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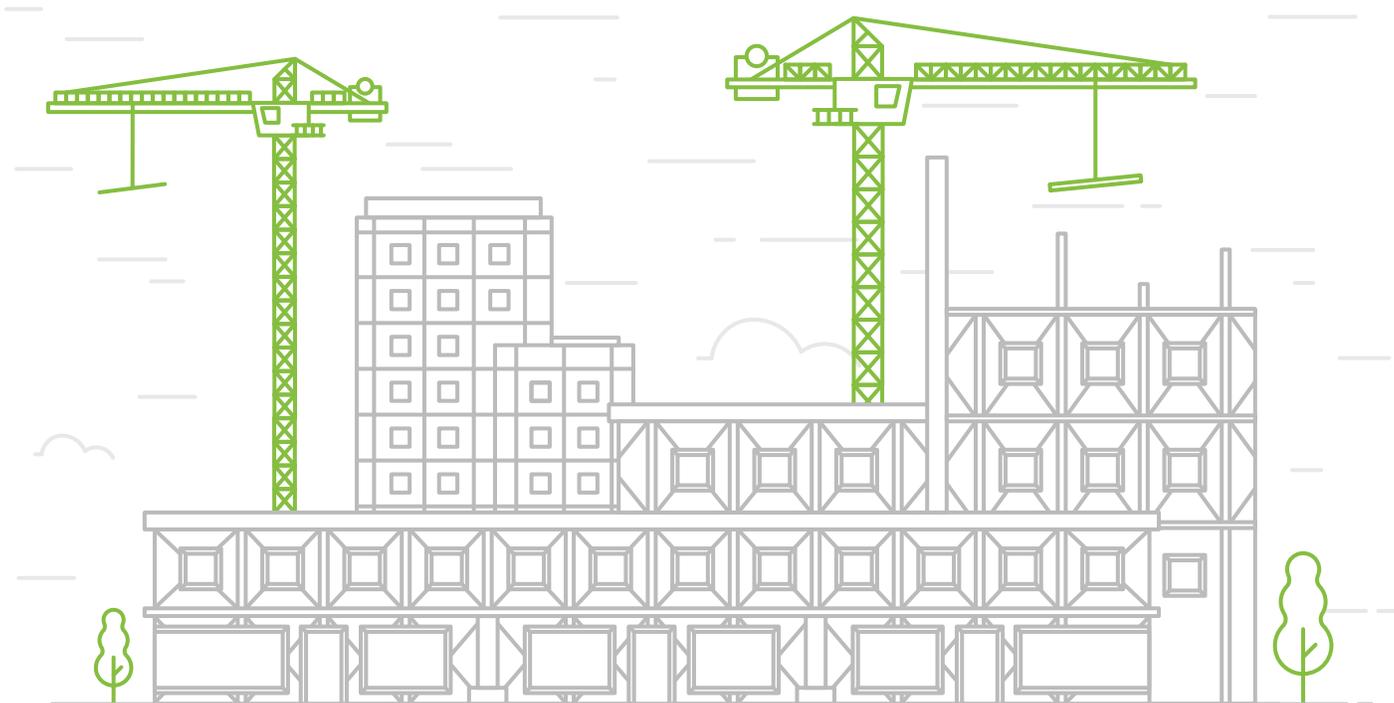
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The new technology on the “block”

The commercial real estate (CRE) industry appears to take pride in keeping several aspects of its operations secret, such as comparable lease rental rates, property prices, and valuations, to create a possible competitive advantage. However, secrets are hard to keep—and may not even be desired—in today’s hyperconnected and digitized world. In response to greater demand for transparency, technology advancements and the disintermediation by startups are gradually making some of this information public.¹ As a result, property-related information is increasingly available in digital and paper form. However, a significant portion of the digitized information is hosted on disparate systems, which results in a lack of transparency and efficiency, and a higher incidence of inaccuracies that creates a greater potential for fraud.

Blockchain technology—a digitized, distributed ledger that immutably records and shares information—could enable the CRE industry to address these inefficiencies and inaccuracies. According to a 2015 World Economic Forum survey of 800 executives and information and

communications technology sector experts, 57.9 percent of the respondents believe that 10 percent of the global GDP information will be stored on blockchain technology by 2025.²

Until recently, blockchain was known more as the technology powering Bitcoin. However, industry players now realize that blockchain-based smart contracts can play a much larger role in CRE, potentially transforming core CRE operations such as property transactions (purchase, sale, financing, leasing, and management). Over time, blockchain adoption can have a broader impact, as it can be linked to public utility services such as smart parking, waste, water, and energy billing, and also enable data-driven city management.

In this report, we will dive deeper into the value proposition of blockchain technology and its applicability to property leasing and management, and purchase and sale transaction processes.

But is CRE ready for blockchain technology?

As CRE companies invest in a multitude of technologies to meet their varied business requirements, it may be worthwhile to first understand the benefits of blockchain technology that are highlighted in Figure 1.

Figure 1: Benefits of blockchain technology

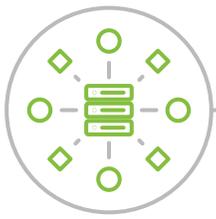


Source: Deloitte LLP

Companies should then assess whether and where blockchain can be useful, as the technology has its own unique characteristics and perhaps may not address each inefficiency in current processes. The technology should meet certain prerequisites for blockchain to be relevant (see prerequisites in Figure 2 on the following page). Once companies identify a process that is ready for blockchain technology, they should evaluate costs and benefits. While doing so, they will potentially benefit from assessing the extent of overhauling existing systems and interoperability with the various technology systems used by different stakeholders of CRE transactions.

Figure 2: Prerequisites for adopting blockchain technology

Why consider blockchain for real estate leasing and purchase and sale transactions?



Need for a common database

Shared databases are critical for leasing and purchase and sale transactions. One of the key examples is a multiple listing service, which collates property-level information from private databases of brokers and agents.



Multiple entities can modify database

Transacting and managing real estate properties involves several entities, such as owners, tenants, operators, lenders, investors, and service providers, who provide, access, and modify a variety of information.



Lack of trust among entities

Many times, participants in leasing and purchase and sale transactions are new to each other and could be over cautious in due diligence and may even have data integrity concerns. However, blockchain can help reduce the risk through digital identities and more transparent record keeping systems for real estate titles, entitlement, liens, financing and tenancy.



Opportunity for disintermediation

Trusted intermediaries such as title companies can be disintermediated through blockchain, due to increased security and transparency in title management and auto-confirmation by government land registries.



Transaction dependence

Many real estate transactions have conditional clauses and can be executed through smart contracts. For instance, the conclusion of a purchase-sale transaction could be dependent on loan approvals or title clearances.

Source: Gideon Greenspan. "Avoiding the Pointless Blockchain Project," LinkedIn, November 24, 2015; Deloitte Center for Financial Services analysis.

As set forth in Figure 2, we believe that among the core CRE processes, leasing and purchase and sale transaction processes are ripe for blockchain adoption, as it can take advantage of its inherent benefits and meets the prerequisites for using the technology.



How can blockchain technology elevate CRE leasing, and purchase and sale transactions?

Blockchain technology in CRE leasing processes

CRE owners have an opportunity to alleviate some of the existing challenges in their leasing transactions using blockchain technology (also visualized in Figure 3 on the following page):

