INFERENTIAL FOCUS

BRIEFING

IF 3805 March 29, 2017

NEW KIDS ON THE BLOCK(CHAIN):

THE CAPABILITY BEHIND BITCOIN FINDS NEW USES

CONTEXT & DYNAMICS

Blockchain, or distributed ledger technology (DLT), *has become a major focus of financial institutions, corporations in general and the government. Institutions are joining consortia to develop standards and products, and they are already testing and deploying specific products based on DLT. They seem to be excited about the capability that made cryptocurrencies, such as bitcoin, possible. But their interests have little to do with the actual currencies and much to do with enabling better ways to complete transactions. The main motivators for moving ahead rapidly are efficiency, by which is meant a large money savings on transactions, and security, by which is meant easy and secure payment transfers. Regulators are meeting to discuss how to oversee this new capability, and competitors are starting to take to the field. Blockchain could soon move from a marginal capability backing cryptocurrencies to a mainstream capability backing consumer and commercial transactions.*

OPPORTUNITIES

- *Many blockchain start-ups could find themselves in great demand and could well benefit from buyouts.*
- *Money movement for a transaction could be not only more secure but also easier to trace, making corruption more difficult.*
- *Efficiencies will lower operational costs for many institutions, especially financial institutions, thereby increasing profits.*
- *Payments, communications and transactions could be made more secure, creating problems for surveillance but keeping business and personal interactions more private.*

RISKS

- *Any professionals who facilitate the physical aspects of a transaction, whether loan officers, lawyers, notary publics or others, could find demand for their services going down.*
- *If blockchain fails to deliver what it promises, some confusion could arise as institutions seek to return to their original systems.*
- *Digital thieves will just have to work harder to find accessible places to rob.*
- *Standards and regulations may not keep pace with commercial development of blockchain, and a market "Wild West" emerges, hurting many of the separate products' market appeal.*

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A New Way to Transact

"Blockchain is the answer to the question we've been asking since the dawn of the Internet age: How can we collectively trust what happens online?" With that optimistic perspective, *PC Magazine* launched into a lengthy description of how the sophisticated software that first enabled the cryptocurrency bitcoin might function. Blockchain came to the forefront when bitcoin became a topic among those hoping to develop a currency without a sovereign power attached to it. While bitcoin's value has been quite volatile over its relatively short life, the value of the software behind bitcoin has enjoyed a steady increase.

Defining exactly what blockchain is can be clumsy. The *Nikkei Asian Weekly* defined it as "a database that is shared and maintained across multiple computers, creating an accurate, verifiable record of transactions that is extremely difficult to tamper with or revise." *Reuters* published an article that said, "Blockchain is a tamper-proof distributed record of transactions that is maintained by a network of computers on the Internet and secured through advanced cryptography." Don Tapscott, who wrote *Blockchain Revolution* (2016), said in a TED talk that blockchain is "some kind of vast, global, distributed ledger running on millions of computers and available to everybody, and where every kind of asset from money to music could be stored, moved, transacted, exchanged and managed, all without powerful intermediaries." And finally, Wikipedia says blockchains "are an open distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way." (*Nikkei Asian Weekly*, 9/12/16; *Reuters,* 1/27/17; *PC Magazine*, 2/6/17)

> Blockchain comprises many distinct and separated computers maintaining a decentralized, distributed, accessible, continuous and highly secure transaction ledger.

"If you follow these guidelines, you should be out of your depth in no time."

From these definitions, a few general points of agreement can be surmised: Blockchain comprises many distinct and separated computers maintaining a decentralized, distributed, accessible, continuous and highly secure transaction ledger. Advocates of this interlinked network for transactions note that blockchain maintains accuracy, immutability and access without recourse to a large institution such as a bank, government or corporation. So it is particularly interesting that banks, governments and corporations are now at the forefront of groups looking to discover a use for blockchain.

Let's Get Together and Talk About This

Consortia and discussion groups have become the medium by which efforts are taking place to find viable applications of blockchain capabilities. Technology companies, banks and governments are developing ways to make the distributed ledger work in areas of data security and any kind of transaction. Some participants belong to more than one group, each with its own blockchain, because they sense a variety of possible applications. As Alex Batlin of Bank of New York Mellon explained, "We are pretty equally spending our time across the different chains." The critical point, however, is interoperability. Will these

consortia make their products accessible and workable for members of their groups only? Here are some of the groups that have gotten together so far.

