

THOMSON REUTERS PROJECTS:

Blockchain for Construction/Real Estate

Executive Summary

In April 2018, Thomson Reuters Projects (TRP) and consultancy firm Cavendish Maxwell hosted a jointly-organised webinar on blockchain and its potential applications for the construction and real estate industries in the Middle East and North Africa, particularly focusing on the United Arab Emirates. The webinar brought together local and regional industry experts to discuss the latest developments and potential benefits of blockchain and smart contracts, plus the challenges of applying this new technology to the sector.

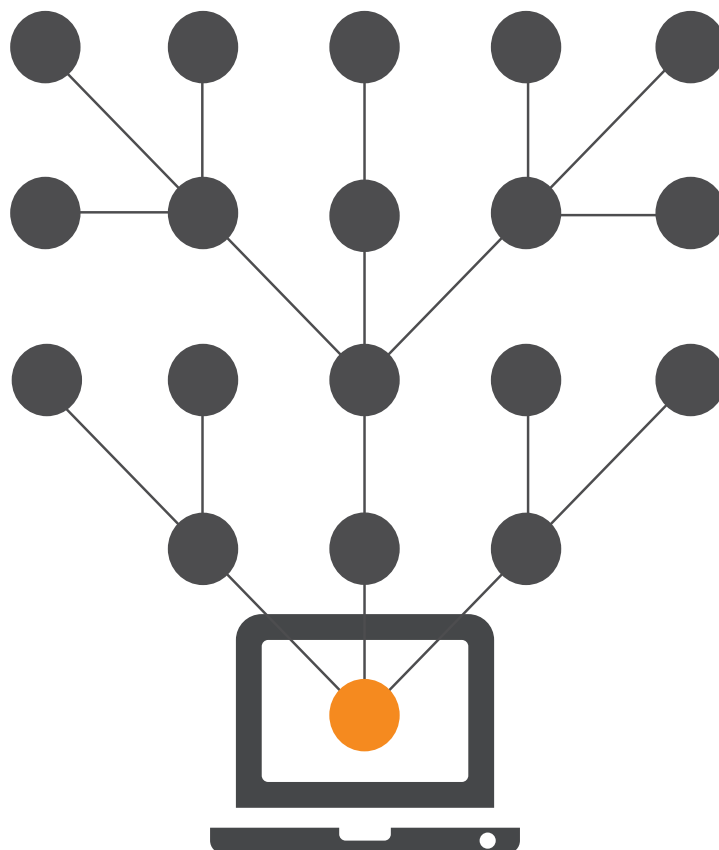
Guest speakers included Riad Bsaibes, President and Chief Executive of the Amana Investments, the holding company of the Amana Contracting and an active investor in contech companies; Robert Flaws, Legal Director of law firm CMS's Dubai office; Saqr Ereqat, Blockchain Evangelist at technology giant IBM; and Tanvir Shah, Managing Director at The Partnerships Consulting, a Dubai-based advisory firm.

Cavendish Maxwell's construction expert Craig Ross moderated the one-hour session on blockchain, which is best known as the technology underpinning cryptocurrencies such as Bitcoin, but which could dramatically alter business models by speeding up transactions and cutting costs.

Participants agreed that the use of blockchain and smart contracts in construction and real estate was likely to increase over the next few years, a phenomenon that will be more pronounced in Dubai thanks to the government's [Smart Dubai](#) initiative.

However, lawmakers must introduce new legislation to govern how disputes on blockchain and smart contracts will be handled before the technology can go mainstream, and it is likely to face some resistance among professionals in both the construction and legal industries.

The details of what was discussed during the webinar are covered in this white paper.



Introduction

A large part of digitized information is today hosted on various systems. As a result, businesses often face challenges such as a lack of transparency and efficiency, while a higher rate of inaccuracies creates a greater potential for fraud and disputes.

Blockchain technology – a digitized, distributed ledger that immutably records and shares information – could enable the commercial real estate (CRE) industry to address these inefficiencies and inaccuracies, according to consultancy firm Deloitte.