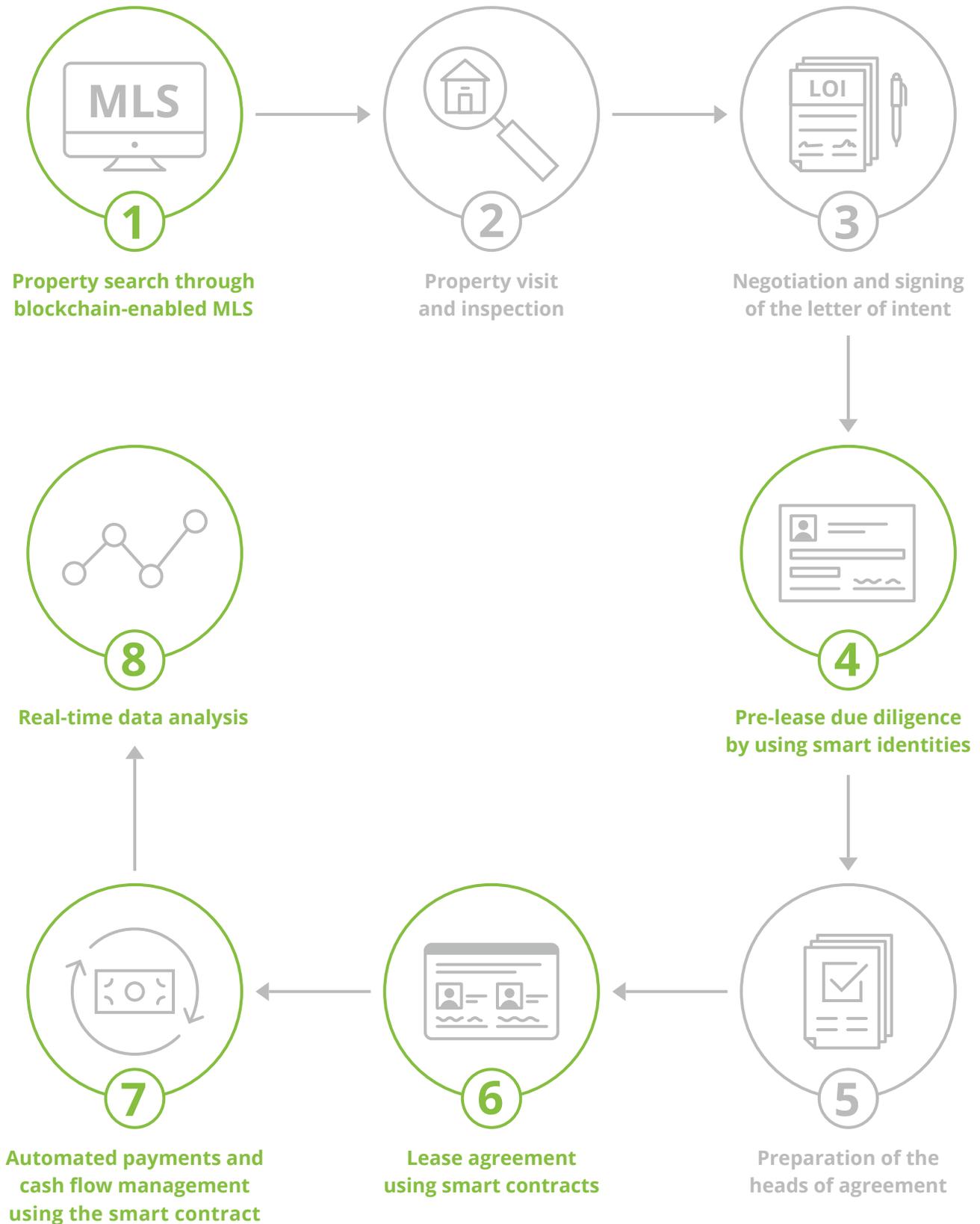
Inefficient property search process due to fragmented listings data

Time-consuming, paper-driven, predominantly offline due-diligence process

Complexity in managing ongoing lease agreements, property operations, and cash flows

Absence of real-time rich data affects management's decision-making capability

Figure 3: Using blockchain technology in a CRE lease transaction



Source: Deloitte Center for Financial Services analysis.



(Figure 3 cont'd)

1	Property search through blockchain-enabled MLS
	The lessor and the lessee or their respective brokers list their requirements on the multiple-listing services (MLS). A transparent MLS system enables all parties to view the available listings based on their requirements.
2	Property visit and inspection
	The brokers discuss their clients' requirements and arrange for property visits and inspection.
3	Negotiation and signing of the letter of intent
	Both sides negotiate the terms and value of the deal. The lessee sends the letter of intent (LOI) to the lessor, expressing interest in the property.
4	Pre-lease due diligence by using smart identities
	Using blockchain-based digital identities of individuals and assets, the lessor conducts a background check on the lessee and the lessee checks the prior transactions and liens on the property.
5	Preparation of the heads of agreement
	The heads of agreement, containing all the clauses and terms agreed between the two sides, is prepared and verified by the accounts and legal teams on both sides.
6	Lease agreement using smart contracts
	The key terms of the agreement are recorded on the blockchain and this becomes the smart contract. The smart contract initiates payment of security deposit/advance rent either through Bitcoin wallets or bank accounts using a payment interface. The lessor then transfers the possession of the property to the lessee. The transaction agreement is officially recorded.
7	Automated payments and cash flow management using the smart contract
	Based on the terms of the agreement, the smart contract initiates the regular lease payments from the lessee to the lessor, after paying the outstanding maintenance expenses to the contractors, using the preferred mode of payment. On completion of the lease term, the smart contract initiates the transfer of the security deposit to the lessor.
8	Real-time data analysis
	As several payments and transactions are recorded on the blockchain along with the digital identities of individuals, properties, and organizations, the lessor can perform real-time data analyses using appropriate analytics tools.

Blockchain in CRE purchase and sale transactions

The existing purchase and sale transaction process is complex and involves multiple steps. As such, identifying a property and closing a transaction can be a time-consuming affair and costly for both buyers and sellers, which may include CRE owners or institutional investors. Such impediments may include:

Inefficient property search process due to fragmented listings data

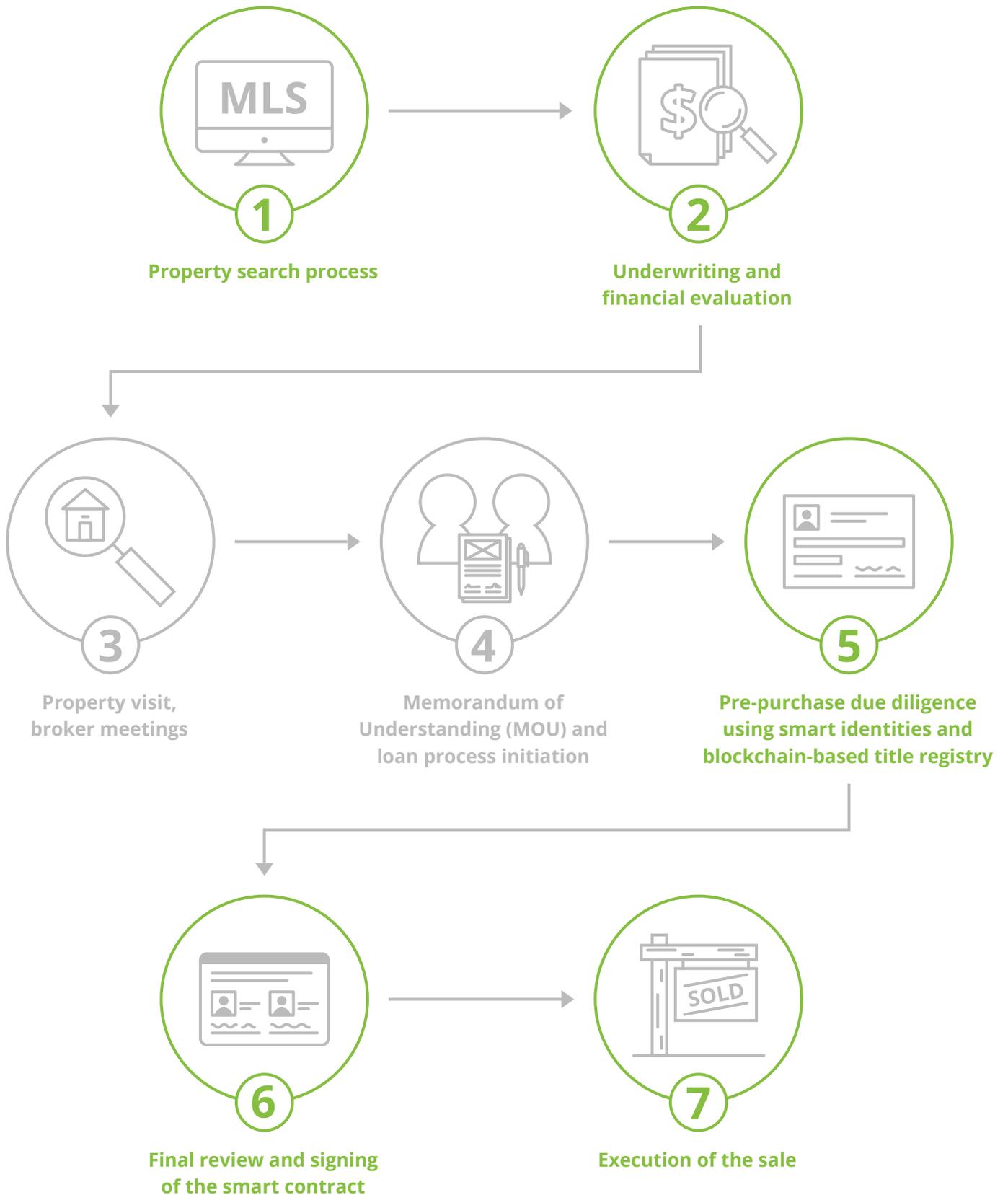
Time-consuming, paper-driven, predominantly offline due-diligence process

High title insurance and related costs due to chain of title and lien recording issues, fraud risk, required diligence, and cumbersome clearance process

Slow, expensive, and opaque financing mechanisms and payments, especially in cross-border transactions

The transaction only gets more complex if the seller uses mortgage financing. CRE players can potentially simplify the current process using blockchain technology, as illustrated in Figure 4.