◆ Hyperledger Foundation leads an open-source initiative to create an open, standardized and enterprise-grade distributed-ledger framework and code base to be used across industries. Overseen by Linux Foundation and led by IBM, the Hyperledger group includes Cisco, Intel, Red Hat, Samsung, Hitachi, VMware, JPMorgan, Wells Fargo and others.

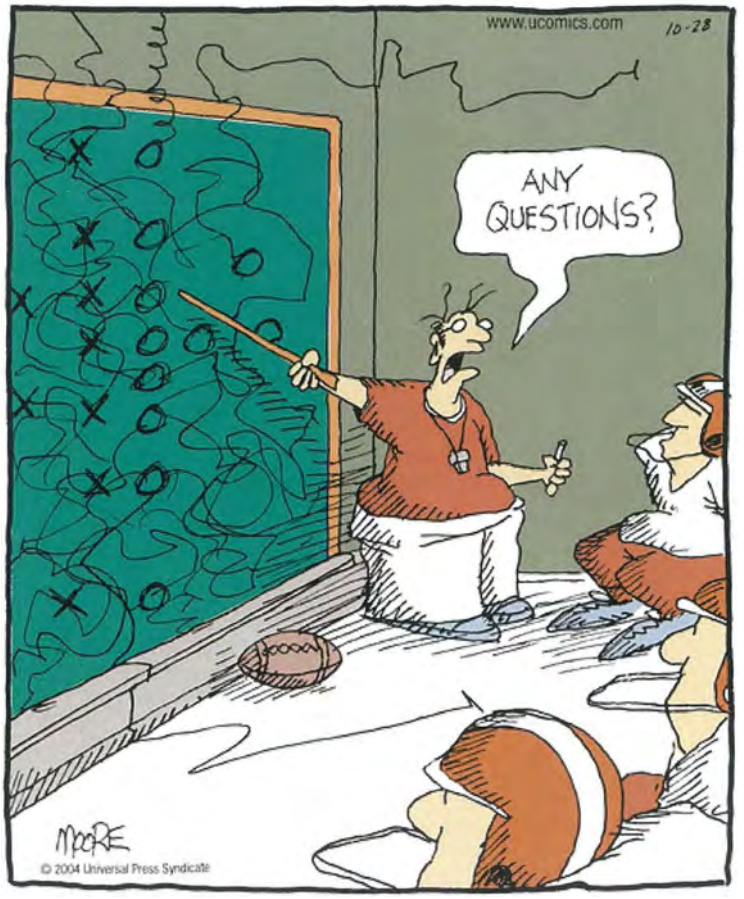
◆ Hyperledger Fabric wants to provide a foundation for developing blockchain solutions with a modular architecture, pluggable implementations and so-called container technology. The group, which is deploying IBM's blockchain to global supply chains, is being led by The Seam, which facilitates commodities trading and provides agribusiness software. This consortium includes Calcot, Cargill, ECOM Agroindustrial Corp., EWR, Louis Dreyfus Company, Olam International, Parkdale Mills, Plains Cotton Cooperative Association and Staple Cotton Cooperative Association. The IBM blockchain does not support a cryptocurrency.

◆ R3 CEV, a blockchain consultancy, is leading a consortium composed of more than 70 of the world's largest financial institutions to research and develop advanced distributed ledger technologies (DLT) for global financial markets. This group includes Barclays, Credit Suisse, JPMorgan, Royal Bank of Scotland, UBS, Bank of America, Citibank, Deutsche Bank, HSBC, Morgan Stanley, Wells Fargo and others.

◆ The Enterprise Ethereum Alliance seeks to create a standardized version of the Ethereum software (which includes cryptocurrency ether) to enable businesses around the world to track data and financial contracts. The Alliance includes Accenture, JPMorgan, Banco Santander, BBVA, Credit Suisse, ING, Intel, Thomson Reuters and UBS. Protocols created by the alliance have been tested globally for more than two years.

◆ Another consortium is creating a blockchain protocol for security on the Internet of Things (IoT) and includes Bank of New York Mellon, Foxconn Technology Group, Gemalto (a security company) and several blockchain start-ups such as Consensus Systems, BitSE and Chronicled.

