

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

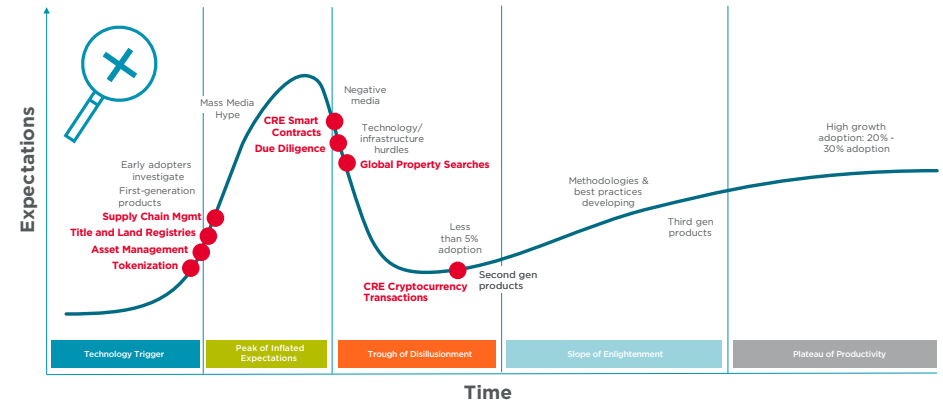
November 2018

EXECUTIVE SUMMARY

- Blockchain, the technology behind cryptocurrencies, has the potential to disrupt the commercial real estate (CRE) industry. The three benefits of blockchain technology—efficiency, security and transparency—can transform CRE transactions ranging from property listings, asset management and the purchase and sale of properties.
- Cryptocurrencies have been utilized by early adopters to purchase residential assets, however, their widespread use in CRE will probably be through the tokenization of assets, opening up commercial real estate to more retail participants.
- There are many barriers to the widespread adoption of blockchain and its related technologies. In order to gain acceptance, all participants need to agree on a consensus protocol, and that is often cumbersome. Processing speed is currently also an issue. Other barriers include regulatory uncertainty, volatility of cryptocurrencies and, most importantly, the accuracy of the databases that underlie blockchain.
- However, companies are developing applications, standards and processes to overcome many of these hurdles.

BLOCKCHAIN-RELATED CRE APPLICATIONS ON THE “HYPER CYCLE”

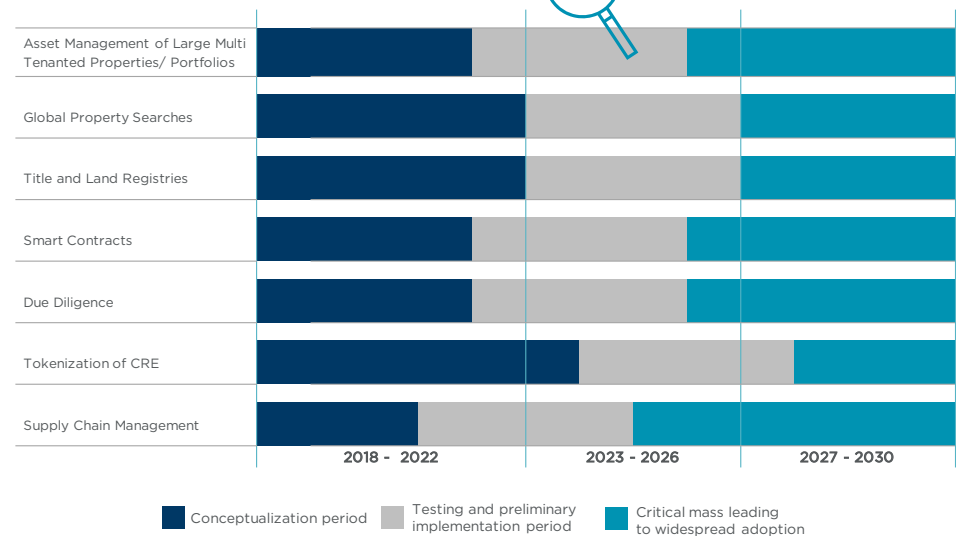
Click to zoom



Source: Gartner, Cushman & Wakefield Research

ADOPTION TIMELINE

Click to zoom



Source: Cushman & Wakefield Research

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

- The CRE industry will need to respond to the adoption of blockchain and cryptocurrencies by major industry groups and clients. As institutional occupiers, owners and investors implement blockchain technology in their operations and processes, the CRE industry will need to be ready to align with the technology seamlessly.
- If blockchain technology is to gain traction, early adoption by large users such as banks and insurers is vital. Once systems are in place, are verifiably secure and shown to improve efficiencies, other users will most likely follow.
- Cushman & Wakefield Research expects blockchain technology will be widely adopted in a decade. It anticipates individual applications in the CRE space will develop as the technology matures.

Blockchain and Cryptocurrencies: Setting the Scene

Cryptocurrencies and their underlying blockchain technology are widely touted as the next technology advancement with potential to disrupt commercial real estate markets. But is it another overhyped technology?

Blockchain is often conflated with the cryptocurrency bitcoin, leading to the view that blockchain is primarily a “database for money,” relevant to financial services, but with limited application to other sectors.

Blockchain is actually a shared digital ledger of transactions recorded and verified across a network of participants in a tamper-proof and visible chain. Permissions determine who can access or participate in the chain. Most commercial applications are expected to use a permissioned model.

