded on a new block on the blockchain, and regular loan repayments to the lender from the buyer are facilitated by the smart contract.<sup>37</sup>

How will the integration of blockchain technology impact these pain points in the real estate lifecycle? Transforming the experience for tenants, landlords, property owners, property buyers, lenders, investors, brokers, and attorneys, the primary areas of impact for both leases and sales are leveraging blockchain-enabled technologies for more efficient search, faster more accurate due diligence, cheaper more transparent property management, and simpler, more secure title management.

### *More Efficient Property Search*

While a number of websites have made real estate data more accessible, real estate brokers still have a monopoly on the crucial type of information that may soon become much more widely available, and even much of this information is not always updated, accessible, or correct. Through the price of a subscription, one can access multiple listing services (MLS), a database of property-level information maintained by real estate brokers. Despite the high fees for access to such information, MLS platforms rely on unstandardized processes and human updating. Not only is the information often not accurate, outdated, or incomplete but the data is spread across hundreds of MLS platforms. While the National Association of Realtors claims brokers “have spent millions of dollars to develop MLS and other real estate technologies that

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<sup>37</sup> Deloitte. “Blockchain in Commercial Real Estate.” p. 9.

make the transaction more efficient,” the organization also notes there are over 800 MLS platforms.<sup>38</sup> These different systems “are not built to communicate with each other” which necessitates brokers posting the same listing on multiple MLS sites and “every time a person is needed to post, repost, update a post, change a post, and remove a post across multiple mediums, the chances of inaccurate information, misinformation, outdated information, or conflicting information increases geometrically.”<sup>39</sup> Due to this proliferation of errors, “misinformation is often passed on to buyer, brokerages, and other intermediaries creating delays in decision-making for both landlords and tenants and heightening mistrust about the quality of information available on MLS systems.”<sup>40</sup>

A blockchain-based universal MLS could ensure access to more real-time data subject to less human error, presumably at a much lower cost, though some sort of “user-fee or a transactional fee will still always be necessary” as compensation for “multiple parties (miners) perform[ing the] reconciliation processes (mining).”<sup>41</sup> However, such a comprehensive blockchain-based technological solution is likely still far in the future. A more realistic intermediary step is a utilizing blockchain to create a “database protocol upon which MLS SaaS (service-as-a-software) providers, such as Dotloop or CoStar, could build...’chain-based’ applications...[that could] communicate and reconcile with each other...working off the same operating protocol.”<sup>42</sup> While not the comprehensive solution blockchain enthusiasts envision, creating such a database protocol that various MLS SaaS providers could use would mark a great improvement over the current situation in which hundreds of MLS platforms run on different

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<sup>38</sup> National Association of Realtors. “Multiple Listing Service (MLS): What Is It?”

<sup>39</sup> Spielman, Avi. “Blockchain and Commercial Real Estate.” p. 6.

<sup>40</sup> Verma, Urvashi. “Why blockchain is the next big disruptor in commercial real estate.”

<sup>41</sup> Ibid. p. 7.

<sup>42</sup> Ibid.

database protocols and “literally speak different languages”<sup>43</sup> creating significant inefficiencies that could be directly addressed through blockchain technology.

Companies are already working to be the first to truly disrupt the broken property search process. One example is Imbrex, which is working on using the Ethereum blockchain to create a listing platform that “decentralizes and encrypts data,” directly connecting buyers and listing agents and using “digital tokens instead of money to create more transparency and minimize obstacles” in real estate transactions.<sup>44</sup> Unlike the current MLS system, where the third party running the platform gains control of brokers’ valuable listing data, Imbrex “does not take ownership of your data, you control how it’s shared” through a “decentralized architecture [that] results in lower costs and true connectivity” through a “globally accessible network.”<sup>45</sup> Imbrex “build[s] on systems that are akin to public utilities, establishing a new method for data portability, where agents, firms, and MLSs can easily migrate information between systems and provide quality listing data to buyers.”<sup>46</sup>

### *Faster, More Accurate Due Diligence*

While it is hard to imagine the end of commercial real estate’s “paper-heavy and human-heavy paradigm that we have currently learned to live with,”<sup>47</sup> blockchain’s most significant impact on the industry may be in the unnecessarily long and complicated due diligence necessary for these types of transactions. Both leasing and sales transactions require verifying “physical documents and proof of identity such as those supporting the history of ownership, a tenant or

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<sup>43</sup> Verma. “Why blockchain is the next big disruptor in commercial real estate.”

<sup>44</sup> Daley, Sam. “17 Blockchain Companies Boosting the Real Estate Industry.”

<sup>45</sup> Imbrex “About: Imbrex”

<sup>46</sup> Ibid.

