

BLOCKCHAINS:

WHAT ARE THEY AND HOW THEY WILL AFFECT THE CONSTRUCTION INDUSTRY

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OVERVIEW

- Why should you care about Blockchain?
- What is a Blockchain?
- Blockchain in the Construction Industry / Surety Industry
- Cost
- Potential Legal Ramifications
- Going Forward

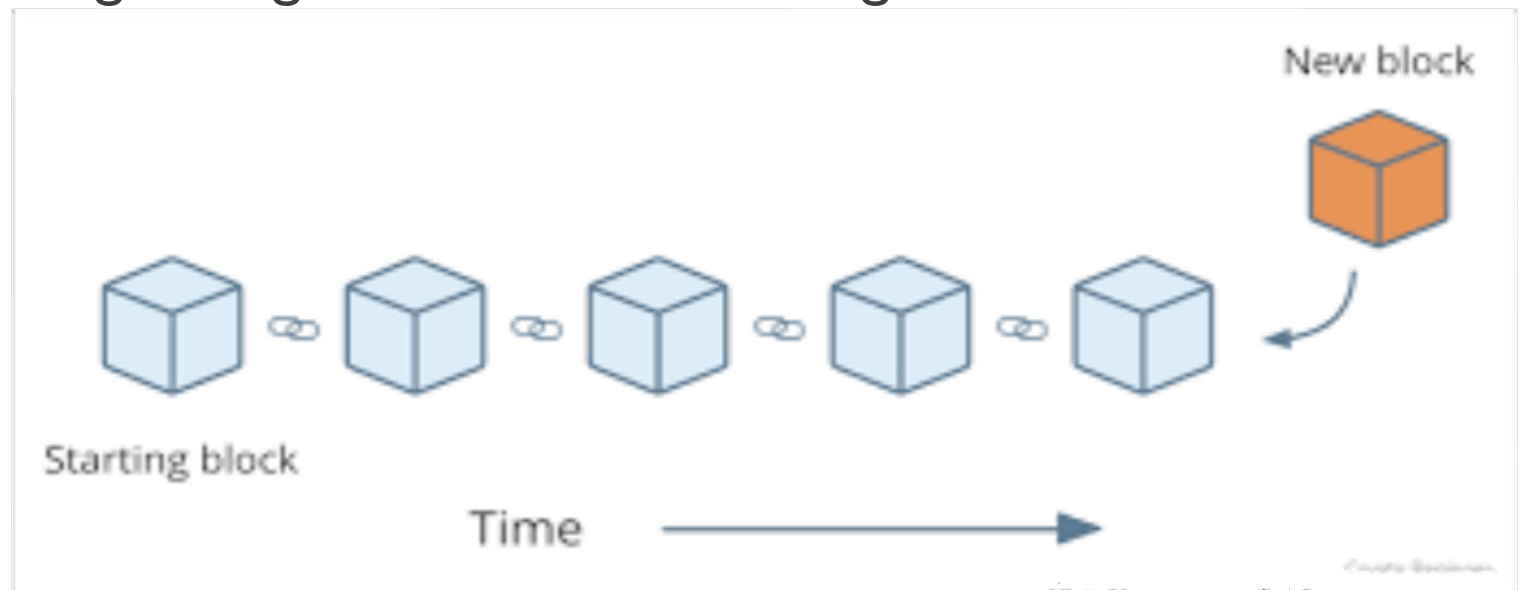
WHY DOES BLOCKCHAIN MATTER TO YOU?

- CFMA – with an emphasis on the “F”
- Implementation of Blockchain can help “trim the fat” and remove fragmentation of construction administration
- It is estimated Blockchain can takeover 80-85% of administrative tasks, freeing up the employee to do other tasks the computer cannot, or allowing the company to “trim the fat.” *Construction Management Blockchain Project Delivery, D.Graham (Oct. 9, 2018).*



WHAT IS BLOCKCHAIN?