IS IT BLOCKCHAIN? OR IS IT BITCOIN?

Smart Contracts are another train running on the blockchain track.

Bitcoin is a train that runs along a blockchain track. It is the predominant cryptocurrency and has monetary value.



Blockchain is the technology behind cryptocurrencies, much like tracks for numerous trains. The tracks are currently being built for an infinite number of trains

Blockchain Technology Primer

Consensus protocol: The decentralized nature of blockchain means that there is more than one person in charge of making decisions for a group. The group must reach a consensus about whether a block can be added to the chain. Rules (protocols) for adding blocks are set up early in a project. The group relies on this protocol when confirming transactions, thus bypassing third-party authentications.

Processing speed: Mainly refers to computational energy required to authenticate transactions.

Hype cycle: Gartner’s hype cycle depicts the path a new technology takes before attaining widespread adoption.

Decentralized systems: Currently, most systems are housed within a central repository or bank of networks. In a decentralized system, the information exists in various systems at the same time. This increases security. A hacker infiltrating a centralized network could gain access to ALL the data on it, whereas a hacker would need to infiltrate ALL decentralized systems to gain access to the data.

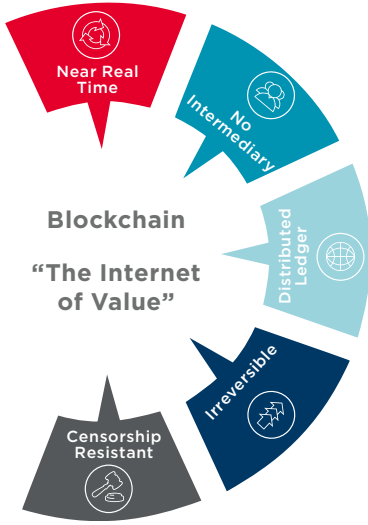
Tokenization: Interest in a real estate asset is represented by virtual tokens on a blockchain platform. The interest represents fractional ownership in equity, debt, or other variations.

BLOCKCHAIN, BITCOIN AND REAL ESTATE

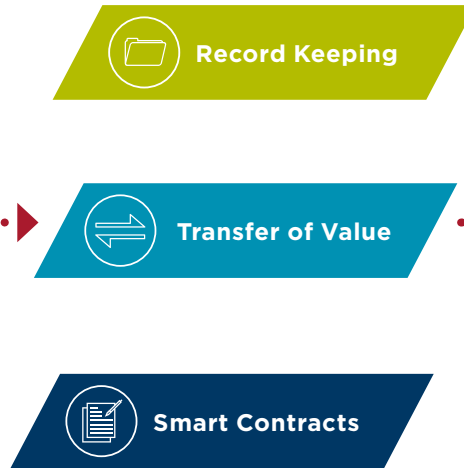
Part 2 of the Tech Disruptor Series

BLOCKCHAIN FUNDAMENTALS

FEATURES



PURPOSE



TYPES

PUBLIC BLOCKCHAIN

- Fully decentralized - requires very low trust
- Fully transparent - Anyone can read, send transactions and participate in the consensus process
- Secured by economic incentives and cryptographic verification; Low cost for transactions

PERMISSIONED BLOCKCHAIN

- Quasi decentralized - hybrid; Read permission of the blockchain restricted to participants
- Participants can agree to rule changes, reversals and modification
- Greater degree of privacy protections as only preselected entities are allowed to read the blockchain