Figure 4: Using blockchain technology in a CRE purchase and sale transaction



Note: The loan application and servicing steps would be applicable only if mortgage financing is used for purchasing the property.

Source: Deloitte Center for Financial Services analysis.

 —Indicates steps which could utilize blockchain technology

(Figure 4 cont'd)

1	Property search process
	Buyer shortlists properties using a blockchain-enabled multiple listing service (MLS).
2	Underwriting and financial evaluation
	Buyer creates a financial model of rents, occupancy, and costs, based on the data available from the property's digital identity on blockchain. Buyer determines the bid price.
3	Property visit, broker meetings
	The buyer: Conducts a physical inspection of the property, and of similar properties for a relative comparison. Elicits broker's opinion on the selected property.
4	Memorandum of Understanding (MOU) and loan process initiation
	Buyer and seller sign an MOU and the buyer transfers the earnest deposit into an escrow account. Buyer also initiates the loan process with the mortgage lender.
5	Pre-purchase due diligence using smart identities and blockchain-based title registry
	Using blockchain-based digital identities and title registry, the buyer and/or the mortgage lender conduct several checks including environmental clearances, zoning permissions, tenant leases, and title clarity, among others. The mortgage lender also conducts a due diligence of the buyer (borrower) to assess the loan terms, including loan amount and loan-to-value.
6	Final review and signing of the smart contract
	On successful completion of the due diligence: A smart contract between the buyer and the seller is reviewed and executed by the deal principals and the advisors of both parties. A smart loan contract between the buyer and the mortgage lender is linked to the above contract between buyer and seller.
7	Execution of the sale
	The mortgage lender transfers the sale proceeds to the escrow account and the seller transfers the possession to the buyer. The smart contract between the buyer and the seller initiates the payment of sale proceeds from the escrow account to the seller's bank account and notifies the registrar to initiate the property title transfer to the buyer with a lien on the property in favor of the mortgage lender. The registrar validates the transfer of the property title on blockchain and a new permanent block is created, making it official and irreversible. The smart loan contract between the buyer and the mortgage lender initiates regular loan repayments to the latter.





Opportunity I: Improve property search process

Existing challenge: Inefficient property search process due to fragmented listings data

Today, CRE brokers, owners, tenants, and buyers and sellers often use multiple listing services or MLS to access property-level data such as location, rental rates, capital values, and property features. These platforms are typically subscription-based, commanding high access fees from users.³ The accuracy and detail of property-level data is completely dependent on the preferences of the brokers, due to a lack of standardized processes and substantive human intervention. This may result in the information being inaccurate, dated, or incomplete.⁴ Further, the search process itself tends to be inefficient, as the data, in general, is fragmented across multiple platforms.⁵ As a result, there are delays in decision-making for landlords and tenants, and low levels of trust on the quality of information available on MLS.

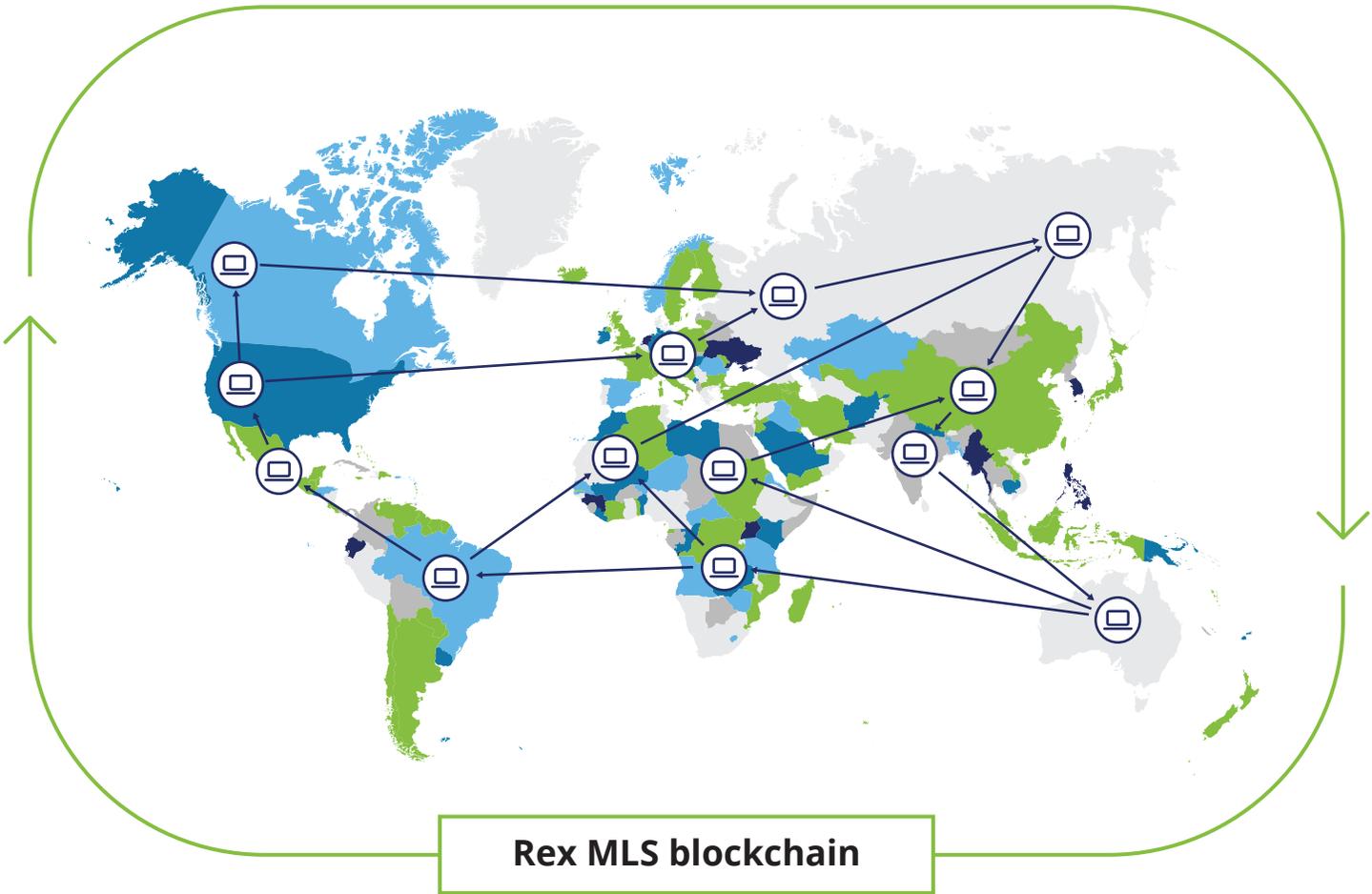
The blockchain opportunity: Efficient and reliable property search

A blockchain-based MLS would enable data to be distributed across a peer-to-peer network in a manner that allows brokers to have more control over their data, along with increased trust, as listings would be more freely accessible.⁶ This enhanced, blockchain-enabled MLS would also provide clear details on property location and address, comparable rental rates, capital values, ownership history, tenant details, age of the property, and title clarity.⁷ As a result, market participants could have access to more reliable data at a lower cost. In fact, per a recent Deloitte survey of 308 executives, 36 percent of respondents perceive efficiencies (lower costs/greater speed) as one of the key benefits of using blockchain technology.⁸ While many blockchain uses are in proof-of-concept stage, companies such as Rex MLS have started testing the technology for property listings (Figure 5).

Figure 5: Rex MLS—revolutionizing CRE listings globally

Type of blockchain	Public blockchain based on Ethereum
Development stage	Initial testing completed, final roll out in the works
Service offering	It is a freely available multiple listing service based on the blockchain platform providing users access to listing information

Process:



Users upload the property listing on the Rex MLS blockchain; in turn, they are rewarded Rex's cryptocurrency.

Rex MLS allows users across the platform to freely access data on the MLS and also make transactions using Rex's cryptocurrency.

Outcomes



Increased transparency



Enhanced process efficiency and accuracy



Easier access to international listings



Lower transaction costs

Source: Evander Smart, "Rex: Decentralizing and Disrupting Real Estate Listing Services," BTC Manager, June 7, 2016; Rex company website.