A 2015 World Economic Forum survey of 800 executives and experts from the information and communications technology (ICT) sector found that 58 percent of respondents believe that a **tenth of global gross domestic product (GDP) will be stored on blockchain technology by 2025.**

Until recently, blockchain was largely known as the technology powering Bitcoin. However, construction industry players now realise that blockchain-based smart contracts could play a much larger role in the sector, potentially transforming core operations such as property transactions (purchase, sale, financing, leasing and management), Deloitte wrote.

Smart contracts use a software code to automate tasks that would otherwise involve hours of paperwork processing. These self-executing contracts, which define the rules and penalties around an agreement, help exchange money, property or shares in a traceable and transparent way while avoiding the need for the services of a middleman, speeding up transactions, cutting costs and improving the trust among the parties.

Over time, blockchain adoption can have a broader impact, because it can be linked to public utility services such as smart parking, waste, water, and energy billing, and also enable data-driven city management.

Dubai, one of the seven emirates making up the United Arab Emirates, in the UAE, aims to become the first government worldwide to **conduct all its transactions via an online encrypted database by 2020.**

If achieved, visa applications, bill payments and license renewals, which total over 100 million documents each year, will be recorded using blockchain, slashing the amount of paperwork. Switching to blockchain could save the Dubai's government \$1.5 billion a year, according to official estimates.

Over half of the UAE's federal government transactions should be powered by blockchain technology by 2021, helping the country save some 11 billion dirhams it spends every year on processing documents, **the government said in April.**

In October 2017, **Dubai Land Department launched a blockchain-powered database** to record all real estate contracts and link them with the local utility provider, telecommunications systems and other property-related bills.

Dubai has also announced plans to launch its own **blockchain-based cryptocurrency emCash** that people can use to pay for various services, from a trip to the coffee shop to school fees and utility bills.



Benefits of Blockchain technology



Near real-time - Blockchain enables near real-time settlement of recorded transactions, removing potential conflicts and reducing risk.



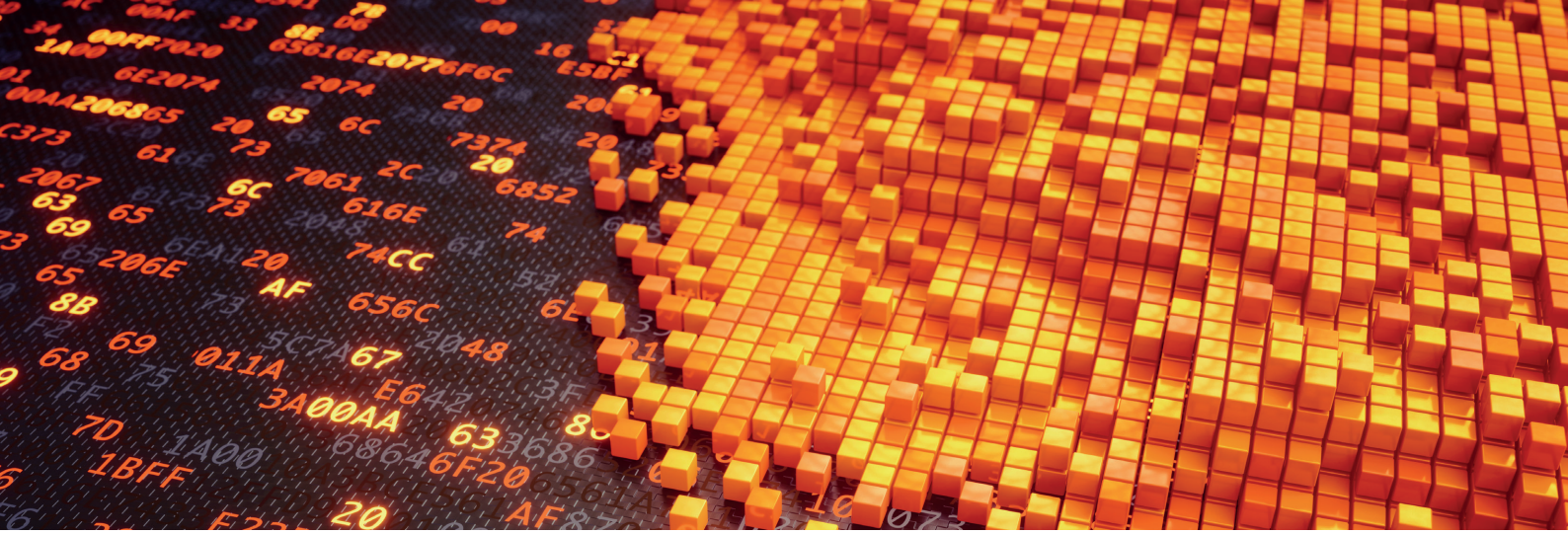
Direct transactions - Blockchain technology is based on digital signature, allowing any two parties to transact directly with each other without the need for a trusted third party, such as a regulatory or government authority.