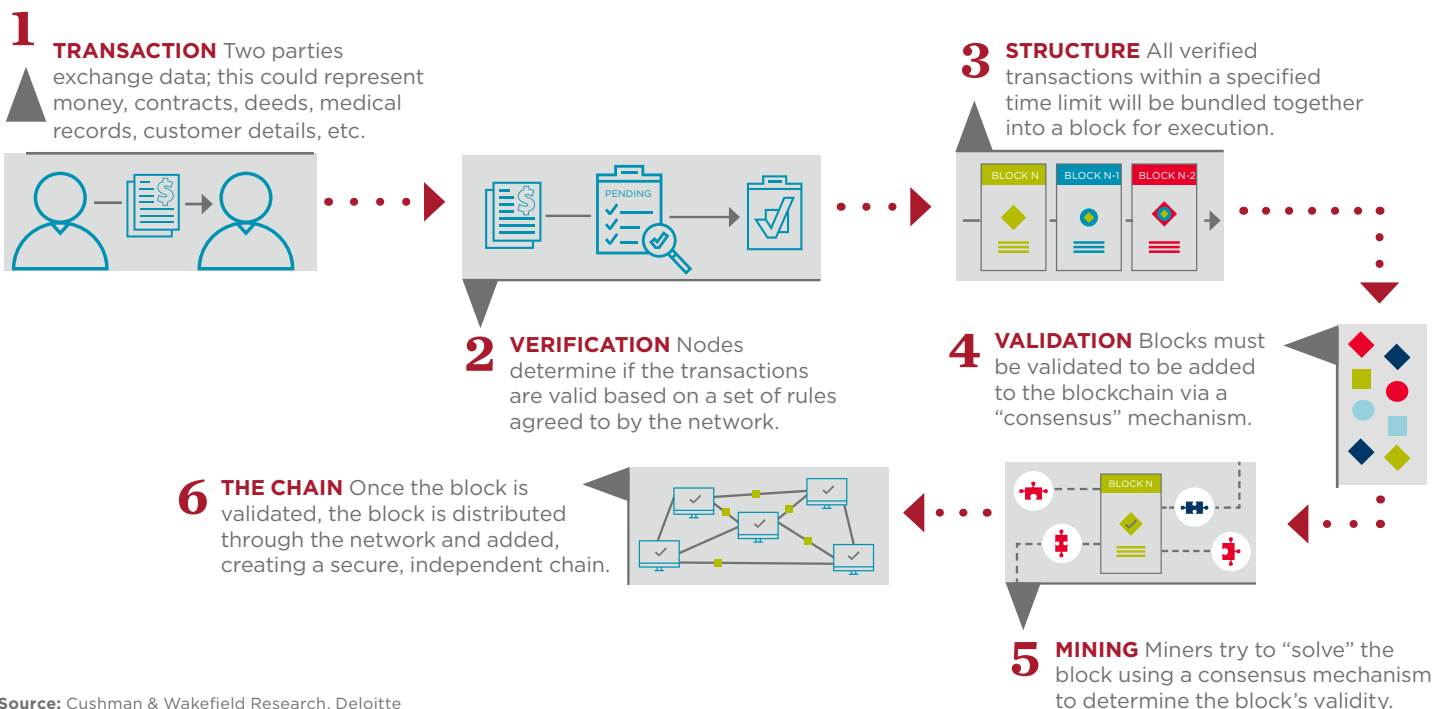
PRIVATE BLOCKCHAIN

- Centralized- requires 'high trust' entity
- Only the centralized authority has the capability to agree to rule changes, transaction reversals and modification
- Transaction costs dictated by one entity

Source: Cushman & Wakefield Research, Deloitte

HOW DOES A BLOCKCHAIN TRANSACTION WORK?

Once a transaction is posted on the network, several activities occur in order for that transaction to be processed and recorded on the blockchain.



Source: Cushman & Wakefield Research, Deloitte

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

As cryptocurrencies vie for position in the global monetary eco-system, Cushman & Wakefield Research believes the blockchain technology behind them—using distributed ledgers—has the greatest potential to be widely adopted in the commercial real estate space. Blockchain has three benefits that lend itself to widespread commercial applications:

- Distributed ledgers provide a level of **efficiency**, particularly in multiparty transactions, that current commercial real estate processes and systems lack—from financial transactions and due diligence to supply chain tracking.
- Blockchain technology increases **security** and reduces fraud, thereby increasing trust since all

parties have access to the same information in real time. This opens up markets to a wider range of players and enables peer-to-peer transactions.

- Blockchain transactions are also **transparent**. This transparency does not result in loss of privacy or security; indeed, blockchain technology actually reinforces both.

The impact of innovations like blockchain is the result of the convergence with other technologies, thus enabling new business models. This paper evaluates current applications of blockchain and cryptocurrencies in the commercial real estate space and considers the technology’s potential growth trajectory, likely hurdles and a suggested timeframe for fruition.

Potential uses in the CRE industry

Some of the potential applications of blockchain in CRE include:

CRE SPACE	IMPACT AND POTENTIAL DISRUPTION	ILLUSTRATIVE EXAMPLES OF COMPANIES USING BLOCKCHAIN
Property due diligence for transactions	<p>Cryptocurrency payments can enable real-time transaction settlements, reducing the time to close transactions through the existing banking infrastructure.</p> <p>Fees tied to document preparation and review can be drastically reduced on a blockchain. Cryptocurrency transfers would reduce those costs significantly.</p>	Northern Trust, in partnership with IBM, ¹ has launched several blockchain initiatives that have improved efficiencies in financial transactions and auditing.
Asset management of large multi-tenanted properties/ portfolios	<p>Facilitate automation of invoicing, reconciliations and lease management.</p> <p>Eventually, lease payments will also be monitored through blockchain applications.</p> <p>Automation will shift job skills to higher competencies, freeing up the workforce to focus on value-add tenant and owner services.</p>	The city of Rotterdam ² partnered with Cambridge Innovation Center and Deloitte Netherlands to develop blockchain applications that will record leases.
Global property searches	By increasing transparency and access, blockchain speeds up the process of matching buyers to sellers in a truly borderless system.	Swiss-based eLocations, ³ focused on global retail property listings, aims to provide a decentralized platform for retail properties giving owners, tenants and brokers real-time access to their property listings allowing them to edit or correct information.
Title and land Registries	<p>Government registries are often opaque and cumbersome. Blockchain can record, track, transfer and store registries, and provide instant authentications.</p> <p>Eliminates need for various third parties involved in title searches and authentication.</p>	<p>Her Majesty’s Land Registry (HMLR),⁴ which registers properties in England and Wales, announced a partnership with tech firm Methods to deploy blockchain technology. The goal is to simplify the registration process and provide transparency to the buying-selling of properties.</p> <p>Delaware-based Ubitquity⁵ offers a blockchain platform for financial, title, and mortgage companies. The company is currently working with the Land Records Bureau in Brazil to overhaul the land registries of two municipalities.</p>

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

Potential uses in the CRE industry (Continued)