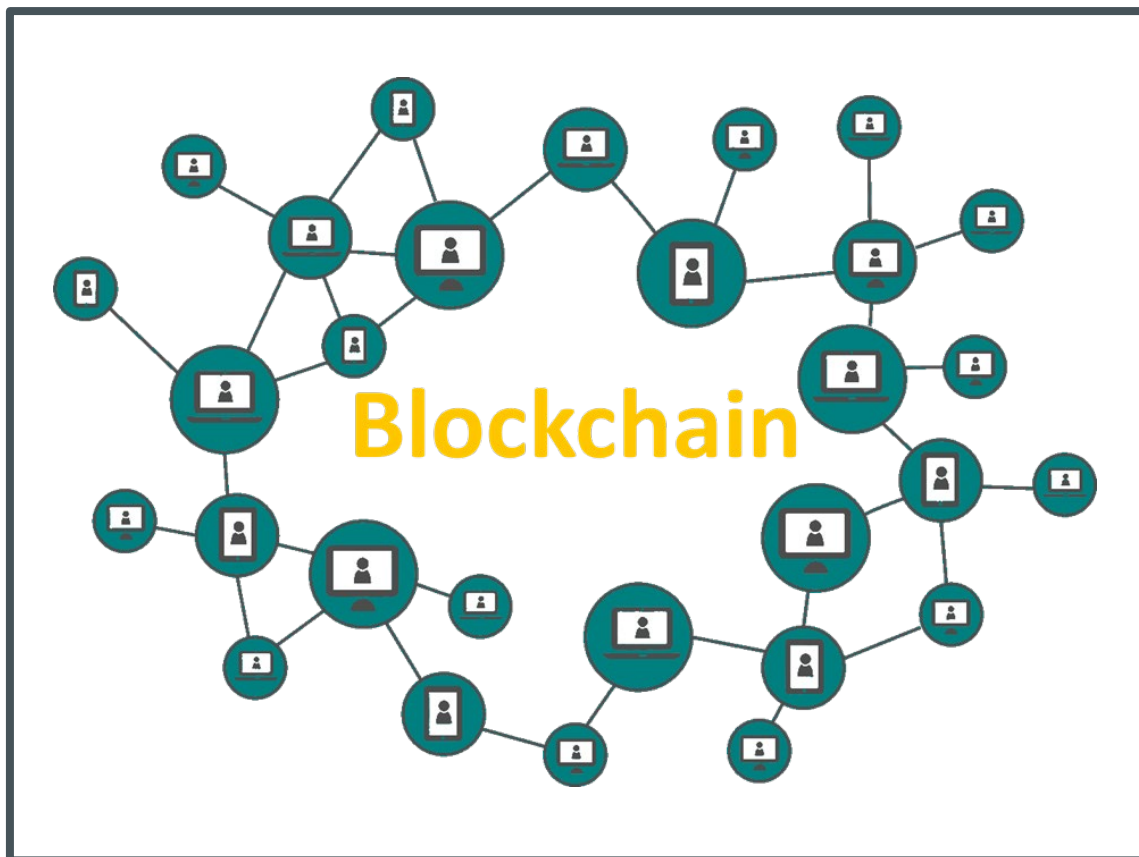
- Blockchain technology is a decentralized database or ledger that stores information, data or assets.
- “Blockchain” gets its name because, at scheduled intervals, information on transactions is recorded and added to the chain as a block creating a continuously growing necklace of chronological information.



BLOCKCHAIN – WHAT IS IT?

- “An incorruptible digital ledger of economic transaction that can be programmed to record not just financial transactions but virtually everything of value.” *Blockchain Revolution 2016*
- Components:
 - Timestamped data;
 - The data is managed by series of computers not owned by one single person or entity; and
 - Each of the blocks of data are tied to and bound to each other using cryptographic principles -- thereby making the Chain.