Opportunity II: Expedite pre-lease/deal due diligence and financial evaluation

Existing challenge: Time consuming, paper-driven, predominantly offline due diligence and financial evaluation process

In a CRE leasing or purchase and sale transaction, usually significant time is spent on due diligence activities related to financial, environmental, and legal review to assess rental rates/bid price. This is predominantly due to the use of physical documents for proof of identity, documents that are often stored in siloed places and have limited flexibility to be customized to suit various needs.⁹ For a property, these could include documents supporting the history of ownership income and expenditure, occupancy, tenants, and repairs and maintenance activities. This manual verification process increases administrative tasks and is prone to loss of information and errors. Further, involvement of numerous third-party service providers tends to elongate the due diligence process, and increase transaction related cost. Finally, if the buyer is financing the acquisition of the property with a mortgage or other third party financing, many due diligence steps and documentation are duplicated by both the buyer and the lender.

The blockchain opportunity: Drive efficiency and accuracy in due diligence process

CRE market participants should consider developing digital identities for a property to keep pace with the growing preference for digital transactions. As the name suggests, digital identity with respect to a real estate property would imply a digital identifier that consolidates information such as vacancy, tenant profile, financial and legal status, and performance metrics in digital form.¹⁰ A combination of blockchain technology along with digital identity can alleviate the above-discussed challenges of physical identity proofs, and expedite a few of the pre-transaction activities such as underwriting, financial evaluation, obtaining a mortgage commitment, etc. An August 2016 Deloitte-World Economic Forum report titled “A Blueprint for Digital Identity: The Role of Financial Institutions in Building Digital Identity” mentions that a “digital identity would allow financial institutions to perform critical activities with increased accuracy over that afforded by physical identity, and to streamline and partially or fully automate many processes.” Having said that, data integrity is critical for accurate digital identities and blockchain transactions. The reality is that the initial data would be as good as the user entries. To ensure accuracy, different participants such as tenants, investors, financing sources and advisors, etc. could validate the data. In addition, companies are developing solutions to address data integrity challenges.¹¹ In fact, if companies experimenting with blockchain technology also consider using the digital identity of property and people, the result can have a powerful impact on reducing the current inefficiencies and inaccuracies. Digital identities of properties linked to the digital identities of transacting parties can create valuable and secure online records for a property, improve lease information management, and greatly ease the due diligence process. Figure 6 on the following page illustrates a digital identity-based system for real estate transactions, linking digital identities of individuals, organizations, and assets.

Figure 6: Telia, ChromaWay, Lantmäteriet, and Kairos Future—digitizing the identity of individuals, organizations, and assets

Type of blockchain	Private blockchain (can be replicated on a public blockchain, like Bitcoin or Ethereum)
Development stage	Proof of concept and technical demonstration
Service offering	Digital identity based system for real estate transaction processing

Process:

- 

1 Buyer and seller log into the app using their Telia (telecom provider) IDs

 - The buyers' and sellers' identities are verified by Telia's digital ID solution on ChromaWay's (blockchain start up) app developed for Lantmäteriet (Swedish land registry).
 - Telia's ID solutions can be used on mobile phones and can register individuals with or without a personal identification number.

- 

2 RE agent and bank are appointed and due diligence is done

 - Using the app, the seller appoints the RE agent who does the property due diligence and invites the potential buyer.
 - The interested buyer invites its bank to the transaction through the app.
 - The interested buyer's bank verifies the property ownership through the app.

- 

3 Agreement is signed

 - The seller and the buyer both sign the contract using digital signatures and identification.

- 

4 Payment is completed

 - The buyer instructs its bank to make the payment to the seller. Both parties are notified once the payment is completed.

- 

5 Property title is transferred

 - Upon payment, the registrar receives a notification to initiate title transfer.
 - The registrar digitally transfers the title from the seller to the buyer.
 - Title transfer is updated on the app and visible to all parties.

Outcomes

- 

Reduced transaction time
- 

Enhanced data security
- 

Less manual errors and duplication in verification process

Source: ChromaWay company website; John Camdir, "Sweden Conducts Trials of a Blockchain Smart Contracts Technology for Land Registry", Bitcoin Magazine, June 23, 2016; "The Land Registry in the blockchain," Telia, ChromaWay, Lantmäteriet, Kairos Future, and International Council for Information Technology in Government Administration (ICA), July 2016.

Opportunity III: Ease leasing and subsequent property and cash flow management

Existing challenge: Complexity in managing ongoing lease agreements, property operations, and cash flows

There are complexities in managing a CRE property due to dependencies among landlords, tenants, property managers, and various vendors. Right from the start of a lease, there are numerous payment and service transactions that need to be executed, tracked, and recorded on a regular basis. There are also several checks on the same data. For instance, periodic cash flows are investigated by real estate owners and:

- **Auditors as part of preparation and review of financial statements**
- **Banks for (re)financing related decisions**
- **Financial regulatory authorities for monitoring purposes**
- **Appraisers for property appraisals**

As a result, real estate companies have rigorous accounting, compliance, and cash flow management needs and related costs.

The blockchain opportunity: Smart contracts enable easier, transparent, and efficient management of property and cash flows

Executing a real estate lease using smart contracts can address many of the challenges associated with property and cash flow management. According to Nick Szabo, a prominent thought leader of blockchain and smart contracts, “a smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises.”¹² For the real estate sector, the traditional lease contract can morph into a smart tenancy contract. The use of a smart tenancy contract on a blockchain platform would enable transparency in lease terms and transactions. The contract could use rent or bonds for automated payments to real estate owners, property managers, and other stakeholders along with near real-time reconciliation.¹³

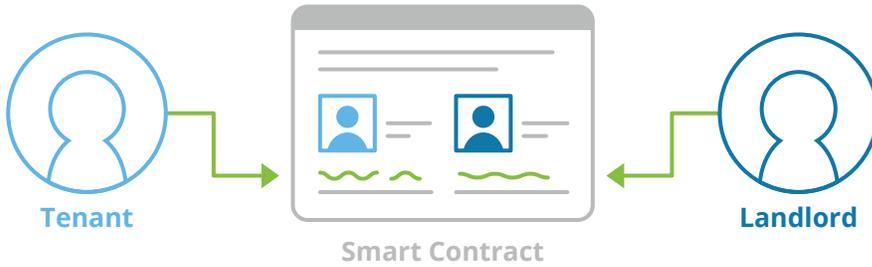
Figure 7 on the following page highlights how smart tenancy contracts used by the London-based startup, Midasium, can enable efficient property management and cash flows. In general, there is openness in using smart contracts within the business community. Deloitte’s aforementioned blockchain survey suggests that about 46 percent of respondents would be comfortable contracting with another party using a blockchain-based smart contract instead of a traditional paper-based legal contract, and 40 percent believe there is value in recording existing contracts on the blockchain.

Figure 7: Midasium—Enabling smarter property and cash flow management

Type of blockchain	Private (permission-based) blockchain
Development stage	Prototype ready
Service offering	Property and cash flow management using smart contracts based on the blockchain

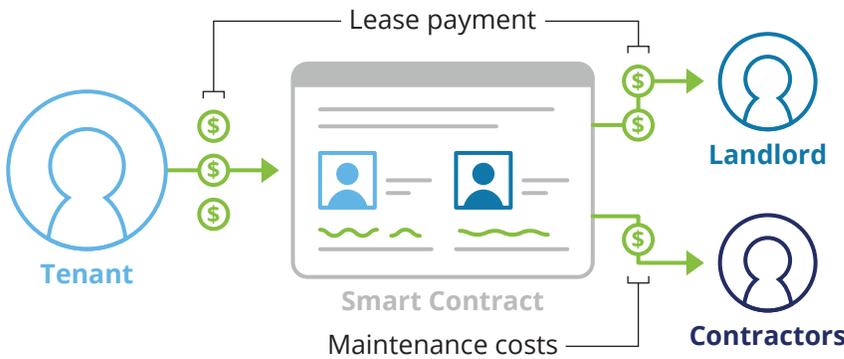
Process:

1



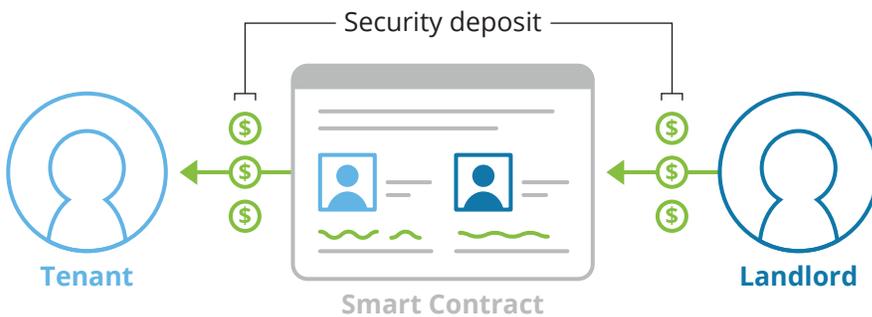
Both parties digitally sign the smart contract (agreement), which includes details such as rental value, payment frequency, and tenant and property details.