Distributed ledger - The peer-to-peer distributed network records a history of all transactions. Blockchain retains a secure source of proof that the transaction happened.



Fraud proof - Blockchain contains a certain and verifiable record of every transaction ever made and prevents deleting of past information, which alleviates the risk of double spending, fraud and manipulation of transactions.



Blockchain applications

Much hype surrounds cryptocurrencies such as Bitcoin, one of the largest public blockchain networks, but cryptocurrencies represent only one application of blockchain technology.

From a construction and real estate industry perspective, especially real estate finance, blockchain's potential lies in its ability to verify transactions between multiple parties and execute smart contracts through the lifetime of a particular construction project.

There are two big differences regarding how cryptocurrencies function and how blockchain applications in the construction industry will likely work.

One is that cryptocurrencies, and the blockchain upon which they are based, are publicly available instruments, whereas a distributed ledger to verify transactions and financing deals in the construction industry will likely be a private protocol accessed only by the parties involved.

Secondly, a construction-related blockchain will likely be connected to a small number of nodes – a connection to the network - while a cryptocurrency such as Bitcoin has around 10,000 reachable nodes, according to some estimates.

Public vs private blockchain

The only difference between public and private blockchain is who is allowed to participate in the network, execute the consensus protocol and maintain the shared ledger.

A public blockchain network is completely open and anyone can join and participate in the network, with the Bitcoin cryptocurrency an example of such a setting.

Such a model, however, has two main disadvantages. A public blockchain network requires a substantial amount of computational power needed to maintain a distributed ledger at a large scale. Another one is the openness of public blockchain, which means little to no privacy for transactions and only a weak perception of security.

On the other hand, a private blockchain network requires an invitation to participate, which must be approved by either the network starter or by a set of rules. Restrictions can also apply on who is allowed to participate in certain transactions.

The access could be controlled by existing participants or a regulator issuing participation licenses. Once a business joined such a network it participates in maintaining blockchain in a decentralized manner.

Hyperledger Fabric, hosted by the Linux Foundation, is an example of such a permissioned network.

Privacy and transparency

Data privacy is a major concern worldwide and it is no different for blockchain.

For real estate transactions, one of blockchain's advantages is its encryption, but the industry nonetheless has concerns as to how to balance privacy with making sufficient details public – at least to regulatory authorities – to legally allow a transaction to be completed.

Blockchain is a distributed ledger that will retain a permanent, tamperproof transaction record, which is one of its main advantages for real estate. Should the transaction ledger be shared across the entire industry network, it will promote transparency and help minimise mistrust among industry players, speeding up the whole transaction process.

From a legal perspective, there will be a clash between individuals and entities wanting to remove certain data from the transaction record and those who want to maximise disclosure. One of the key developments will be to see how blockchain complies with privacy and data use.

Supply chain tracking

Walmart said in April 2018 it was ready to use blockchain technology in its fresh food business.

Blockchain enables Walmart to shorten the time it takes to track produce from six days to two seconds, which illustrates how this technology can help other sectors such as construction make tracking of their supply chain more efficient.

The company, which began running tests with IBM in 2016, is now encouraging suppliers to put food on blockchain, which Walmart says can help reduce waste and improve contamination management and transparency.



Slashing complexity

A great deal of data is generated during the lifecycle of a project in the construction sector.

There are serious leaks and gaps in both the origination of construction finance loans and management of loans. The current way of managing these transactions through extensive paperwork provides opportunities for fraud and negligence, whereas a shared ledger visible to all parties simultaneously vastly reduces the potential for malpractice.