BLOCKCHAIN AT A GLANCE



- Shared
- Ledger of Transactions
- Anyone can inspect the transactions
- No single entity controls

BLOCKCHAIN – IN A NUTSHELL

- Forget all of the technical definitions
- De-centralization
- Gets rid of the middle man
- It is getting a lot of attention

PUBLIC VS. CONSORTIUM VS. PRIVATE BLOCKCHAIN

	Public No Centralized Management	Consortium Multiple Organizations	Private Single Organization
Participants	Permissionless <ul style="list-style-type: none"> ▪ Anonymous ▪ Could be malicious 	Permissioned <ul style="list-style-type: none"> ▪ Identified ▪ Trusted ▪ Could misbehave 	Permissioned <ul style="list-style-type: none"> ▪ Identified ▪ Trusted
Consensus Mechanisms	Proof of Work, Proof of Stake, etc. <ul style="list-style-type: none"> ▪ Large energy consumption ▪ No finality ▪ 51% attack 	Voting or multi-party consensus algorithm <ul style="list-style-type: none"> ▪ Lighter ▪ Faster ▪ Low energy consumption 	Pre-approved participants <ul style="list-style-type: none"> ▪ Lighter ▪ Faster ▪ Low energy consumption ▪ Cheaper
Transaction Approval Freq.	Long (ish) Bitcoin: 10 minutes or more	Depends on number of nodes but faster than public blockchain	Short – 100X msec

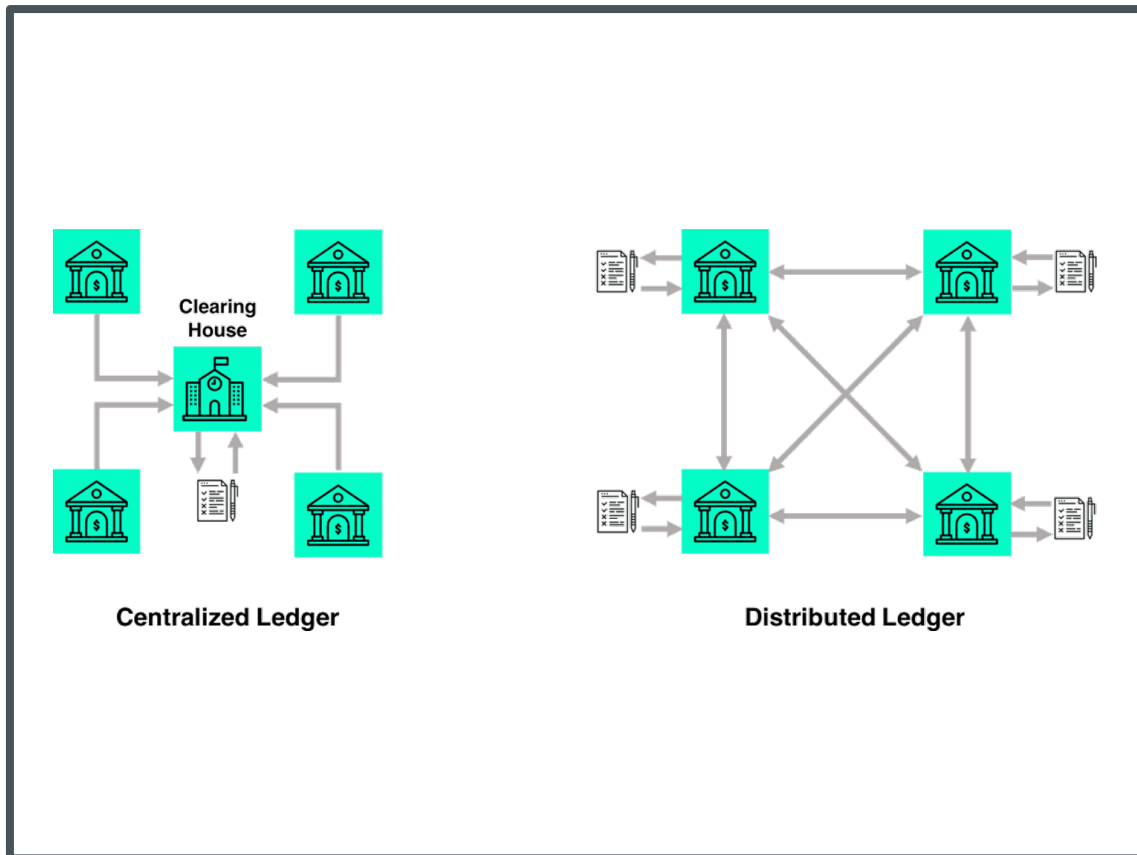
ETHEREUM

- Blockchain Platform – runs smart contracts
- Allows different digital assets to be used in conjunction with its means of payment/cryptocurrency, Ether.