2



Based on the terms of the contract, the smart contract periodically initiates the lease payments from the tenant to the landlord and the contractors.

3



On termination of the lease, the contract triggers the payment of security deposit back to the tenant after adjusting for any damage repair charges.

Outcomes



Instant settlement and management of cash flows



Simplified property management



Legally enforceable contracts



Faster reconciliation of payments

Source: "Blockchain, Bitcoins and rental payments", Property Council of Australia, November 15, 2016; Midasium website.

Opportunity IV: Enable smarter decision-making

Existing challenge: Absence of rich real-time data impacts management’s decision-making capability

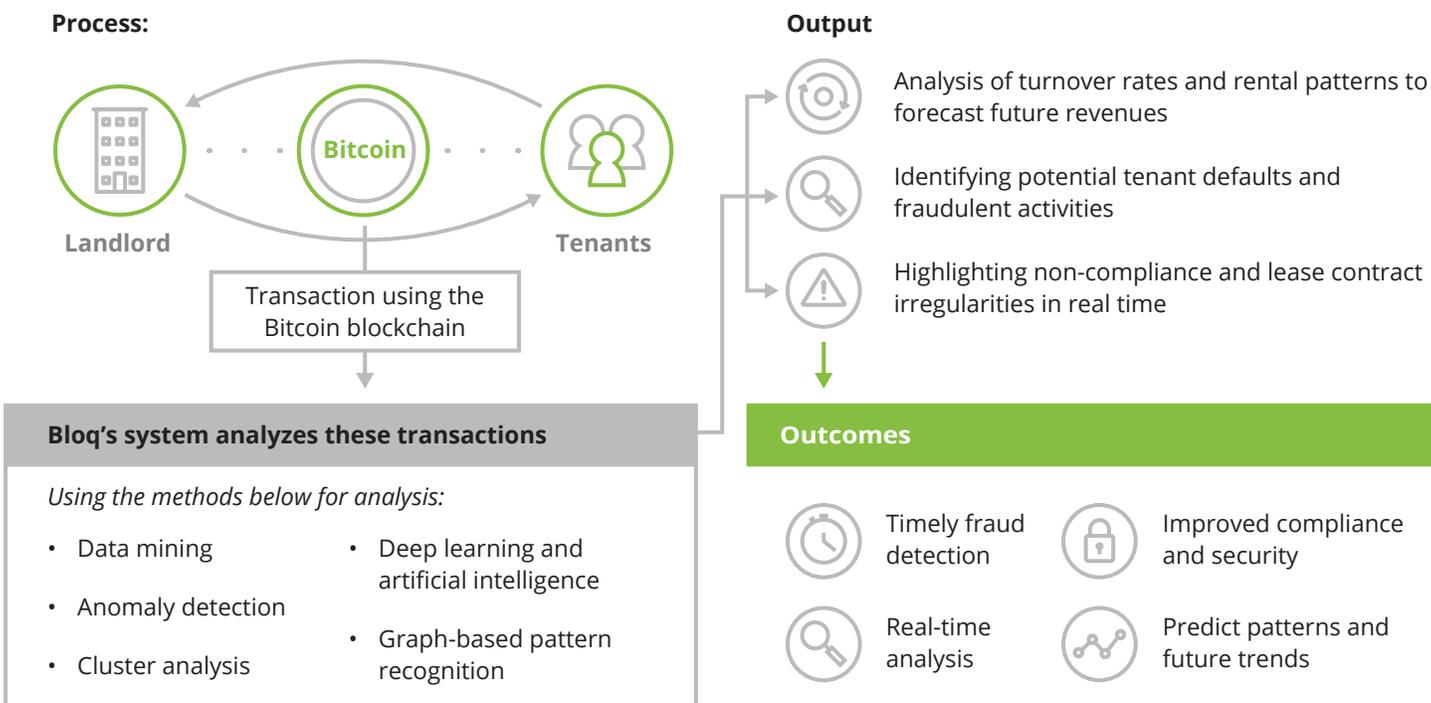
Currently, many CRE systems and processes are siloed, and information is consequently scattered on different point solutions. This lack of interoperability results in data redundancies, duplication of records, and opaqueness. As such, RE management’s decisions are frequently based on data sets, which do not provide a real-time view of ongoing activities.

The blockchain opportunity: Connective tissue between varied technology systems refines quality of data, analysis, and decisions

Blockchain technology can be the connective tissue between technology systems of CRE companies and other participants in a leasing transaction by providing a more open and shared database for all involved parties. This would enhance data quality and also enable real-time recording and retrieval. As a result, CRE players can address some of the interoperability issues and use predictive analytics to draw smarter and near real-time insights from the blockchain data, which may eventually enhance the quality of leasing-related and property operating decisions. While players can use their own capabilities to analyze internal data, they could hire third-party blockchain vendors as intermediaries to analyze aggregated industry data. In Figure 8, we show Bloq’s use of advanced analytics and artificial intelligence on blockchain data to identify patterns and predict future behavior.

Figure 8: Bloq—enabling analytics on blockchain

Type of blockchain	Currently on the Bitcoin blockchain with plans to expand to other blockchains
Development stage	Product development and planning
Service offering	Analytics service on blockchain data



Source: Bloq company website

Opportunity V: Transparent and relatively cheaper property title management

Existing challenge: High title insurance and related costs due to chain of title and lien recording issues, fraud risk, required diligence, and cumbersome clearance process

Legacy title recording systems and the current paper-based property titles have several disadvantages. To begin with, there may be concerns about the authenticity of the mortgage and title documents, as well as accuracy of recorded liens and other information attached to the title. For instance, according to American Land Title Association, in nearly all real estate transactions there is at least one title defect that must be corrected before transferring the title.¹⁴ Additionally, in 25 percent of transactions, title professionals need to take extraordinary action to fix title defects that could impact the buyers' ownership.¹⁵ As a result, property owners often incur high legal fees proving ownership. Certain estimates suggest that nearly \$1 billion is spent annually on title fraud resolutions.¹⁶

To meet the above challenge, buyers often take out title insurance for purchase and sale transactions, which adds to the property purchase cost. Additionally, some insurers raise premiums on a regular basis, and are not transparent about the changes.¹⁷

Further, in the event of mortgage finance for a property purchase, banks usually end up duplicating the title check effort to complete their own due diligence for loan clearance and disbursal. As a result, there can be an increase in buyers' financing costs.

The blockchain opportunity: Reduce fraud and simplify the process of title records and checks