CRE SPACE	IMPACT AND POTENTIAL DISRUPTION	ILLUSTRATIVE EXAMPLES OF COMPANIES USING BLOCKCHAIN
Smart contracts	<p>Smart contracts automatically authenticate buyer and seller identities using unique blockchain passcodes. The verified identity is then used throughout the process, eliminating the need for further authentication at each step of the process. Third-party providers that authenticate and process transactions will be either eliminated or significantly reduced, resulting in faster closings.</p> <p>Documents on a blockchain will remain immutable, however, amendments can be appended to show changes which must be approved by all parties. Due diligence will most likely remain the same with added requirements for experts who understand blockchain to be part of the process.</p> <p>Smart contracts can be used in any facet of CRE transactions, from buying/ selling properties to leasing agreements, property management and vendor agreements. Buy in from several sectors would be necessary for smart contracts to work seamlessly and smoothly. Please click here for more on smart contracts.</p>	<p>StreetWire,⁶ a New York-based company, is launching smart contracts for renting or buying properties, obviating the need for onerous paper transactions.</p> <p>San Francisco-based Propy⁷ has successfully completed a handful of residential real estate transactions via its blockchain smart contracts in San Francisco and overseas. The goal is to expand to the commercial property space both in the San Francisco market and globally. Its property registry currently includes a mix of properties in both spheres.</p>
Tokenization of CRE	<p>A property is allocated a number of tokens based on its value and tokens are available for purchase by investors. This increases liquidity by allowing for partial ownership in an asset by several investors. Tokens would be listed on an exchange and subject to regulatory compliance.</p>	<p>London-based Leaseum⁸ partnered with New York based Michael Chetrit to create a \$250 million blockchain-based investment fund. The fund will be backed by New York office properties and aims to distribute rent based dividends and capital gains from property sales. Token holders will be able to trade on a peer-to-peer basis, bypassing typical hold requirements.</p>
Supply chain management	<p>eCommerce has increased the volume of goods moving along the supply chain, resulting in increased costs⁹ throughout, but particularly at the last mile.</p> <p>Blockchain tracks and documents products through the supply chain process—reducing time delays, added costs and human errors. Blockchain would facilitate the automated ordering of items as it becomes integrated with a warehouse's IOT.</p>	<p>CB Insights¹⁰ tracks firms such as Provenance (tracking and documenting supply chain processes) and Hijro (formerly Fluent)—which offer an alternative platform for lending into global supply chains—and Skuchain, which builds blockchain-based products for the business-to-business trade and supply chain finance market.</p>

Source: Cushman & Wakefield Research

¹ <https://www.ibm.com/case-studies/t059754h46738r79>

² <https://www2.deloitte.com/nl/nl/pages/over-deloitte/articles/for-the-first-time-lease-agreements-are-recorded-in-blockchain.html>

³ <https://www.elocations.io/>

⁴ <https://www.gov.uk/government/news/hm-land-registry-to-explore-the-benefits-of-blockchain>

⁵ <https://www.ubitquity.io/web/about.html>

⁶ <http://www.streetwire.net/>

⁷ <https://propy.com/>

⁸ <https://www.leaseumpartners.com/>

⁹ <https://www.robeco.com/en/insights/2018/03/e-commerce-logistics-going-the-extra-mile.html>

¹⁰ <https://www.cbinsights.com/research/industries-disrupted-blockchain/>

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

Market Capitalization

- Global spending on blockchain technology totaled \$945 million in 2017.¹¹ This amount is forecast to increase to \$9.7 billion by 2021. Most of the growth is expected to come from the financial and banking sectors, as well as the public sector. On the other hand, cryptocurrencies despite the excitement remain a niche product subject to considerable volatility.
- Market capitalization of cryptocurrencies as of October 31, 2018 totaled \$208 billion,¹² nearly one fourth of its January 2018 value, highlighting its inherent volatility. Adoption in the CRE markets is patchy. To date, a handful of single-family home sales have transacted using cryptocurrency. In March 2018, the tokenization of a multifamily property in Brooklyn¹³ was launched by ConcenSys in partnership with owners Cayuga Capital Management and Cushman & Wakefield. The property was listed on an ethereum blockchain set up by ConcenSys where investors can purchase tokens representing a fractional ownership in the property. The building has been fully tokenized and equity raise is being performed through a private offering on the Meridio Platform. In December 2017, New York-based REALECOIN¹⁴ announced what it claimed was the world's first real estate fund for cryptocurrencies.

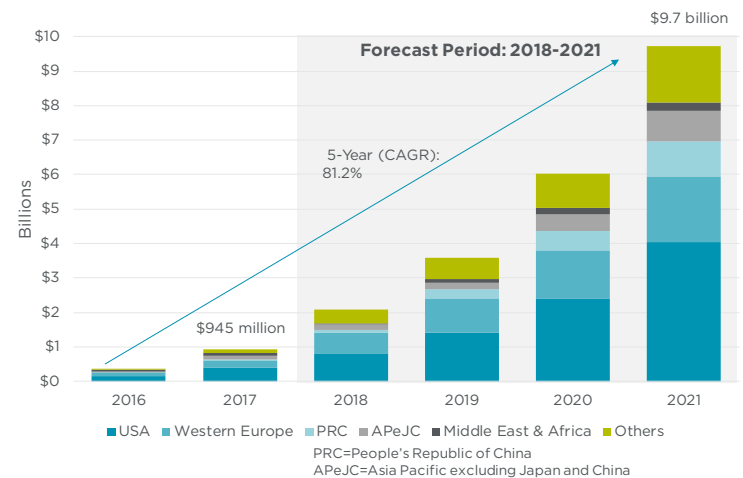
What's the catch? Hurdles to Widespread Adoption.