(*PC Magazine*, 2/6/17; *Forbes*, 1/7/17; *New York Times,* 2/28/17)



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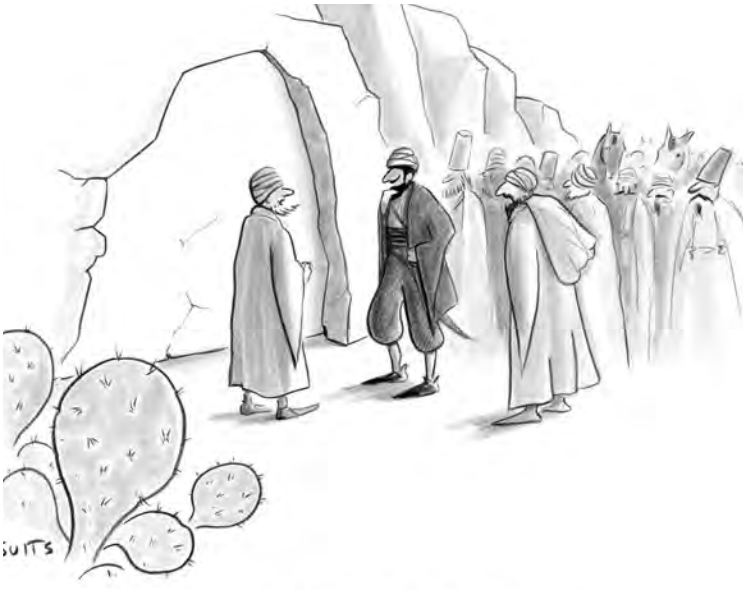
This kind of extensive activity involving many different players from many different industries is likely to lead to successful uses of blockchain in the very near future. The federal government has recognized the effort being made, and two members of the U.S. Congress have launched the Blockchain Caucus to advocate for "sound public policy toward blockchain-based technologies and digital currencies." The recent decision by the Securities and Exchange Commission (SEC) not to grant the Winklevoss brothers permission to offer an exchange-traded fund tied to bitcoin was the result of the cryptocurrency's not being regulated. The decision had nothing to do with the uses of blockchain. (*The Hill*, 2/9/17; *New York Times*, 3/10/17).

Moving Ahead

In December 2016, Deloitte issued survey results of senior executives who were aware of blockchain and whose companies had at least $500 million in annual revenues. Of those who responded, 28 percent reported their companies had already invested $5 million in blockchain and 10 percent had invested $10 million. Eighty percent of banks surveyed by Infosys said they were part of a consortium or collaboration on blockchain. In the healthcare and life sciences fields, 35 percent of respondents said their companies would be deploying blockchains in the coming calendar year. Overall, 24 percent of respondents to the Deloitte survey said they would be deploying a blockchain process in their operations in the coming year. (*Pymnts*, 2/28/17; *PC Magazine*, 2/6/17; *American Banker*, 1/12/17)

> Last December, Overstock.com became the first publicly traded company to issue stock on blockchain, selling 126,565 shares through a subsidiary, TØ, the world's first blockchain-based trading platform for stocks and securities.

Awareness is real. The listed groups and others all seek either proprietary or open-source versions of blockchain for better security and easier transactions. Given blockchain's and cryptocurrency's appeal to criminals who seek to hide their money and transactions, lawful institutions have been working to make it function openly and legally while maintaining the security and efficiency aspects of the process. Progress has been steady but slow.



"Try 'Open underscore sesame.'"

Here are some instances of participants having taken actions to try out or install their products.

◆ The Depository Trust and Clearing Corporation (DTCC), which records all stock and bond trades in the U.S., announced it is installing blockchain to replace the Trade Information Warehouse, which records all credit-default swaps. IBM is leading the conversion.

◆ The Delaware Blockchain Initiative announced last year that it will completely automate stock issuance and record-keeping on a blockchain ledger in that state.

◆ The Australian Securities Exchange (ASX) has completed a distributed ledger that can store entire transaction histories and is working on similar capabilities for the equity market in general, being assisted by Digital Asset. A final decision on whether to deploy its blockchains will be made this year. The Sydney Stock Exchange (SSX) announced a similar project, with the assistance of Bit Trade Labs.

◆ In October, the first cross-border transaction between banks using multiple blockchain applications took place, between the Commonwealth Bank of Australia and Wells Fargo, and that resulted in a shipment of cotton to Qingdao, China, from Texas.

◆ Last year, Visa started testing an interbank payment system made secure by blockchain. It does not use a cryptocurrency but it enables transfers from bank to bank using dollars, euros and other hard currencies. If this test goes positively, Visa would like to add blockchain to all its credit cards for security.