<sup>47</sup> Ray, Jason. “Blockchain and CRE: It's All About Speed To Transact!”

buyer's income, occupancy history, and repairs and maintenance records" as well as reviewing leases and purchase and sales agreements upwards of 200-300 pages in length.<sup>48</sup> Manually processing the data in such an enormous amount of paperwork, reviewing signatures, etc. creates a situation in which human errors are common and can be costly, information is siloed or lost, and due diligence takes significantly longer than it should. The industry accepts that the due diligence process related to financial, environment, and legal issues can take months and requires a number of third parties (e.g. title insurance companies, environmental assessment experts, highly-specialized attorneys, etc.) that increase transaction related costs. Furthermore, many aspects of due diligence performed by the buyer will likely need to be repeated by the lender when a mortgage is used to purchase a property, leading to further duplication of efforts and elongating the time it takes to close.

Blockchain-enabled verification could accelerate the current due diligence process from underwriting to securing a mortgage, etc. This is already beginning to happen on a smaller level as commercial real estate market participants begin creating digital identities for real estate properties that "consolidate information such as vacancy, tenant profile, financial and legal status, and performance metrics in digital form," and combine this with blockchain technology to mitigate the error-prone and unnecessarily elongated due diligence process presented by obtaining, verifying, and examining so many paper documents.<sup>49</sup> As explained by audit, tax, and consulting firm RSM's principal who specializes in blockchain and digital assets, this technological advance will likely be gradual: "Blockchain's impact on the commercial real estate

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<sup>48</sup> Verma. "Why blockchain is the next big disruptor in commercial real estate."

<sup>49</sup> Deloitte. "Blockchain in Commercial Real Estate." p. 12.



industry will not happen right away, and there won't be any sort of big bang, but these changes will begin to happen bit by bit over time.”<sup>50</sup>

For example, telecom company Telia's digital identity technology was used to digitally register and verify individuals in ChromaWay's blockchain-based app used by the Swedish Land Registry, the Lantmäteriet's, pilot project. Real estate transactions in this system are encoded in the blockchain the “moment an agreement to sell is reached and remain until the land title is transferred...limit[ing] information asymmetries by allowing all parties—banks, land registry, brokers, buyers, and sellers—to monitor the progress of the transaction” and potentially save more than €100 million a year.<sup>51</sup> ChromaWay decided for its innovation to work through permissioned writing to the blockchain and open-access reading on the blockchain for relevant parties (e.g. buyers, sellers, brokers, tax collectors) in a way that complies with Swedish laws regarding transparency and privacy.<sup>52</sup> The app relies on open-source code, and metadata regarding covenants, etc. is stored separately from the blockchain.<sup>53</sup>

Once apps like ChromaWay's become more widespread, buyers and sellers will simply log on, relevant brokers and banks will be appointed and due diligence by relevant parties will be accomplished digitally, the contract will be signed using digital verification, funds will be transferred, and the property title will be transferred from seller to buyer, reflecting the change in title on the app in a visible way.<sup>54</sup> Even with a single national agency authenticating property titles, 9 percent of applications in Sweden are rejected for errors. The United States fares much

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<sup>50</sup> Lerman, Tara. “Commercial Real Estate Prepares For The Era Of Blockchain.”

<sup>51</sup> McMurren, Juliet, et al. “Addressing Transaction Costs Through Blockchain and Identity in Swedish Land Transfers.”

<sup>52</sup> Yermack. “Digital Currencies, Blockchains, and the Future of Financial Services: Blockchains in the Capital Markets.”

<sup>53</sup> Ibid.

<sup>54</sup> Deloitte. “Blockchain in Commercial Real Estate.” p. 13.

worse at 30 percent,<sup>55</sup> and could surely benefit even more from implementing such technology, but an analogous solution would be difficult to develop on a nation-wide scale due to a fragmented system which differs by county. That being said, there is certainly interest. In 2017, Cook County, Illinois began investigating how blockchain could expedite and improve accuracy for recording deeds, and a similar pilot program was begun in Vermont in early 2019.<sup>56</sup> South Burlington's City Clerk office collaborated with real estate tech company Propy to move deeds to the blockchain.<sup>57</sup> While such technological improvements are in their early stages, pre-lease and pre-sale due diligence will certainly be faster, more secure, less duplicative, and less error prone, as key participants in commercial real estate begin slowly but surely incorporating blockchain technology in this way.