As noted in Cushman & Wakefield's first paper in the series,¹⁵ any technology must meet three preconditions before it is adopted widely and can affect the wider real estate markets as a whole: 1) acceptance, 2) convergence with other technologies and 3) scalability.

Some of the hurdles to wider acceptance and adoption include:

- Operational complexity and lack of standardization:** There may be many special-purpose blockchains created for a wide variety of applications. To gain widespread adoption, we believe technical standards will be needed to ensure similar technical implementations across industries, particularly in cases where multiple blockchains need to interact with each other. According to the *Financial Times*, SWIFT undertook an evaluation of banking transfers; this

GLOBAL BLOCKCHAIN SPENDING ANNUAL REGIONAL SPENDING, USD



Source: Cushman & Wakefield Research, IDC

required the creation of 100,000 subledgers, which is not viable operationally.

- Lack of trust and conflicts:** A blockchain database, like all databases, is only as good as its underlying data and business process. Failure to reach a consensus among counterparties because of business process or commercial conflicts could significantly slow or even halt blockchain's adoption.
- Privacy concerns:** Applying a distributed database to commercial transactions raises the question of whether organizations want to share information about counterparties. Similarly, the idea of "reputation management" could raise concerns about the ability to permanently impact reputations. Users will need to carefully weigh these factors.
- Slow speed and performance:** A distributed database is inherently slower than a centralized one, raising the question of whether blockchain is appropriate for high-speed, high-volume applications. Although many blockchain variants promise to enhance performance, this remains a

¹¹ <https://www.idc.com/getdoc.jsp?containerId=prUS43526618>

¹² <https://coinmarketcap.com/charts/>

¹³ <https://www.cnn.com/2018/03/19/own-shares-of-brooklyn-building-with-tokens-blockchain-real-estate.html>

¹⁴ <https://www.prnewswire.com/news-releases/realecoin-launches-new-digital-security-using-secure-platform-300731944.html>

¹⁵ Will Robots Take Over CRE? (<http://www.cushmanwakefield.com/en/research-and-insight/2018/will-robots-take-over-cre>)

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

question for commercial applications. The blockchain design requires all participants to keep records of transaction and there are limited on how many transactions the computers can share and store in a specified time period. Bitcoin is estimated to be able to handle seven transactions each second. By contrast, a firm such as Visa handles 50,000 transactions per second.¹⁶ While efforts to work through this involve adding new databases, the operational efficiencies of these still remain to be worked out.

In addition to these, cryptocurrencies have some specific challenges as well:

- **Volatility:** The value of bitcoin now hovers around \$6,000 per coin,¹⁷ down approximately 75% year-over-year. This limits its use from beyond a speculative investment to widespread use for commercial transactions. For instance, at Overstock.com—one of the first online retailers to accept cryptocurrency—only 0.2 percent of its 2017 revenue came from purchases utilizing cryptocurrencies,¹⁸ much of which was converted to dollars. This example demonstrates one of the challenges for cryptocurrency use in global transactions.
- **Crime:** Data from Autonomous NEXT¹⁹ and Crypto Aware suggest that about 15 percent of cryptocurrencies have been stolen between 2012 and the first half of 2018. This represents a cumulative \$1.7 billion in value at the time of the theft, and it could rise. In the first half of this year alone, more than \$800 million has already been stolen. Specific areas of fraud include money laundering, exploiting the 51% security flaw to gain control of blockchains, and “pump-and-dump” schemes in which an individual or group talk up the price of a cryptocurrency online, and then sell their shares immediately causing others to lose their investment. *The Wall Street Journal*²⁰ found over 175 pump-and-dump groups online, however, these schemes only work as long as individuals find takers

online. As cryptocurrency investors become more sophisticated, it will become more difficult to pump and dump.

- **Increased scrutiny from regulators:** The SEC²¹ currently requires that companies issuing initial coin offerings (ICO) must register with the SEC and be regulated as a securities exchange or to seek an exemption. The Internal Revenue Service (IRS) treats cryptocurrency as property.²² Cryptocurrency transactions trigger a tax event and possible capital gains, increasing the cost basis of making purchases with and trading virtual currencies. The IRS will most likely continue to monitor cryptocurrencies before revising these guidelines.

Blockchain Technology Primer

51% attack: This exploits blockchain’s decentralized network. Due to the decentralized nature of blockchain, data exists in multiple locations instead of one data repository. It takes a group consensus to validate data. In a 51% attack, an individual or group is able to take control of over 51% of the data, thereby, taking over ownership of the blockchain.