Blockchain technology distributed on a private protocol can decrease complexity and, in effect, increase the speed of related transactions.

In one of the latest local initiatives, Evareium, a blockchain-powered platform developed and managed by the UAE-based Evarei Management, aims to digitalize real estate investments through the use of tokens as digital assets. Apart from property investments, network participants should be also able to use tokens built on a smart contract for customer services such as smart leasing.

Contract innovation

Looking at the real estate and construction sector from a legal perspective, blockchain will require fundamental changes to the way entities contract with each other.

Within the industry, people are comfortable dealing with a lot of paperwork, so a change of mindset will be required to convince them of the merits of switching to blockchain-enabled smart contracts.

That will not be straightforward because many common events that occur in construction projects are difficult to encapsulate in computer code. These include force majeure, new legislation or an on-site accident causing work to stop, for example.

For blockchain and smart contracts to become successful innovations in the construction industry, these new concepts must transform traditional contracts into something more innovative and useful.



Legislation and smart contracts

The integration of blockchain into contractual obligations will enable certain actions to be activated automatically, such as payment to a contractor when an agreed construction milestone has been reached, and evidence of this is then added to the shared ledger.

But lawmakers have yet to introduce legislation to make what happens on the blockchain legally binding. A lack of such legislation will hinder blockchain adoption across various industries. Incorporating blockchain into the construction and real estate sector will likely be difficult and face legal obstacles.

Legislation is required to create proper functioning of smart contracts and to govern how disputes relating to such contracts will be resolved.

One such area is the issue of digital signatures. Each transaction on blockchain proves that consent was given by its participants, however, for it to be legally binding, their digital signatures have to be accepted as such.

On a public blockchain network anyone can approve a transaction with a personally created signature. But where a qualified signature is needed for a business transaction on blockchain, participants may have to go through a costly and time consuming process in order to receive a certificate from a trusted service provider.

The entities would have to be under a constant watch by the certificate provider, which, as a result, may have to manage a large number of certificates, defeating the purpose of a permissionless decentralised ledger.

An advantage of blockchain is that it is not possible to delete past information stored in the shared ledger, putting it at odds with data protection laws in many countries.

The legal profession may try to oppose blockchain adoption, which could make large parts of the industry obsolete. Yet, from a legal perspective, smart contracts are an interesting new area of law.

As blockchain use increases, the legal industry's challenge will be to incorporate traditional contractual models into software codes so that they can be executed without the need for a middleman.

That may have implications for notary services, for example, with parties no longer required to be physically present to confirm their identity if their private identification data are integrated into a digital signature and securely stored on blockchain.

Lawyers will have to change from being draftsmen and advisers to individuals who can perhaps write code themselves or work with organisations such as IBM to determine how blockchain can be integrated into current and future legislation to create a proper transactional structure.

Blockchain has already come a long way and deployment and adoption will accelerate over the next five years.

Legal disputes

Poor record keeping is a major cause of disputes between companies involved in the construction sector, while disagreements over transactions and the release of funds are also common.

Yet resolving such disputes would be far simpler if every transaction or deal between a borrower, lending bank and other related parties were recorded on the blockchain.

For example, blockchain technology leader IBM has incorporated blockchain into its internal dispute resolution procedures within the company. This has cut the average time it takes to resolve a dispute from 40 days to 10 days, freeing up \$100 million that had been allocated to settling such cases.

Property listings

In the real estate sector, blockchain technology could be used to create a master ledger that will prevent duplication of property listings on sales websites.

In the United States, a property for sale is usually represented by a single real estate agent and for this arrangement to be registered with state authorities. Such practices do not exist in the UAE, for example, and sellers tend to use multiple brokers in the hope of finding a buyer faster.

As the property market matures, the Dubai Land Department will likely demand to know who is listing what. If so, the regulator will probably maintain a master database of property listings, for which blockchain would be the ideal host.

All property listings could be included on blockchain, with all parties feeding data into this ledger. Consequently, private listing services by real estate agents would be of little use, with the blockchain cutting out the middleman.

Blockchain puts all data in a place where everyone can access it in a structured manner. Currently, a property transaction in Dubai will generate 300 pages of documents at Dubai Land Department, but if all transaction participants were on the blockchain the sales process would become much simpler. In theory, hundreds of buyers could look at the property and contact the owner directly.