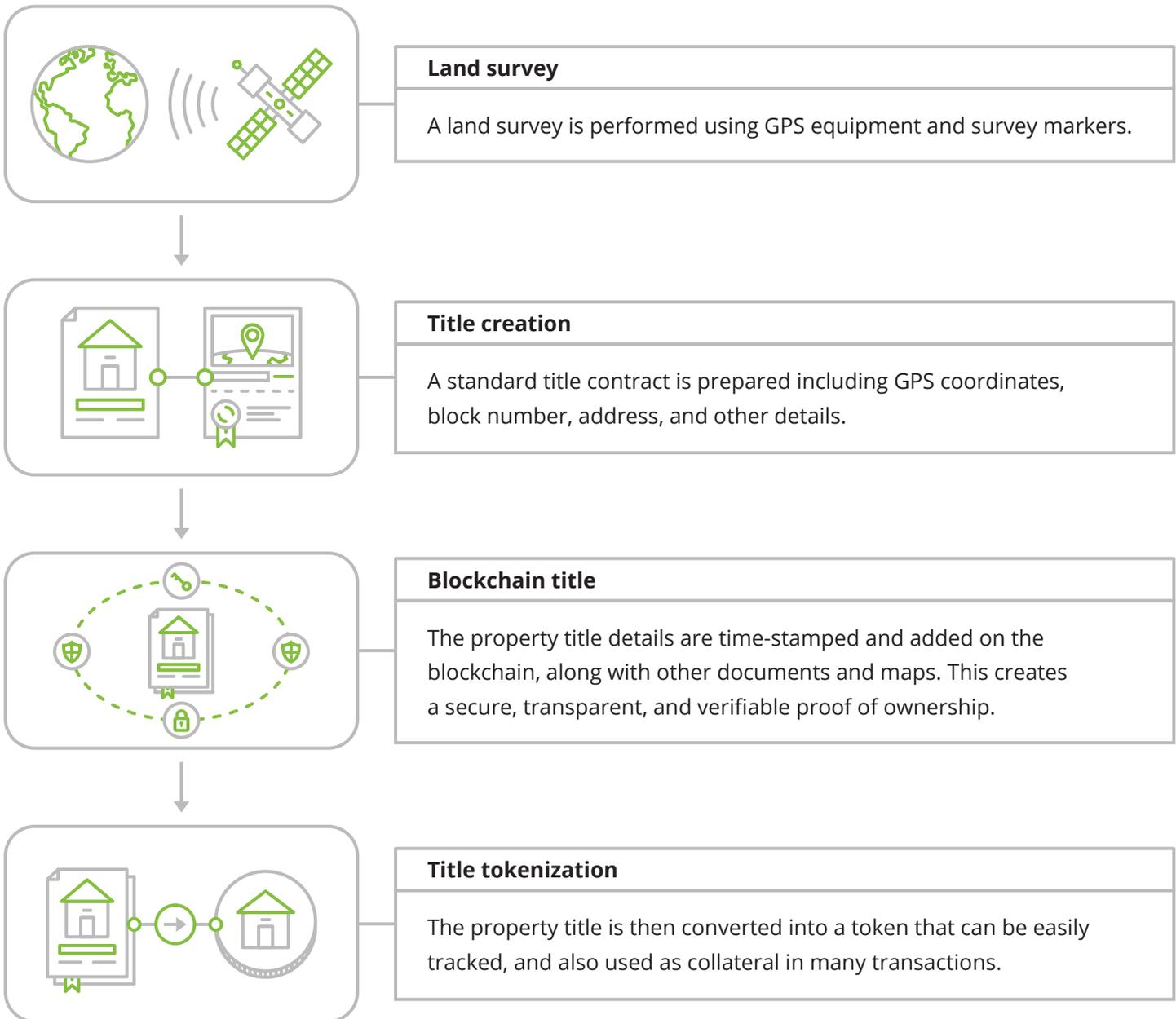
A blockchain-based digital identity of a property may include its history, location, and title details. Usually, buyers and banks can potentially rely on this digital identity of the property for title assessment, as any change to existing data would have to be made through a consensus across several blockchain nodes. Also, the distributed, tamper-proof, and encrypted nature of blockchain is likely to make it difficult for perpetrators to commit fraud related to liens, easements, air and subsurface rights, titles, or transfers.¹⁸ This increase in security and transparency may reduce both title-fraud risk and costs by simplifying the title check process.

A more digitized and transparent process could also speed up title transfer execution, use of title as a collateral, and reduce overall transaction time. In fact, a few governments across the world are planning to use the blockchain platform for broader social impact as land title registries have the potential to reduce corruption and improve transparency about land ownership.^{19,20} In Figure 9, we discuss Bitland's blockchain-based land-title registry, which is expected to be used by the government of Ghana to create a digital title ID for all existing real estate.

Figure 9: Bitland—improving transparency and security of land title

Type of blockchain	Public blockchain
Development stage	Pilot development
Service offering	Blockchain-based immutable land-title registry

Process:



Key Benefits

- Imutable record of land titles
- Faster title transfers
- Increased security and transparency
- Lower costs and less title fraud

Sources: Bitland company website; Sam Yohannes, "Land Records System Improvement," NewsBTC Africa, October 20, 2015.



Opportunity VI: Enable more efficient processing of financing and payments

Existing challenge: Slow, expensive, and opaque financing mechanisms and payments, especially in cross-border transactions

Payments and money transfers for property transactions are expensive and time consuming due to the involvement of multiple-channel partners and extensive documentation.²¹ This is perhaps most pronounced when the buyer funds a purchase through a mortgage or when the transaction is cross-border.

The typical time to close a commercial mortgage is about three months,²² and the finance approval process tends to involve extensive paperwork during the due diligence process. Often there is less coordination among different parties, and the lack of standardized data increases the risk to the mortgage lender.

In a cross-border transaction, foreign exchange charges and involvement of multiple intermediaries typically increase both the payment lead time and transaction costs. As an example, consider a property transaction wherein the buyer is from the United States and the seller is from the United Kingdom. In this case, the buyer's local bank would typically transfer the amount to its correspondent bank in the USA, which in turn would transfer the amount to the seller's correspondent bank in the United Kingdom, and in the final leg, the amount is credited to the seller's local bank account. The existing modes of payments and transfers are typically opaque²³ and thereby susceptible to errors.²⁴

The blockchain opportunity: Financing and payments systems that are faster, cheaper, safer, and simplified

Blockchain-enabled digital identities and smart contracts can potentially reduce inefficiencies and increase transparency in the financing and payments processes.

To begin, blockchain can simplify the financing process during the loan application, documentation, due diligence, and servicing stages. The digital identity of a property would reduce both due diligence and loan documentation time, and perhaps even data integrity concerns. Then, the borrower and lender can execute a smart contract-based²⁵ loan document. The smart loan contract would be accessible to all involved legal parties.

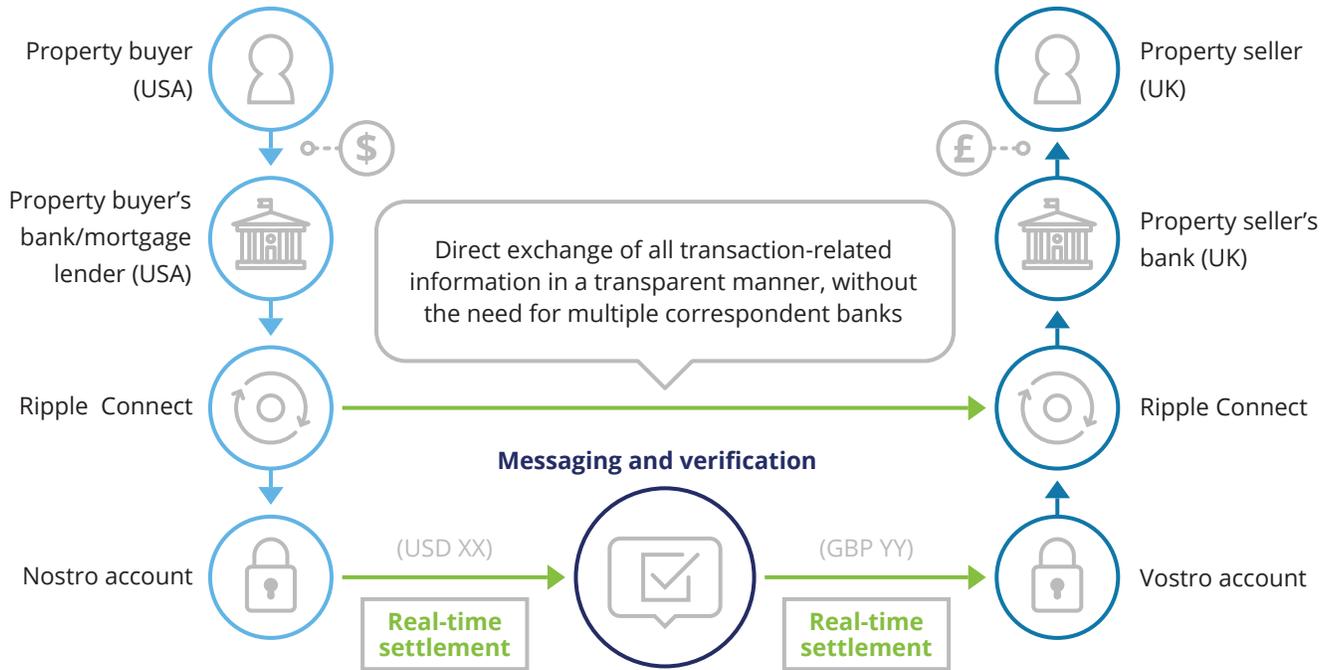
Moreover, execution of smart contracts on blockchain platforms would inherit all benefits of blockchain, including a series of complete, immutable, and traceable records, offering audit trails of transactions such as ownership history, property cash flows, and mortgage payments. The buyer could also track the mortgage in real time. For more details about blockchain's applicability to the mortgage origination, securitization, and servicing processes, please refer to our paper [**"Applying blockchain in securitization: Opportunities for reinvention."**](#)

In cross-border real estate transactions, blockchain can provide a common network for the transacting parties to interact and share information without intermediaries such as correspondent banks. The information shared on the common network can include details of sender and receiver, transaction fees, foreign exchange rates, delivery time, and many others. Moreover, the settlement process could be more seamless as the ledgers of the parties on either side of the transaction would be connected through an open network. The robustness of the process would be improved through software that cryptographically verifies the fund availability and facilitates simultaneous transfer of funds. In this way, the technology can help in real-time settlement across all ledgers, while minimizing settlement risk and payment delays. Currently, there are many blockchain-based B2B payment solutions that are being developed or tested by traditional payments and blockchain startups.²⁶ To understand the practical application of blockchain in cross-border payments, we have delved deeper into Ripple's solution in Figure 10.