#### *Cheaper, More Transparent Property Management*

Managing leases, operating expenses, and income for large commercial properties can be extremely complex and requires “numerous payment and service transactions that need to be executed, tracked, and recorded on a regular basis”<sup>58</sup> as well as confirmed by auditors, regulatory agencies, appraisers, and banks underwriting mortgages. Even leases for commercial property are not as simple as they seem. Negotiating lease terms can be complex, time-consuming, and expensive and executing the lease requires constant management and enforcement. Every aspect of commercial real estate leases “from routine rent collection to eviction proceedings” represents opportunities for streamlining.<sup>59</sup> Smart contracts provide a blockchain-based improvement on

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<sup>55</sup> Yermack. “Digital Currencies, Blockchains, and the Future of Financial Services: Blockchains in the Capital Markets.”

<sup>56</sup> Lerman. “Commercial Real Estate Prepares For The Era Of Blockchain.”

<sup>57</sup> Ibid.

<sup>58</sup> Deloitte. “Blockchain in Commercial Real Estate.” p. 14.

<sup>59</sup> Spielman. *Blockchain and Commercial Real Estate*. p. 8.

how leases are currently written, and also will transform various other aspects of property management and cash flow.

Smart contracts are self-executing agreements, automated through blockchain technology, that operate based on “if-then” logic. Smart contract pioneer Nick Szabo describes the benefits of smart contracts as “reducing mental and computational transaction costs” by using “protocols and user interfaces to facilitate all steps of the contracting process... giv[ing] us new ways to formalize and secure digital relationships which are far more functional than their inanimate paper-based ancestors.”<sup>60</sup>

An obvious application of smart contracts in real estate would be the payment of rent automatically if the tenant utilizes the space during a specified month, and the transaction is instantly recorded on the blockchain. However, smart contracts on blockchain platforms could streamline a number of payment systems and greatly simplify property management as well. For example, CBRE, the largest real estate services company, manages 6.1 billion square feet of commercial properties and corporate facilities.<sup>61</sup> The company is already exploring how smart contracts on the blockchain will do more than expedite leasing and sales, but will allow the “self-execution of pre-arranged conditions” through smart contracts to spend less time managing vendor relationships as well as more efficiently documenting the “history of repairs, maintenance, and environmental credentials of a building in perpetuity,”<sup>62</sup> as well eventually storing on the blockchain similar information for assets of the building, such as HVAC units and other expensive equipment requiring significant maintenance throughout its life cycle. Even if blockchain-enabled smart contracts can accomplish even the minimum of what they are expected

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<sup>60</sup> Szabo, Nick. “Formalizing and Securing Relationships on Public Networks.”

<sup>61</sup> “CBRE Group, Inc. Rises To #146 on the Fortune 500” (press release)

<sup>62</sup> “CBRE: Blockchain Promises to Transform How Transactions Are Managed”

to, scaling such solutions over CBRE’s 6.1 billion square feet give some sense of the magnitude of the impending technological changes for even one company.

While large real estate service providers like CBRE are beginning to explore the potential of blockchain technology, tech startups focusing on real estate are already offering smart contracts as a service. For example, Midasium has created its own blockchain for writing smart contracts, a blockchain that is independent (alt-chain, or alternative blockchain), permission-based (participants must be identified and approved to use the system), and consortium-based (only accredited nodes can endorse transactions).<sup>63</sup> Midasium’s contracts use lines of code that “can be converted to a traditional contract form for legal purposes.” The company offers smart contracts that “self-execute and self-enforce” all the traditional agreements of a real estate contract, including “moving funds between bank accounts, transferring property titles, and reconciling payments.”<sup>64</sup> Midasium advertises its smart contracts as trustless, autonomous, and self-sufficient digital contracts that are “tailored specifically for real estate transactions,” as “legally binding and enforceable” as a traditional contract, and involving no cryptocurrency as they “interface directly with banking systems to process payments in real fiat currencies.”<sup>65</sup>

### *Simpler, More Secure Title Management*

As discussed briefly earlier, title management in the real estate industry represents a particularly antiquated process in which there are title insurance expenditures and related costs because of issues with chain of title, lien recording problems, fraud, additional due diligence, and an onerous clearance process. Deloitte notes that in today’s paper-based system, “nearly all real

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<sup>63</sup> “Midasium: The Blockchain of Real Estate”

<sup>64</sup> Ibid.

<sup>65</sup> Ibid.

estate transactions [have] at least one title defect that must be corrected before transferring the title. Additionally, in 25 percent of transactions, title professionals need to take extraordinary action to fix title defects that could impact the buyers' ownership...[and] certain estimates suggest nearly \$1 billion is spent annually on title fraud resolutions."<sup>66</sup> Title insurance to protect against such issues adds to the cost of purchasing properties, and mortgages are more expensive than they need to be since lenders generally undergo another round of due diligence on checking a property's title.