Blockchain in banking

The UAE banking sector lags other markets such as China, India and United States in terms of digital banking and mobile wallets, although the UAE banking federation has spoken about smart contract and blockchain in line with government plans, while Emirates digital wallet will be a mobile wallet solution for 16 UAE banks.

There have also been other innovations this year. Dubai Islamic Bank, in conjunction with Dubai Land Department, [has launched e-mortgages](#), which promises to minimise the procedures for submitting documents to obtain a mortgage. Documents will be processed through the land department's electronic mortgage system, removing the need to visit the department in person.

In April, Emirates NBD [integrated blockchain onto its cheque books](#) to reduce fraud.

Blockchain in construction

Construction is a long-standing, traditional sector and as such change can be difficult to achieve - adopting blockchain technology will be tougher than in financial services, for example.

But as Dubai Land Department starts using blockchain to register deeds, payments and leases, this paradigm shift will trickle down to the contracting sector. Blockchain can be transformative for construction, but it will take time.

Experts forecast the use of blockchain in the real estate and construction sector will steadily expand over the next two to four years.

For general contractors, the benefits of this technology will be mainly around the use of smart contracts to interact with government authorities, various stakeholders and suppliers, and also provide transparency in the supply chain and payments.

In terms of payments, smart contracts should resolve much of the mistrust that exists between the client, contractor, subcontractors and suppliers.

Maersk/IBM blockchain joint venture

In January 2018, Maersk and IBM announced plans to launch a joint venture to provide a more efficient and secure method to conduct global trade using blockchain technology.

The new company will develop an open-source global trade digitisation platform for the entire shipping industry, which can also help the construction sector manage its supply chain, track supplies of raw materials and exchange information about shipments in real time.

Paperless trade will digitize and automate paperwork filings by enabling end-users to securely submit, validate and approve documents across organisational boundaries, helping to reduce the time and cost for clearance and cargo movement.

Blockchain-based smart contracts will ensure that all required approvals are in place, helping speed up workflows and reduce potential mistakes.

More than \$4 trillion in goods are shipped each year, with over 80 percent of the goods that consumers use daily carried by the ocean shipping industry.

Processing trade documents can account for as much as one-fifth of transportation costs; \$36 billion annually is spent on paperwork to ship goods.

The cost of global trade is estimated at \$1.8 trillion each year, with potential savings from employing more efficient process estimated at around 10 percent.

By reducing barriers within the international supply chain, global trade could increase by nearly 15 percent, boosting economies and creating jobs, according to the World Economic Forum.

Cryptocurrency payments

Cryptocurrencies are unlikely to be used to make property or construction project payments in the near future. Adoption of cryptocurrency payments will probably mirror acceptance in wider society.

Among homeowners, their property is usually the most valuable asset they own and also their largest debt, having taken out a mortgage to buy it. The volatility in cryptocurrency prices means property developers, investors and lending banks will be unwilling to conduct real estate transactions in the likes of Bitcoin for the foreseeable future.

Extensive legislation – as well cryptocurrency price stability – will be required before cryptocurrencies become widely used to conduct construction and real estate transactions.

But smart contracts do not need to wait for cryptocurrency volatility to abate. All it will take is for a few likeminded banks to come together to provide smart contracts for stakeholders. Cryptocurrencies are a separate blockchain application and smart contracts do not have to be settled in cryptocurrencies.

Conclusion

Blockchain technology will be to transactions what the internet was to data. It will provide companies with a completely different business model and change how firms fulfill contracts with each other, the webinar participants predicted.

Blockchain will enable businesses to achieve significant cost savings and speed up transactions, while also promoting transparency and trust through the use of the shared ledger, which will eliminate cumbersome paperwork.

However, new legislation is needed to guide the use of blockchain, smart contracts and dispute resolution before it can really take off. More time will be required for the construction sector to accept the new blockchain technology due to its "old school" traditionalist nature.

What will drive the regulatory change is a more widespread business use, experts believe. The more organisations start using and adapting this new technology, the more impetus there will be for regulators to catch up.

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