¹⁶ <https://www.nytimes.com/2018/06/27/business/dealbook/-blockchain-adoption-faces-hurdles.html>

¹⁷ <https://coinmarketcap.com/charts/>

¹⁸ <https://www.nytimes.com/2018/06/27/business/dealbook/overstock-cryptocurrency-blockchain-evolution.html>

¹⁹ <https://www.reuters.com/article/crypto-currency-crime/rpt-hacked-scammed-and-on-your-own-navigating-cryptocurrency-wild-west-idUSL2N1WX10G>

²⁰ https://www.wsj.com/graphics/cryptocurrency-schemes-generate-big-coin/?mod=article_inline?mod=hp_lead_pos9

²¹ <https://www.sec.gov/ICO>

²² <https://www.irs.gov/businesses/small-businesses-self-employed/virtual-currencies>

BLOCKCHAIN, BITCOIN AND REAL ESTATE

Part 2 of the Tech Disruptor Series

We shall overcome! (excluding ICOs)

Blockchain companies are working to overcome the various hurdles to adoption and there is considerable financial backing for this. Per *CB Insights*,²³ just over \$1.0 billion in venture capital was deployed in 2017 by investors in the blockchain space, representing 215 total deals. Total investing in the fourth quarter of 2017 was \$392 million, nearly four times the \$93 million invested in the fourth quarter of 2016.

In a recent report, Deloitte²⁴ notes that some headway is being made in overcoming some of the hurdles:

Regulatory Support: U.S. federal and state regulatory bodies are beginning to pass blockchain-related legislation. The bills address many of the concerns around adoption, including cryptographic signatures, standardization of smart contracts and record keeping. More regulation should bring clarity to many of these issues and alleviate the concerns around regulatory uncertainty.

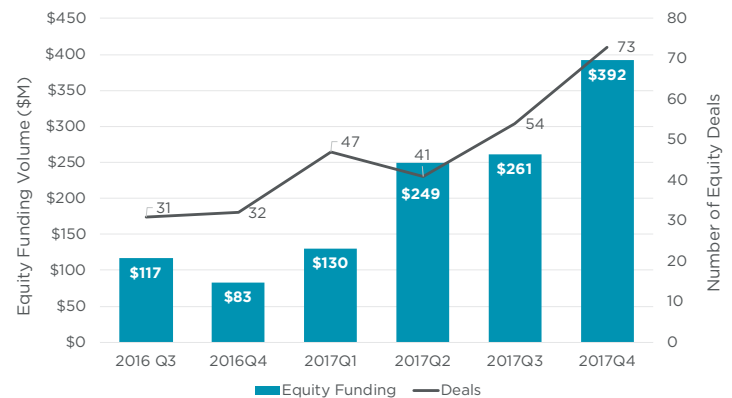
Increasing speed: Firms such as Zilliqa²⁵ are developing “sharding,” a process that helps improve speeds. Processing speeds have reportedly increased to 2,000 transactions per second.

Standardization: Efforts are underway to introduce standards for the different applications of blockchain. Implementation of standards would allow separate blockchains to work together, improving collaboration.

Collaboration and agreement: Collaboration among users is increasing as many entities, including regulatory bodies, are joining consortia globally to develop market-specific standards.

Operational Complexity: Major tech companies, including IBM and Microsoft, are developing platforms that are both easier to use and more cost effective. Blockchain complexity has led to a steep learning curve, making implementation difficult. Streamlining and clearing up processes would allow users to focus in the increased efficiencies gained by adopting blockchain instead of the complexity of the system.

QUARTERLY BLOCKCHAIN EQUITY FINANCING



Source: Cushman & Wakefield Research, CB Insights

The implementation of blockchain technology in the CRE space will increase as hurdles are addressed, although the impact on real estate markets will possibly lag slightly. The timeline for adoption follows Gartner’s expectations that blockchain technology will be widely adopted in a decade; therefore, Cushman & Wakefield Research anticipates individual applications of blockchain in the CRE space will develop as the technology matures.

If blockchain and cryptocurrency are to gain traction, early adoption by large users—such as banks and insurers—will need to occur. Once the systems are in place, are verifiably secure and are shown to improve efficiencies, other users will most likely follow.

²³ <https://www.cbinsights.com/research/blockchain-vc-ico-funding/>

²⁴ <https://www2.deloitte.com/insights/us/en/focus/signals-for-strategists/value-of-blockchain-applications-interoperability.html>

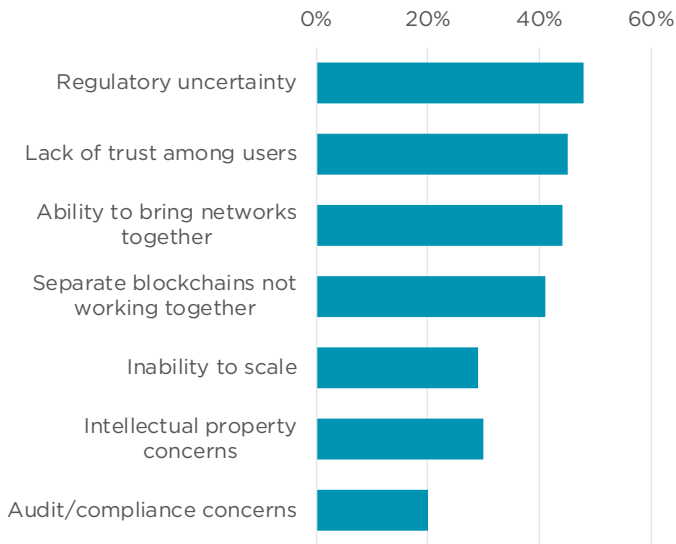
²⁵ <https://blog.zilliqa.com/zilliqa-testnet-v1-0-release-codename-red-prawn-27974ca46ecb>

²⁶ <https://www2.deloitte.com/insights/us/en/focus/signals-for-strategists/value-of-blockchain-applications-interoperability.html>