BLOCKCHAIN TECHNOLOGY

- Distributed Digital Ledger Technology
- Examples → Blockchains, block directed graphs, or transaction based directed graphics
- Bitcoin is an example of implementation of a DLT

DISTRIBUTED LEDGER TECHNOLOGY (DLT)



- Distributed ledgers use independent computers (referred to as nodes) to record, share and synchronize transactions in their respective electronic ledgers
- Blockchain technology used as DLT

BLOCKCHAIN TECHNOLOGY – DEFINITIONS



NODE

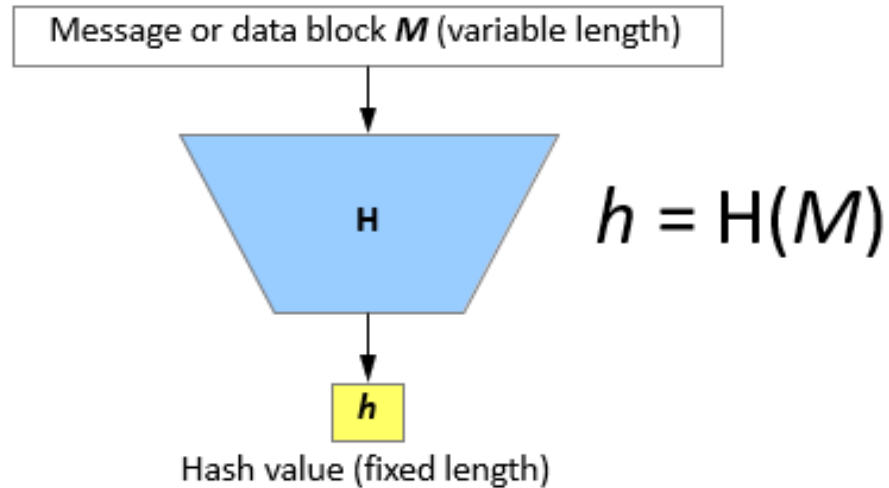


MINING

BLOCK + CHAIN = BLOCKCHAIN

- Blocks
 - Information about the Transaction
 - Participant ID/Signature
 - Hash