◆ Samsung SDS is seeking assistance to create more payment options that include blockchain. The company has also signed an alliance with Blocko to create a blockchain-based digital-identification system, which could complete mortgages, marriage licenses, divorce papers and other legal documents online, without recourse to notary publics, lawyers and the other usual signatories to such contracts.

◆ IBM and Walmart are partnering in China on a blockchain monitor network to track the movement of pork to keep people from eating tainted meat.

◆ Last December, Overstock.com became the first publicly traded company to issue stock on blockchain, selling 126,565 shares through a subsidiary, tØ, the world's first blockchain-based trading platform for stocks and securities.

◆ JPMorgan has created a version of Ethereum, called Quorum, which has enabled the bank in tests to move money between branches globally. Quorum is being included in the Enterprise Ethereum Alliance's project.

◆ MedRec, an initiative of the Massachusetts Institute of Technology (MIT), is using blockchain that can retain a digital family medical history. Such a history could be shared and passed down from generation to generation and could be readily available to any doctor performing, for instance, a medical examination or an emergency-room procedure.

◆ Ripple, a blockchain start-up, can now conduct cross-border payments between banks in just seconds, much faster than the current multi-day process.

◆ Deloitte opened a blockchain laboratory in Ireland last year and just announced the opening of a second one in New York. The company has 800 people in 20 countries working on blockchain. The firm has executed 35 proof-of-concept experiments for blockchain, around areas such as digital identity, cross-border payments, insurance needs and loyalty programs.

◆ Companies such as Microsoft and IBM are working on their proprietary cloud infrastructure to build unique blockchains for customers to experiment with their own uses.

◆ Accenture announced that it had combined DLT with hardware security modules (HSMs) to help companies keep their data secure. (*Nasdaq*, 3/17/17; *New York Times*, 1/10/17; *American Banker,* 1/12/17; *ZDNet*, 3/20/17; *PC Magazine*, 2/6/17; *Fortune*, 2/9/17; *The Hill*, 2/9/17)

Smart Contracts

Advocates of this emerging capability speak of blockchain as being "trustless." By that, they do not mean that it cannot be trusted. Rather, they are referring to the fact that the system's security and accuracy are so complete that trust between the two parties entering into a transaction is not necessary. What makes the system trustless in that sense is the reliability of smart contracts.

> MasterCard is developing blockchain application programming interfaces (APIs) to make smart contracts possible for payment settlements.

◆ Mycelia, a "collective of creatives, professionals and lovers of music," founded by Imogen Heap, is a blockchain-based protective ecosystem using **smart contracts** to enable musicians to make their work available on a free-trade basis, while ensuring that they receive their share of the revenues. (*PC Magazine,* 2/6/17)

Smart contracts, a term forged in 1993 by one of bitcoin's creators, Nick Szabo, are self-automated computer programs that can fulfill contracts without the intervention of a third party. Such contracts provide trust because the financial arrangements are set at the signing and become fulfilled automatically when some designated future event happens. A smart contract checks to make sure specific tasks or events included in the contract actually take place. For instance, MasterCard is developing blockchain application programming interfaces (APIs) to make smart contracts possible for payment settlements. Payment will be made when the contract validates that an event stated in the contract – such as the provision of a product or commodity to the buyer – has taken place. (*Nasdaq,* 3/17/17)

Companies are working their way toward product and operational uses for blockchain – often without referencing or using associated cryptocurrencies. As proof-of-concept and other tests

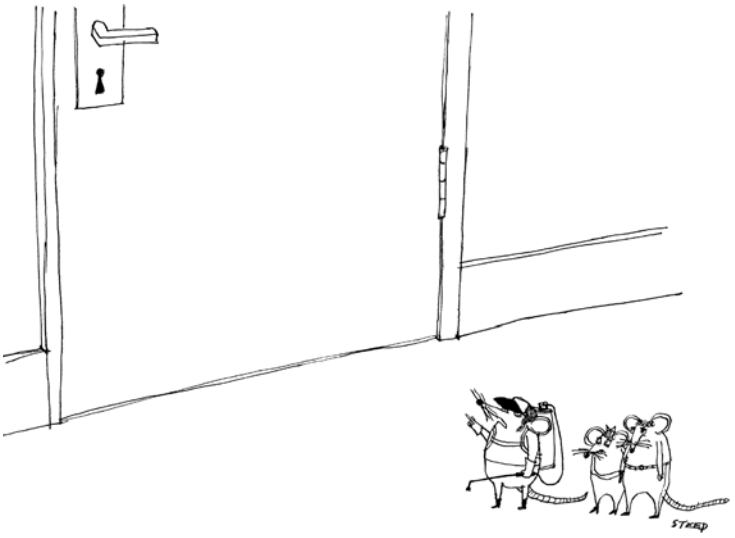
continue to produce reliable processes, the system originally programmed to support the cryptocurrency bitcoin should become a valuable resource in areas other than currencies.