Figure 10: Ripple—enabling efficient and faster cross-border payments

Type of blockchain	Private blockchain
Development stage	Production (pilots completed)
Service offering	Blockchain-based cross-border payments

Process:



—Indicates blockchain

Interledger Protocol (ILP) validator(s)

<p>1. Origination</p> <p>Property buyer reaches out to property buyer's bank with payment request details.</p> <p>Buyer's bank then coordinates with seller's bank through "Ripple Connect" and gets terms of the deal, including foreign exchange rate and transaction fees.</p>	<p>2. Payment initiation</p> <p>Once buyer accepts the quote, buyer's bank communicates acceptance to seller's bank, which in turn locks the quote.</p> <p>Buyer's bank then debits buyer's account in an internal book transfer and notifies seller's bank on "Ripple Connect".</p> <p>The ILP validator then coordinates a "hold" on the funds across both banks and verifies that the funds are committed to the transaction in order to minimize settlement risk.</p>	<p>3. Settlement and confirmation</p> <p>Once the ILP validator verifies a hold on funds, it starts the settlement process and instructs both ledgers to remove the hold and simultaneously transfer funds through ILP.</p> <p>On successful completion of transfer to seller's bank account, a confirmation message is provided to all parties.</p>
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Key Benefits

- Faster payments
- Improved security
- Lower costs
- Increased transparency

Source: Ripple company website; "Ripple Solutions Guide," Ripple, January 2017.

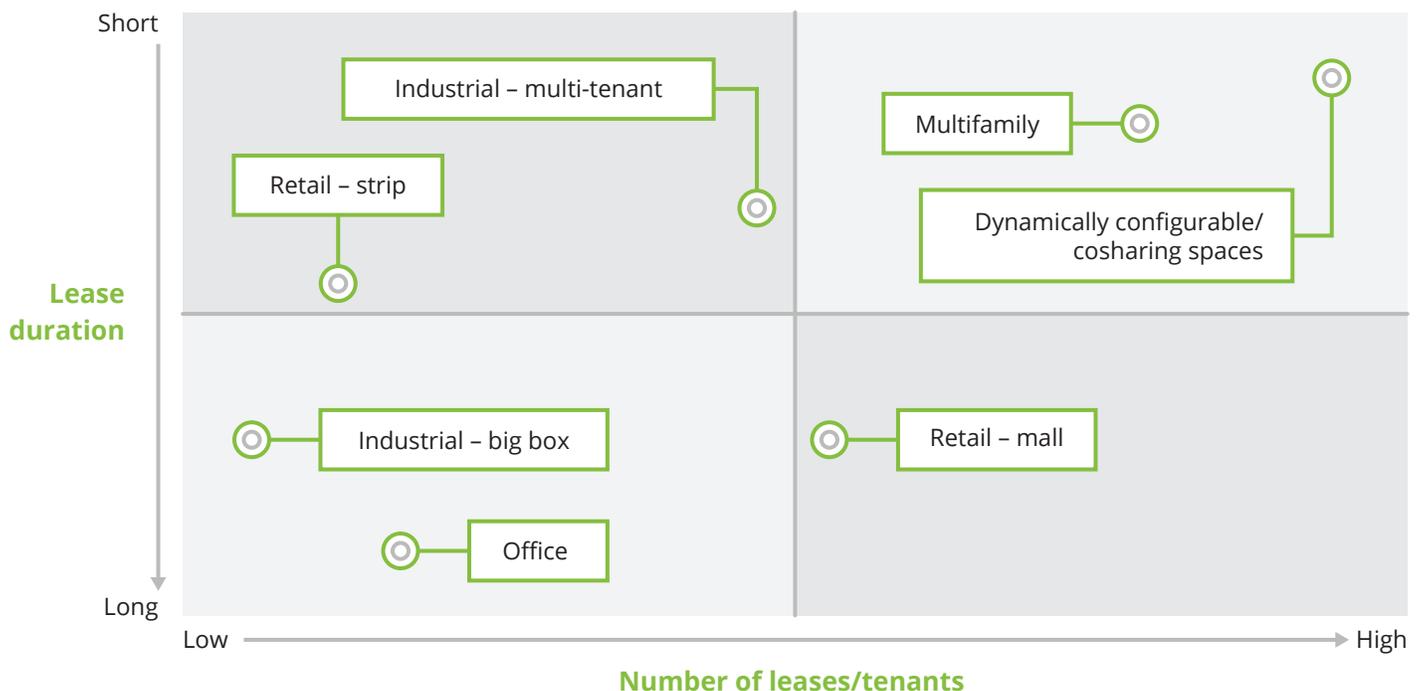
Get real, get ready

Currently, blockchain technology is at a nascent stage, particularly in the CRE sector. Many of its applications will likely be determined through a process of continuous experimentation. However, the underpinning thought is that blockchain technology is not an answer to all the inefficiencies in existing processes. CRE industry participants should acknowledge that it may not be possible to completely automate transactions, as a few trusted intermediaries would still be required to meet contractual obligations, such as an assessment of the building to understand renovation requirements.²⁷ In fact, if blockchain technology is not implemented correctly, it can increase costs.²⁸

With that said, we believe that the value proposition in using blockchain technology for leasing contracts is potentially greater for properties with shorter-duration leases and a higher number of tenants. In such scenarios, there tends to be a relatively higher number of lease contracts, which results in increased documentation and transaction costs. Using the illustrative framework in Figure 11, we've assessed the applicability of blockchain technology to leases of different property types. For simplicity's sake, we have restricted our analysis to different traditional CRE property types (office, apartment, retail, and industrial), and some of the newer CRE formats such as dynamically configurable and co-sharing spaces.*

As the framework illustrates, blockchain seems to be most applicable to dynamically configurable or co-sharing spaces, which have a relatively higher number of tenants and shorter duration leases compared to traditional property types, especially office and big-box industrial.

Figure 11: Illustrative framework to assess applicability of blockchain



Source: Deloitte Center for Financial Services analysis.

*Dynamically configurable spaces are fluid spaces that can be adjusted in size or design, based on specific tenant needs. Co-sharing spaces are collaborative spaces used by anyone and anytime, based on specific tenant needs. So far, co-sharing spaces are available for office use and residential accommodation.

However, companies may also consider the focus areas below as they embrace blockchain technology. These areas are among many others identified in Deloitte’s [“Blockchain: Democratized trust: Distributed ledgers and the future of value”](#) report:²⁹

Figure 12: Key focus areas for adopting blockchain technology

EDUCATE

First, companies need to educate themselves on blockchain:

- What are the benefits and limitations of blockchain?
- How does it apply to real estate?
- What are the real value propositions of blockchain vs. traditional system solutions?

COLLABORATE OR CREATE?

Next, companies need to decide on collaboration opportunities:

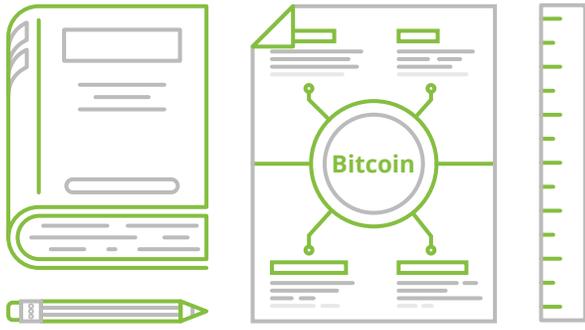
- What is the opinion on “build vs. collaborate” and which business area is the focus?
- What issues or opportunities do we have in common with peers and competitors?
- Which blockchain technology platform (Monax, Symbiont, Hyperledger) should we leverage, keeping in mind the compatibility and long-term usage?
- Which organizations should we collaborate with?