HASH FUNCTION

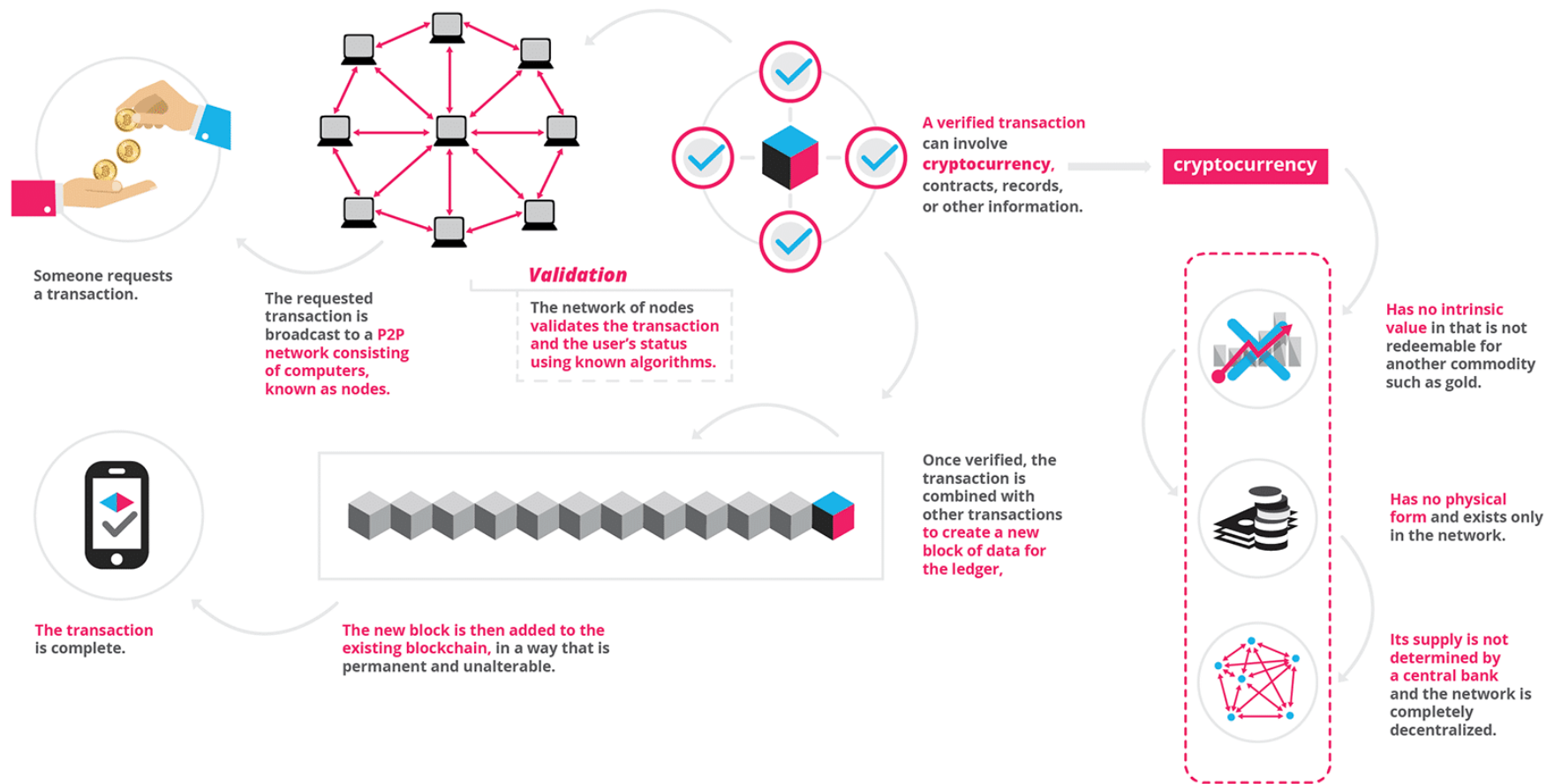


- Any function that can be used to map data of arbitrary size to data of a fixed size
- The value returned by a hash function is called the hash
- Hash is a “fingerprint” of the message

MINING

- Mining of Cryptocurrency
 - Adding transactions to the blockchain (securing and verifying)
 - Releasing new currency – Individual Blocks added by miners contain a proof of work or PoW
- Needs Computer and Special Programming
- Bitcoin Mining Example