Is There a Timeframe?

"When it comes to generating buzz, it's hard to beat blockchain," according to one writer. But most of the talk is about potential, which is substantial, and not realities, which are emerging. Companies are aware of blockchain, many are working together to develop a common standard and most sense it could be helpful. But even with all of these successful experiments and extended tests, how soon will blockchain become a common part of transactions? The answer is: As soon as possible, because two main drivers are increasing blockchain's value to mainstream institutions: efficiency and security.

Efficiency – Accenture recently issued a report stating that a successful application of blockchain to payments resolutions could save the top 10 largest banks between $8 and $12 billion annually. Meanwhile, IBM said that commodity trading using blockchain would lower infrastructure costs by $100 billion annually. Of course, both of these companies have a vested interest in the furtherance of blockchain, but other corporations also are realizing that significant efficiencies might accompany successful deployment of this capability. (*New York Times,* 2/28/17; *Forbes,* 1/7/17)

Security – Any effort to break through blockchain would require the ability to identify and break two components of a transaction: first the block, which is the record of a transaction that is held by thousands, even millions, of different computers and therefore cannot be altered unless a perpetrator knows where all the computers are and where each has stored that transaction; and second, the link, which is a software connection between each new transaction and the one just prior to it, which forms the chain, thereby adding another level of security, because anyone seeking to intervene would not only need to know where the computers are and where in the computer the block is located but also would have to disconnect the block from the prior block… in all the computers. This kind of security, especially when blended with other approaches, such as biometrics, could become critical to making all devices linked on the Internet of Things safe, something the telecom company Telstar is trying to do in Australia. (*ZDNet,* 3/20/17)



"This is probably how they keep getting in."

> International regulators at the International Organization for Standardization (ISO), which has 16 member countries, including Australia, Britain, France, Japan, Germany and the U.S., will meet in April to discuss blockchain and electronic distributed ledger technologies.

One of the biggest questions concerning deployment of blockchain or any distributed ledger capability is regulation. The rapid transfer of money around the world via blockchain capabilities could bypass regulators. In Australia, the government has already assigned eight different regulatory agencies to oversee deployment of distributed ledger technologies. The Australian Securities and Investments Commission (ASIC) said it did not intend to stand in the way of new technologies, but "at the same time, we need to mitigate any potential risks of new business models through the use of new technologies." The first

order of the process is developing "blockchain and DLT terminology standards as a means to clarify definitions." Moreover, international regulators at the International Organization for Standardization (ISO), which has 16 member countries, including Australia, Britain, France, Japan, Germany and the U.S., will meet in April to discuss blockchain and electronic distributed ledger technologies. (*ZDNet,* 3/20/17)

If regulators are gathering to discuss their role in the development of blockchain, then deployment in the consumer and business arenas must be close at hand. Perhaps the following item can add a timing perspective to the implementation of blockchain.

◆ In October 2015, Delaware officials knew nothing about blockchain, yet this year, they are shifting their regulatory systems over to blockchain. (*PC Magazine*, 2/6/17)

Companies and governments have discovered that blockchain can make their processes much more efficient and secure. That means that Rampaging Efficiencies and Data Security are motivators driving institutions toward deployment of distributed ledger technologies in a hurry. And regulators are getting involved. The New Kids on the Block(chain) are on their way to becoming the latest hit technology.

Some of our previous looks at this topic:

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IF 3803 Cyber Now: The Dark Side Of The "Wonderful" Internet, 2/1/17

IF 3717 The Great Digital Experiment, Part I: Disruptions And Two New Realms Of Digital Experience, 12/5/16

IF 3714 Living With Disruption: Certainty, Predictability And Other Anachronisms Of Our Times, 10/13/16

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IF 3506 Digital Fixing Digital: Technology's Solutions For Technology's Problems, 4/28/14

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