FACILITATE

Then, companies need to facilitate the implementation:

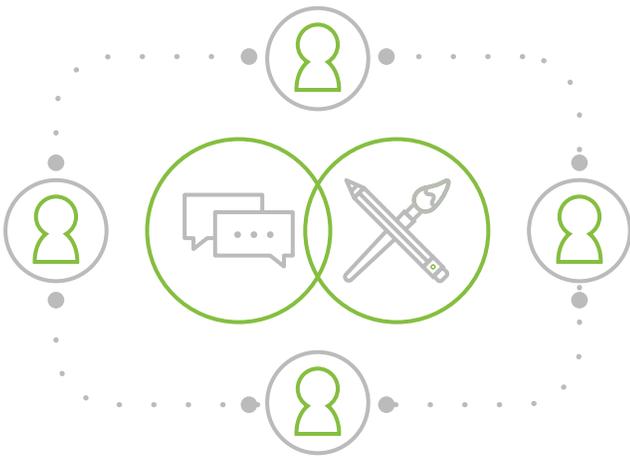
- Which are the existing solutions that can help in our digital identity journey?
- How can we integrate digital identities to make smarter applications?
- Is privacy a priority for our blockchain applications?
- What type of blockchain are we comfortable with—public, private, hybrid?
- How do current regulations impact our blockchain design?

Source: Eric Piscini, Joe Guastella, Alex Rozman, Tom Nassim, “Blockchain: Democratized Trust, Distributed Ledgers and the Future of Value,” Deloitte University Press, February 24, 2016. Vimi Grewal-Carr and Stephen Marshall, “Blockchain: Enigma. Paradox. Opportunity.” Deloitte LLP, January 2016.



Educate

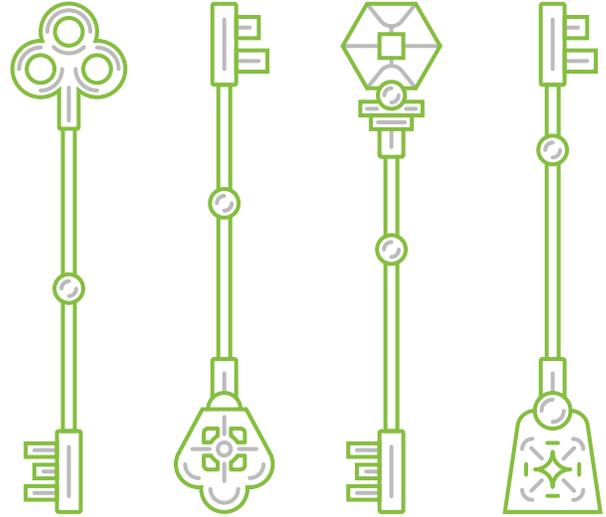
Unlike other emerging technologies such as mobile, analytics, or even the cloud, blockchain can be confusing—what it is, how it works and, most importantly, why it matters. Moreover, some of the earliest and most public use cases involving Bitcoin may be deemed irrelevant or underwhelming. Concerted education efforts are likely required, ideally coupled with a disciplined approach to innovation and a prototype demonstrating potential use cases specific to a given organization and industry.



Collaborate or create?

Given the limited experience of blockchain technology among traditional CRE companies and the continuous growth of the blockchain ecosystem, CRE companies should consider partnering with one or more vendors. But before signing on the dotted line, they should try to understand what makes a prospective partner's offering unique. Is the partner willing to co-invest in solutions (or even in proofs of concept) that will meet your specific needs? Typical caveats apply for tapping start-ups: understanding the leadership team, board, VCs, funding level, and financial viability.

Whether the partner is big or small, consider defining the exit strategy up front, to remove hard dependencies and imbalances in future negotiations. Given the nature of the blockchain, partnerships with peers and competitors might be options as well.

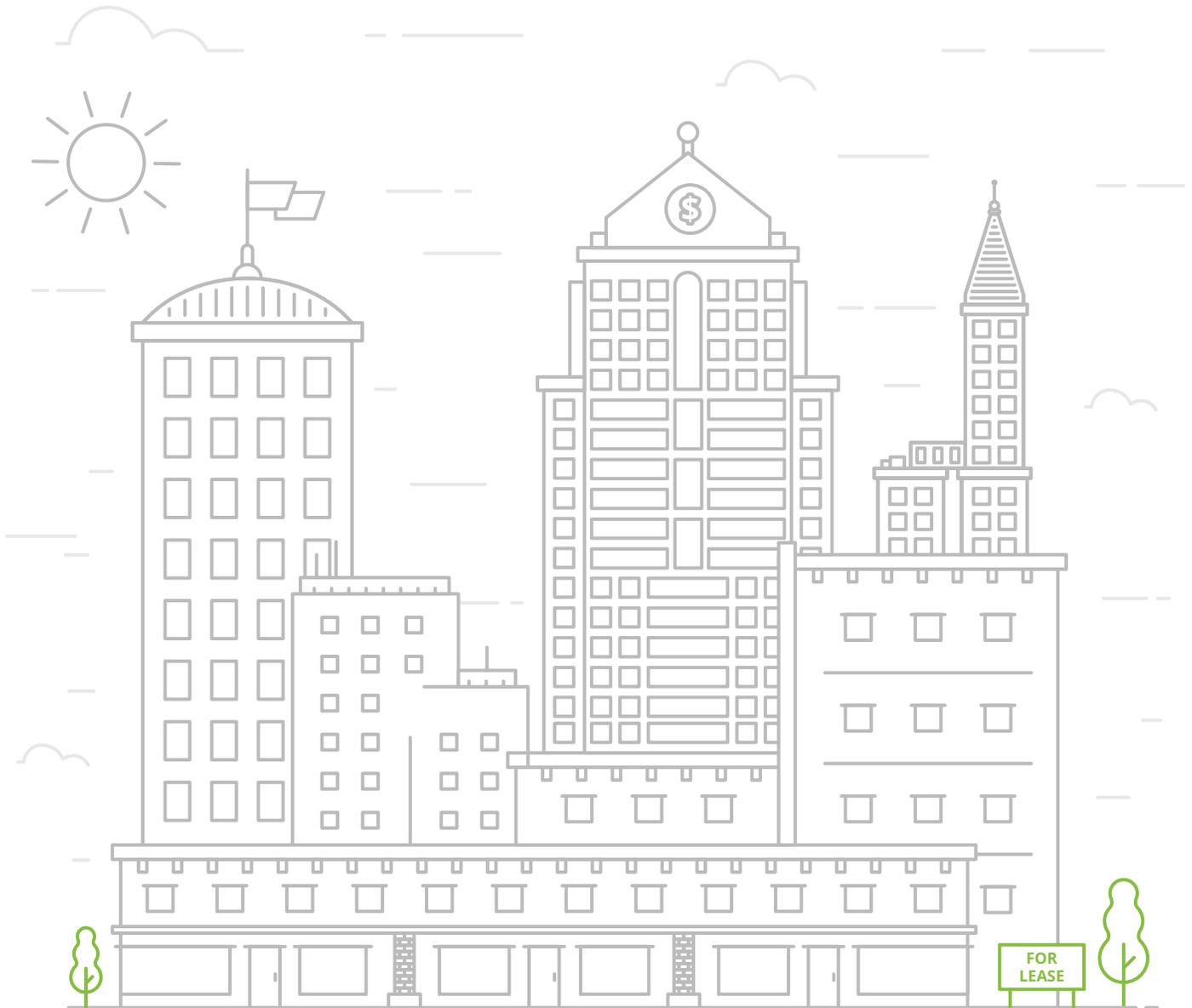


Facilitate

Once companies are more informed about the blockchain technology and have deliberated over strategic alliances, they can focus on facilitating the implementation. Companies can look for ways to create digital identities of their people, properties, and enterprise as key enablers to blockchain-based applications, including smart contracts.

Despite blockchain's immutability, there can be areas of security and privacy vulnerabilities, and so appropriate focus is needed in this regard. For instance, one of the key aspects is to choose the type of blockchain—public, private (permissioned), or hybrid, based on the risk assessment and level of trust.

From a regulatory and compliance standpoint, progress seems to be outpacing regulation, which may help users gain momentum with their blockchain initiatives in the short term. Eventually, regulation—and legal precedents that recognize blockchain transactions—will almost certainly catch up with this technology. Public blockchains will most likely be subject to oversight by governing bodies similar to those overseeing various aspects of the Internet. Private blockchains will be managed under private agreements.



Think about it, question it, but don't ignore it

In our world of continued technological revolution, most new technology comes with a promise to improve business and profitability. And whether one likes it or not, there can be a threat to survival if a business doesn't adapt to the changing times. As blockchain technology continues to evolve, it is challenging status quo and perhaps requires CRE companies to better understand the technology and revisit their existing business model, strategy, processes, and financial plan. CRE companies can consider answering the questions listed in Figure 12 on the previous page as they perform a detailed assessment of adopting blockchain technology.

In summary, blockchain technology has significant potential to drive transparency, efficiency, and cost savings for CRE owners by removing many of the existing inefficiencies in key processes. Hence, CRE companies and industry participants evaluating an upgrade or overhaul of their current systems should have blockchain on their radar as its demonstrated usefulness has the ability to bring significant value to the industry.

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