OVERCOMING OBSTACLES TO ADOPTION

Biggest Barriers to Blockchain Adoption

PwC's 2018 survey of 600 executives from 15 territories



But some barriers are falling: Deloitte's five vectors of progress

- **Regulatory Support:** US, state and federal regulatory bodies beginning to pass blockchain related legislation
- **Collaboration:** Collaboration among users is increasing as many, including regulatory bodies, are joining consortia globally to develop market specific standards and improve the technology.
- **Standardization:** Efforts are underway to introduce standards for the different applications of blockchain.
- **Operational Complexity:** Major tech companies, including IBM, Microsoft, Amazon, are developing platforms that are both easier to use and more cost effective.
- **Increasing speed:** New mechanisms being developed to improve the speed of blockchain. Decreasing the energy consumption and time for processing is essential.

Source: Cushman & Wakefield, PwC, Deloitte

RESEARCH CONTACTS

Revathi Greenwood

Americas Head of Research

+1 202 463 2100

revathi.greenwood@cushwake.com

Follow Revathi on [Twitter](#) or connect on [LinkedIn](#)

Sandy Romero

Senior Analyst

+1 212 713 6970

sandy.romero@cushwake.com

TECHNOLOGY CONTACTS

Melanie Kirkwood Ruiz

CIO, Americas

+1 312 424 8008

melanie.ruiz@cushwake.com

Marcio DaCosta

Technology Solution Owner

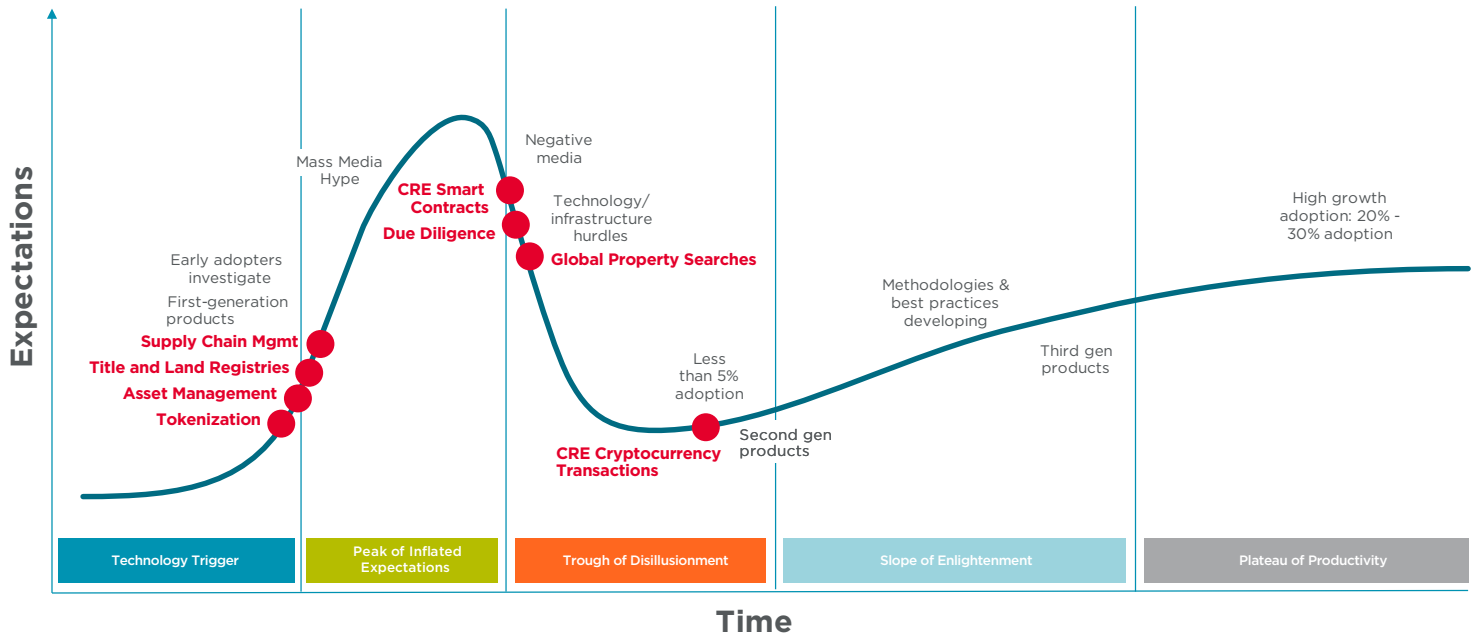
marcio.dacosta@cushwake.com



About Cushman & Wakefield

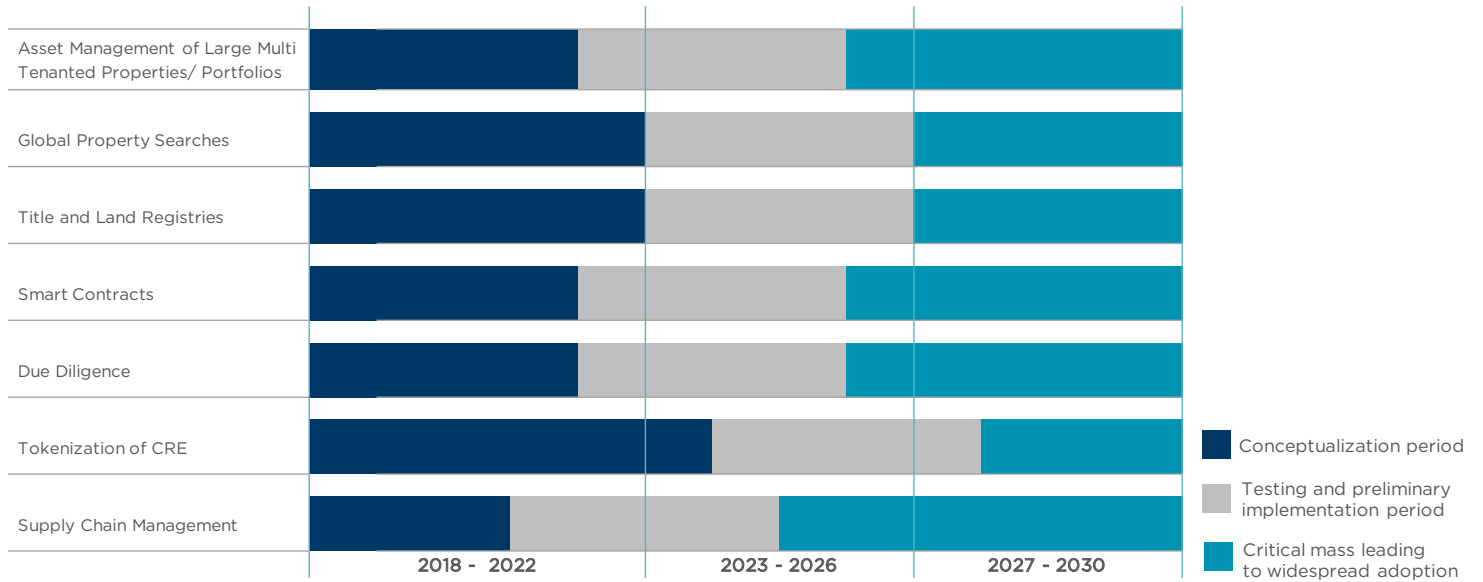