As the transfer of real property is streamlined through smart contracts and away from the current outdated identity verification and document signing process that necessitates a manual closing process, escrow, and recording process, the risk of fraud and document loss can be greatly reduced, increasing all parties' confidence in identity, increasing "efficiency, integrity, and transparency, resulting in reduced cost and enhanced liquidity."<sup>67</sup> Not only can the parties be more confident in the entire process, but auditing and assurance costs can be greatly reduced, increasing efficiency for the real estate transactions process as a whole. Once properties have digital identities on the blockchain, the encryption of data and its distribution requiring several blockchain nodes to approve changes will not only reduce opportunities for fraud but will also make it easier to track liens, easements, and air rights that "run with the land" further reducing title risk.

Once again, the implementation of blockchain technology to disrupt this unnecessarily antiquated aspect of real estate transactions is already beginning. A company called Ubitquity created a platform "meant to be a parallel recording and tracking system to the current legacy paper one." The company is "fully blockchain-agnostic," using permissioned and permissionless

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<sup>66</sup> Deloitte. "Blockchain in Commercial Real Estate."

<sup>67</sup> Smart Contracts Alliance. "Smart Contracts: 12 Use Cases for Business & Beyond"

blockchains to record all relevant information about a property transaction “on a stack that is already interoperable with UTXO [unspent transaction output, used for digital currency transactions to manage the “change” from a transaction] based blockchains.”<sup>68</sup> Ubitquity piloted its Blockchain-as-a-Service (BaaS) platform with the Land Records Bureau in Brazil as well as corporate clients that include real estate title firms but also aviation companies as the company has realized the title applications beyond the real estate industry.

Brazil is an interesting case study from Ubitquity’s work so far. While this paper has focused on the impact blockchain will have on efficiency and transparency for real estate transactions in a country like the U.S., the technology could prove even more revolutionary for a country like Brazil, which “faces a high rate of corruption and fraud especially when it comes to the land titling system” and “the lack of property rights and a missing centralized system for land ownership records has made the system easy to be abused.” In Ubitquity’s pilot project in Brazil, real estate records can be checked against the immutable record on the blockchain “ensuring all parties involved that the records are legitimate.”<sup>69</sup> Startups such as Bitland and Bitfury are doing similar work for Ghana and the Republic of Georgia respectively, and, as mentioned earlier, ChromaWay continues its work in Sweden.

## **Challenges to Disrupting the Industry**

*Cryptoassets: The Innovative Investor’s Guide to Bitcoin and Beyond* cites Clayton Christensen’s work on incumbent firms struggling with technological disruption. Christensen describes how “even the most well managed of firms can fail when confronted with a technology that threatens to disrupt their market...they are often handcuffed when they try to capitalize on

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<sup>68</sup> Ubitquity. “One Block At A Time.”

<sup>69</sup> Ubitquity. “Case Study: Breakthrough In Brazil.”

it.” The incumbent behemoths of the commercial real estate industry are facing disruptive products that may appear, initially at least, to be “subtractive from the company’s existing business line...because it is superior to other products it already offers.”<sup>70</sup> Leaders in commercial real estate sense this and may put off integrating blockchain-based technology for fear of making obsolete other profitable services they offer.

It is not surprising that the real estate industry’s many intermediaries may view with skepticism claims that blockchain technology may soon make aspects of their role irrelevant or no longer as profitable. Mentioned earlier for its openness to investigating blockchain technology, CBRE expresses a surprising level of skepticism about the technology on other company materials. On a different CBRE website, the company notes, “Blockchain offers efficiency and security gains, but may otherwise run counter to a market’s needs” and remarkably even quotes a CBRE “technology expert” as saying “We found it [blockchain] wasn’t solving a real problem...[and] might sometimes go against the best interest of landlords and occupiers.”<sup>71</sup> The larger publicly-traded commercial real estate companies may initially view blockchain-based systems as a threat as they already have entrenched systems and processes. In other words, they are not as nimble as the tech startups innovating in the blockchain space. However, days are numbered for upper management being able to rely on such excuses about adapting to the changing environment around blockchain. Burniske and Tatar write, “the incumbent that avoids developing products that utilize the new technology may be maximizing short-term revenue, but is shooting itself in the foot over the long term.”<sup>72</sup> Even the aforementioned skeptical CBRE page seems to reluctantly admit, “Given broader trends,

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<sup>70</sup> Burniske, Chris and Tatar, Jack. “Cryptoassets: The Innovative Investor’s Guide to Bitcoin and Beyond” p. 264.

<sup>71</sup> Luo, Wei. “Could Blockchain Benefit CRE?”