OVERVIEW OF THE PROCESS

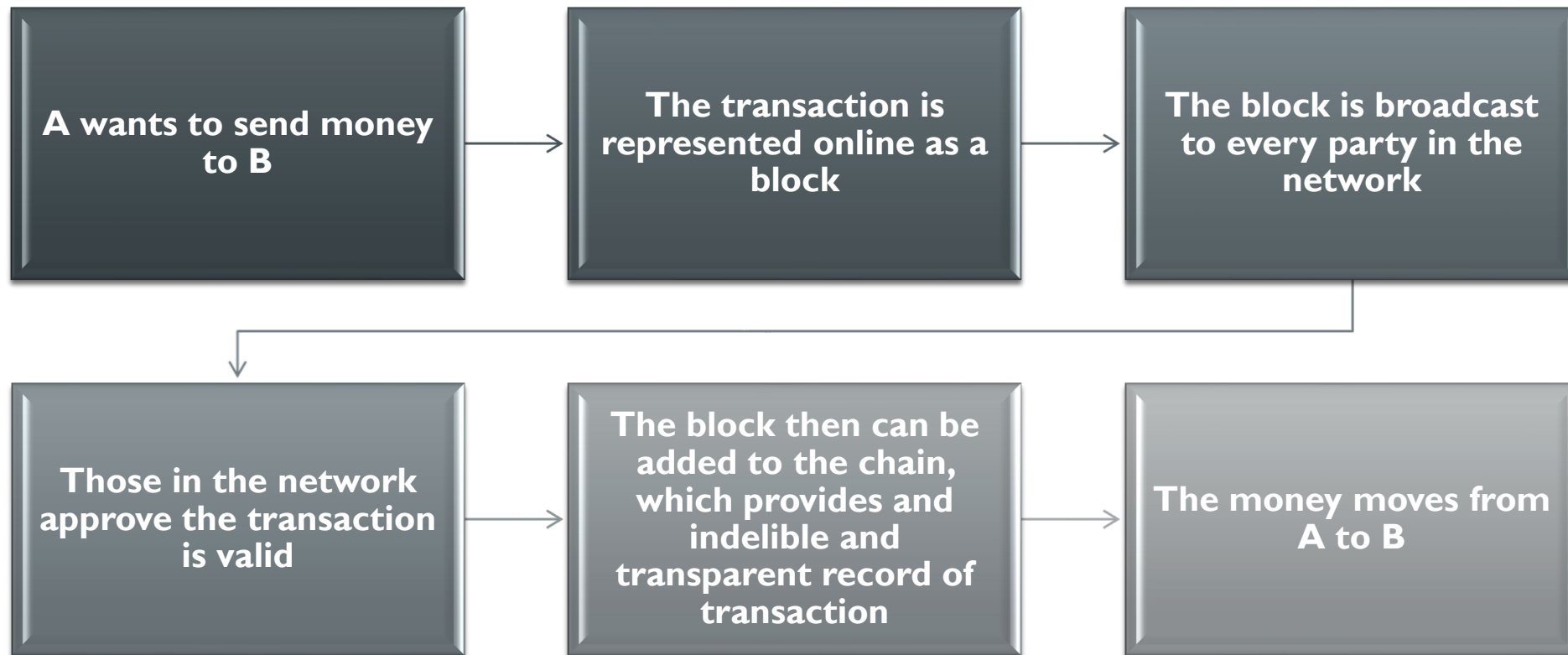


HOW DOES THIS TECHNOLOGY WORK?

■ Amazon Purchase Example

1. Transaction
2. Verification
3. Storing of the Transaction
4. Block Creation
5. Currency moves, more blocks are added, and the chains are created

MODEL TRANSACTION



MODEL TRANSACTION (# 2)

Traditional Payment

- Buy lunch for \$20 using a credit card
- Credit Card checks with your bank
- Credit card sends money to restaurant's bank and charges 3% (merchant gets \$19.40)
- Credit Card Charges Buyer interest/annual fees

Blockchain Using Bitcoin

- You buy lunch for 0.03 BTC
- Bitcoins go directly to vendor and transaction is verified to be true by the network
- Merchant gets 0.03 BTC (Buyer pays a 0.0001 BTC fee)
- Fee = 0.3%

IMPORTANT BENEFITS OF BLOCKCHAIN TECHNOLOGY

- No “Middleman”
- Decentralization
- Transparency and Virtually Incorruptible
- Efficiency
 - Verification Process
 - Fewer Fees
 - Smart Contracts
 - Management

UNCERTAINTIES

- Technology is continuously changing
- Regulation/Laws
- Jurisdiction for disputes

BLOCKCHAIN IN THE CONSTRUCTION INDUSTRY

- Private Block Chain
 - Shared Database/Consortium Blockchain
 - An organization or group of organizations can create private blockchains if they do not need or want anonymity of nodes
 - Benefits → Partial guarantees of authenticity, verification, and decentralization
 - Transactions are cheaper, faster, and easily verifiable
 - Allows consortium to better manage security and access to documents/information on the blockchain
 - Negatives – consortium can change rules or revert transactions if necessary, less secure as there are a limited number of “nodes”

BLOCKCHAIN IN THE CONSTRUCTION INDUSTRY, CONT.

