

ANOTHER GAME CHANGER

# Blockchain Tech

track as-built conditions, design issues, or conflicts

By William S. Thomas

Although it has been around in concept since 1991, “Blockchain” is only now on the verge of becoming a household term, and will soon be working its way into the construction industry. Essentially a distributed ledger technology system, blockchain provides security, transparency, and immutability to every transaction in its network. For these reasons, it has obvious application for participants in the construction field. Coupled with other emerging technological advances, such as “Smart Contracts,” blockchain could be another revolutionary game changer in an industry where such things have become commonplace. But, are construction professionals ready for yet another advancement promising to upend the most basic and critical operating systems in the industry: the contracts containing the terms of their agreement, the manner in which they get paid, and the construction documents themselves?

## BLOCKCHAIN BASICS, BENEFITS

Blockchain itself is a simple concept to understand. Rather than centralizing the storage of data, making it vulnerable to alteration, deletion or corruption, a blockchain spreads critical data out among several locations, and breaks it down into unchangeable “blocks.” The blocks are chained to other blocks so that every transaction impacting a set

of data are kept together. This creates redundancy and preserves security by preventing an outside actor from altering data at one instance of the database, since they would have to alter it all places it’s stored. If someone tampers with a record in the chain of a transaction, all other instances of the data would cross-reference each other and easily pinpoint the location with the incorrect information. This system helps establish an exact and transparent chronology. In this way, no single location within the network can alter all locations where information is securely held.

Coupled with existing BIM technology, blockchain could offer many immediate benefits to construction participants. BIM serves to facilitate digital centralization and universal access to project modeling, but is susceptible to alteration, corruption, and output error. Integrating blockchain into existing BIM technologies would foster more openness, security, and transparency with each transaction. A blockchain BIM system would prevent alteration of data through its built-in distributed network security, while still maintaining the collaborative process. Further, intellectual property can be easily identified and preserved through the secure and immutable “blocks” built into the process for information within the system, making attribution of creation or identification of errors simpler to discover.

Most important to construction professionals, merger of BIM and blockchain allows creation and implementation of smart contracts, which could automate the delivery processes for any project. Development of the BIM model based on a distributed digital register, which is updated and modified during contract execution, allows transactions occurring throughout the project to be entered into a non-modifiable chronology of all construction process stages. They are assigned blockchain properties, which guarantee the unchangeability of the data and allow control of every single step in the process. This allows a self-executing contract to govern the remaining contract execution phases, from design, commissioning, construction, and management of the project throughout its anticipated lifecycle.

## SMART CONTRACTS

Smart contracts then are computer code embedded into the blockchain to facilitate, verify, and execute a contract agreement. Smart contracts establish the conditions agreed to by all parties, such that, when those conditions are met, the terms of the agreement are automatically carried out. As an example, payouts between the parties are embedded in the blockchain and automatically execute when specific contractual conditions have been met, like delivery to the BIM system of the construction documents, delivery

of a specific component or completion of a specific phase of the project. In such an example, the payee initiates a transaction, or block, by uploading the deliverable for which it is seeking payment. The upload contains transaction data such as the date, time and payment amount for that block. Once the deliverable is uploaded, payment is executed. Both the payee and payor see the block of transaction data, so both parties can confirm the deliverable was uploaded and payment was sent and received.

Such a system could be a game changer for construction professionals. Blockchain used during the construction process can better track as-built conditions, and trace design issues or conflicts, assigning responsibility for delays or change order expenses. Supply chain management is made much easier with a blockchain system, allowing scheduling and tracking of every component for the project from source to site. Percent complete information



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and review of pay applications would be made much easier. Beyond completion of the project, the blockchain would simplify and automate project systems' maintenance and service life scheduling, take care of ordering parts and supplies, and simplify ownership's management of the property throughout its lifespan.

### CLOSING THOUGHT

Only 17 states have taken steps to introduce legislation relating to blockchain. Many of these legislative initiatives are merely studying the impact of blockchain technology, while others are blanket authorizations of electronic records, signatures, and contracts. Some permit outright the use of distributed ledger technology as an electronic record of transactions and permit use of smart

contracts. Until the states catch up to the state of the art, there may be some delay in widespread use of blockchain and smart contracts on everyday construction projects. Federal statutes already permit its use. However, international authorities are moving faster, and some high-profile corporations have already begun to implement these technologies. Perhaps it will be the industry itself that will be the driver in seeing these changes implemented sooner than later. ■

### about the author

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