Cushman & Wakefield (NYSE: CWK) is a leading global real estate services firm that delivers exceptional value by putting ideas into action for real estate occupiers and owners. Cushman & Wakefield is among the largest real estate services firms with 48,000 employees in approximately 400 offices and 70 countries. In 2017, the firm had revenue of \$6.9 billion across core services of property, facilities and project management, leasing, capital markets, valuation and other services. To learn more, visit www.cushmanwakefield.com or follow [@CushWake](#) on Twitter.

BLOCKCHAIN-RELATED CRE APPLICATIONS ON THE “HYPE CYCLE”



Source: Gartner, Cushman & Wakefield Research

ADOPTION TIMELINE



Source: Cushman & Wakefield Research

SMART CONTRACTS SIMPLIFY CRE TRANSACTIONS AND BUSINESS

Costs and complexity of transactions are mounting in the current environment

CROWDED TRANSACTIONS



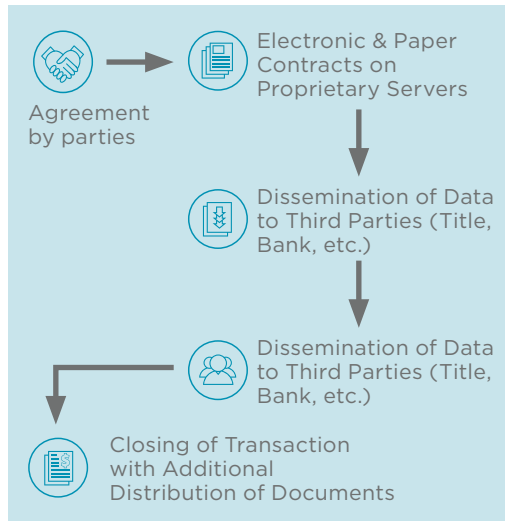
The potential amount of parties involved in a real estate purchase:

- | | | |
|-------------|-----------------|----------|
| Buyer | Title Company | Auditor |
| Seller | Appraiser | Surveyor |
| Realtor | Insurer | Others |
| Underwriter | County Recorder | |
| Lender | Inspector | |

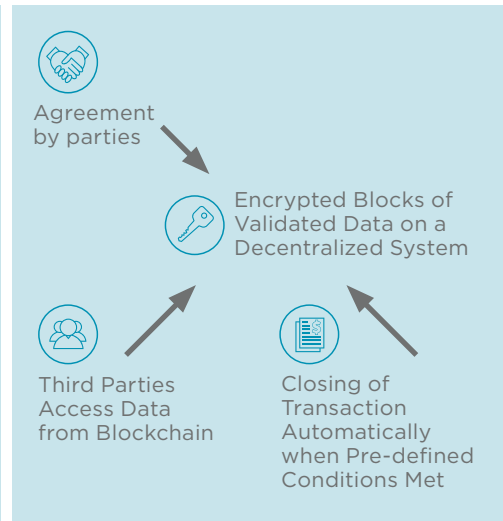
TIME AND COST SAVINGS

- Smart contracts eliminate the need for paper, which is slowing down the CRE industry
- All data on the blockchain would be verified and encrypted, which makes it re-usable

CURRENT CONTRACT SYSTEM



SMART CONTRACTS ON BLOCKCHAIN



Source: Cushman & Wakefield Research