- The process of Blockchain and the construction industry would boil down to roughly five steps:
 - Project Wallet – provides assurances of payment
 - Project Modeling (i.e., BIM) – physical construction of project
 - Smart Contracts – milestones with associated payments
 - Inspection – same as “normal” construction process
 - Delivery – instantaneous

BLOCKCHAIN IN THE CONSTRUCTION INDUSTRY, CONT.

- In short,
 - The project schedule becomes hundreds of smart contracts in a Common Data Environment (CDE), visible to all.
 - Each smart contract has an associated value in exchange for a specific task.
 - Completion and verification of a smart contract triggers an automatic payment from one wallet to another.
 - The project receives its next “block” of information which updates the BIM with completed work and project spend.

THE “SMART” CONTRACT

- What is it?
 - Coding – Based on “If-Then” parameters
 - Vending machine example
 - Safeguards
 - Smart Contracts are only as “smart” as the ones who are coding them

PROJECT MANAGEMENT

- Subcontractor/Worker Tracking
- Scheduling
- Correlation with the “Internet of Things”

SUPPLY CHAIN MANAGEMENT

- Realtime contract tracking, execution, and satisfactory completion of contracts
- Real World Examples – Walmart, Turkey, etc.

EXAMPLE OF BLOCKCHAINS IN THE SURETY INDUSTRY

- Issue: sureties want a verifiable history of a principal's bond history
- Potential Solution → Surety Consortium Blockchain
 - Each Principal has own “surety” ID number
 - Bond Issued – has its own signature/hash on the blockchain
 - Includes details of bond
 - Any changes/activity relating to bond are recorded on ledger
 - Benefits:
 - Surety has specific details of each bond issued to the principal including history of payments and performance of each principal's bond obligations

REAL WORLD SURETY EXAMPLE

- Zurich and Accenture – Benelux Region
 - October 2018 – Accenture creates user interface with Zurich Benelux's existing surety management system and built a blockchain to simplify and make the bond process more efficient
 - Uses Smart Contracts
 - Details:
 - Customer requests a bond and provides relevant information to the surety;
 - Surety assesses the bond and validates a draft version of the bond
 - Customer gets necessary signature and confirmations
 - Transactions/performance are validated by pre-selected parameters that are based on specific business rules and then added to the blockchain

COST

- Depends on how you want to integrate blockchain technology
 - Limited Use or an Entire Blockchain Network
 - Smart Contract Integration
 - Private Blockchain vs. Public Blockchain

POTENTIAL LEGAL ISSUES/DEVELOPMENTS

- Smart Contracts → Jurisdiction, Self-executing, disputes
 - Laws →
 - Arizona (2017)
 - Tennessee (2018)

RULES OF EVIDENCE

- Vermont (2018)
 - A blockchain-based digital record is considered a business record under the Vermont Rules of Evidence
 - Presumptions that apply to the record

CORPORATE FILINGS & SHAREHOLDER VOTING

- Wyoming – HB 0101 (2018)
 - Permits filings made for corporations, LLCs and UCC financing statements to be made on blockchain.

FUTURE LEGISLATION/LAWS

- Real Estate Land Records
- Corporate Records/Filings
- Smart Contract Legislation
- Additional Evidence Related Laws

POTENTIAL USES AS ATTORNEYS OR IN LITIGATION

- Verification of Service of Process
- Document Management
- Online Dispute Resolution
- Bates Number System

TAKEAWAYS – THINGS TO KEEP IN MIND

- Forget the technical words – it is really just a database
- Framework of Blockchains is decentralization and no middleman for verification
- It is getting a lot of attention

INFORMATION RELATING TO BLOCKCHAINS

- Global Legal Blockchain Consortium
- National Conference of State Legislatures
- Coindesk.com

QUESTIONS???

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