<sup>72</sup> Burniske and Tatar. “Cryptoassets: The Innovative Investor’s Guide to Bitcoin and Beyond” p. 265

however, blockchain implementation in the mainstream may be inevitable, and CBRE strives to lead such changes.”<sup>73</sup>

That being said, there are initial reasons blockchain technology does pose some risks that large publicly traded commercial real estate companies and small tech startups alike must continue to consider. As with any new technology, there are still security and regulatory issues that blockchain advocates are working to sort out. The SEC and Financial Industry Regulatory Authority have both made public statements warning against “fraudulent activity on blockchain and encouraged people to ask questions before investing or completing a transaction.”<sup>74</sup> While blockchain technology in general is known for its security, each company’s platform is different and not every transaction is necessarily as secure as it may seem.

*Hacked*, a website dedicated to reporting on disruptive technologies, notes, as with any disruptive technology in its early stages, “one of the biggest holdups is the nascent stage of the technology” and describes deciding upon “the proper consensus protocol” as well as processing speed as the most significant challenges holding up blockchain-enabled technology from producing “scalable solutions...accepted by the industry-at-large anytime soon.”<sup>75</sup> *Hacked* hypothesizes that the big players in the industry will gradually incorporate blockchain technology as their clients begin demanding it for specific uses, and while forecasts about adopting new technologies are notoriously bad, the article suggests that “analysts in both the technology and real estate industry tend to agree that it is reasonable to expect widespread adoption within a decade.”<sup>76</sup> The *Commercial Observer*, widely read within the commercial real estate industry, focuses on the legal risks as the biggest challenge to blockchain implementation

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<sup>73</sup> Luo. “Could Blockchain Benefit CRE?”

<sup>74</sup> Lerman. “Commercial Real Estate Prepares For The Era Of Blockchain.”

<sup>75</sup> Bartlett, William. “Blockchain and Real Estate: An Industry Overview .”

<sup>76</sup> Ibid.



rather than the technological challenges, such as how to safeguard users' access to the platform, that is, securing private keys that cryptographically allow a user to access his or her blockchain address. Companies managing the blockchain platforms need to be confident in how they "implement robust information security and cybersecurity policies to mitigate the risks of bad actors hacking the platform."<sup>77</sup>

## **Conclusion**

Despite these challenges, it seems inevitable that the pace will increase at which blockchain-based technologies are employed to address the previously described inefficiencies in commercial real estate transactions. The applications of blockchain seem almost tailor-made to the problems of this industry. At the same time, the industry is notoriously slow to adopt new technologies, as "deals are done a certain way and supported by incumbent systems and processes that have been around for ages."<sup>78</sup> It will be interesting to observe in coming years to what extent and over what time horizon blockchain can overcome this reluctance to change. There are positive signs that real estate companies are more open to embracing technological innovation than they were in the past. For example, funding for real estate tech startups increased 40 percent over the past 5 years.<sup>79</sup> Even Lewis Ranieri, the 72-year-old known as the "father of securitization" for creating the mortgage backed security and his company Ranieri Solutions are partnering with Symbiont to reimagine the mortgage market using blockchain. Ranieri Solutions is looking to use Symbiont's blockchain platform to create a single source of truth for a mortgage throughout its life, automating the terms through smart contracts, preserving information when

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<sup>77</sup> Sherman, Eric and Harris, Marion. "Navigating the Risks of Blockchain Technology in Commercial Real Estate."

<sup>78</sup> Stewart, Tyler. "How Blockchain Will Revolutionize Commercial Real Estate."

<sup>79</sup> Ibid.

mortgages are assigned or assumed, and providing mortgage servicers, investors, regulators, and borrowers with a new level of transparency.<sup>80</sup> Blockchain-related innovation in real estate may come from unexpected places as the industry may not be as reluctant to embrace technology as many suppose.

That being said, some third parties that make a living from the inefficiencies of transacting in real estate as well as larger real estate companies that profit from such services will certainly resist to some extent, but ultimately there is just too much money at stake to ignore the opportunities that will arise from blockchain-based innovations that will make transactions in real property faster, less reliant on intermediaries, more transparent, more automated, and more secure. Blockchain will not solve all the industry's problems, but as the technology continues to improve, there will surely be even more advantages to adopting and scaling blockchain-based solutions. It will be interesting to see the pace at which such innovation is adopted, where in the industry it will have the largest effect, and how such changes, whether incremental or abrupt, ripple through the commercial real estate industry to the financial services industry more broadly and vice versa.

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<sup>80</sup> Govindan, Shivan, Chairman of Symbiont. 1 May 2019. Personal phone interview.

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