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Is Blockchain's Future in Oil and Gas Transformative or Transient?

By Mark Koeppen, David Shrier, and Morgan Bazilian

Ask an oil and gas executive what they think about distributed ledger technology, and you might get the following response: "That's Bitcoin, right?"

Distributed ledger technology, commonly known as blockchain, has its roots in the online currency Bitcoin. But blockchain is growing beyond its currency origins, making inroads into the financial services and tech industries toward improvements in operations and finance.

Is blockchain ready for prime time in the oil and gas industry? Is it hype—or a genuine agent of change? The jury is out. Some executives recognize its potential for reshaping their business. Others express concern about disruption, unsure if the future benefits will outweigh the risk and investment demands of being a first mover. More than a few have little or no knowledge of the possibilities—or they may believe that alternate solutions such as robotics and cognitive technology are superior solutions to their current challenges.

In a survey commissioned by Deloitte in late 2016, nearly two in five senior executives surveyed at large U.S. companies across industries had little or no knowledge about blockchain technology. While 55 percent of respondents said they believed their companies would be at a competitive disadvantage without it, 42 percent acknowledge its disruptive potential.[1]

To date, the technology has had little impact on the oil and gas industry, providing a small frame of reference for oil executives to adequately assess its

[1] *https://www2.deloitte.com/us/en/pages/about-deloitte/articles/press-releases/deloitte-survey-blockchain-reaches-beyond-financial-services-with-some-industries-moving-faster.html*

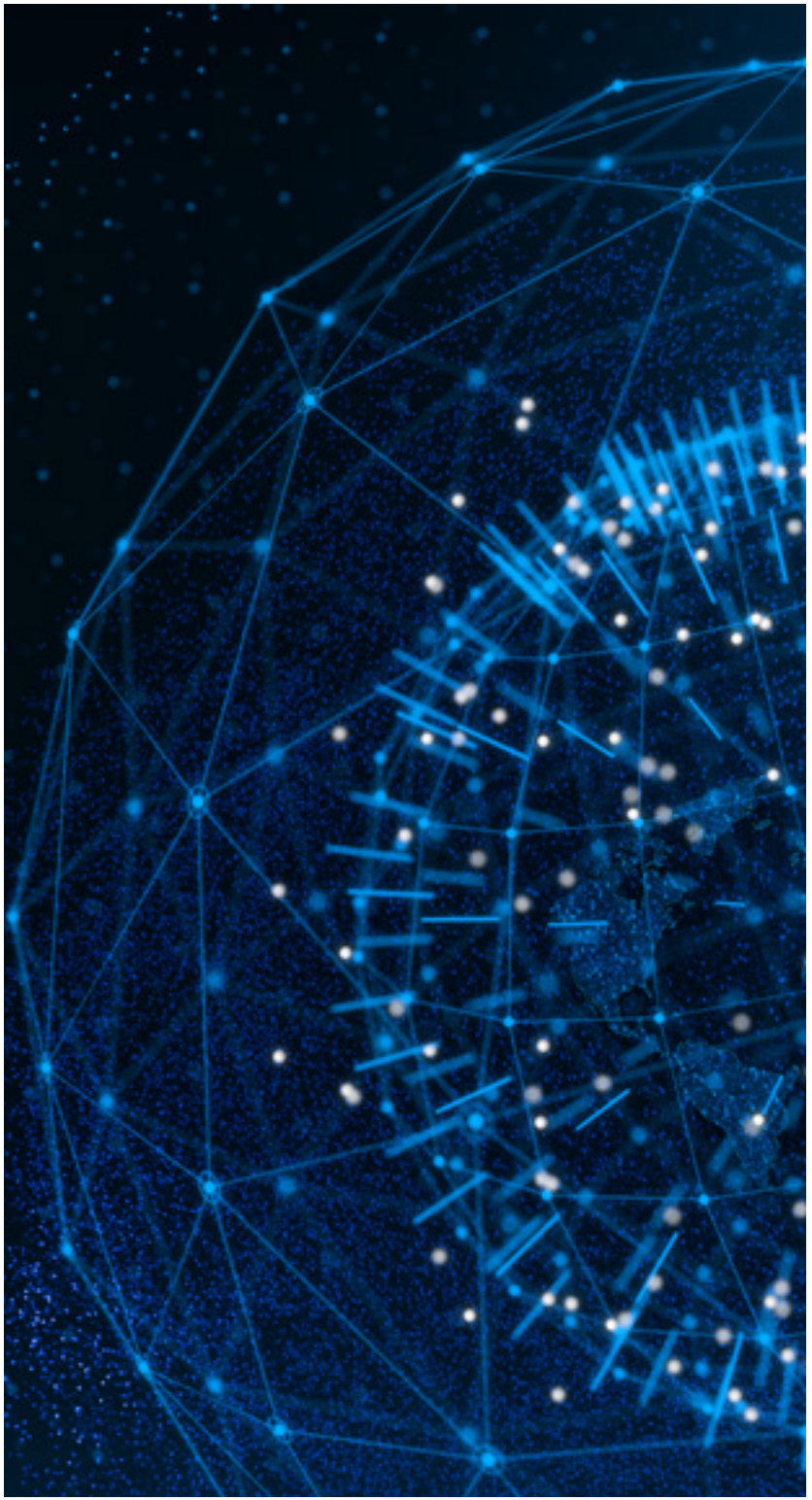
current and future value. But given the data-intensive opportunities available through the growth and expansion of the Internet of Things, blockchain could be an important vessel to carry the industry's data transformation forward.

One element of this new technology that can bind skeptics and true believers is the potential of blockchain as a means of simplifying processes that can lead to enhanced efficiency and cost reductions. Blockchain can offer transactional verification instantly across a network, without relying on a central authority—potentially reducing operating costs, more securely storing and managing data, and improving the speed of transaction processing.

That's the big picture, and some major global players are already hopping on board. For example, the global petroleum and mining company BHP Billiton announced at the second annual Global Blockchain Summit in Shanghai last September that it would start using the technology to enhance supply chain efficiency, better secure real-time data generated during delivery, and create a chain of order requests connecting engineers, analysts, and laboratories, according to Bitcoin Magazine and other media accounts.

Supply chain is often a good place to start in assessing practical value. Companies could forge new agreements with producers, suppliers, financial experts, record-keeping departments, and third-party vendors, potentially leading to reduced costs, streamlined management and a clearer understanding of the assignments and expectations of each player on the field.

Innovation isn't just about influencing existing business models in a positive and productive way. It's also about how to monetize new ideas. Oil and gas companies have struggled through price volatility and record production levels in recent years, often leading to massive cost-cutting efforts, reduced exploration, and layoffs. This has forced oil and gas companies to drastically rethink how they operate and identify innovative ways to improve transaction processing.



The business case

The industry is no stranger to technological innovation on the operations side. Getting resources out of the ground through hydraulic fracturing, 3-D seismic and other extraction processes is a hallmark of the industry's growth. On technology that improves and refines the back-office function, it has been a different story. The industry generally hasn't brought much new digital technology to the supply chain, procurement, or finance parts of the business.

The time seems right for blockchain, but will it be the next big industry breakthrough?

In an industry of such global reach and complexity, special operational and management challenges routinely come into play. In navigating an often dizzying array of national regulations and restrictions, simplifying and making more robust the paperwork and processes of global product movement is essential for oil and gas assets both in the United States and abroad.

Where there is a clear economic case to be made, the industry can be persuaded to embrace and enact new solutions. Questions arise in these cases: Can new technology generate higher revenues? Can it assist in consolidating the workforce? Can it create greater transparency and accountability? Can it streamline the supply chain? That's a good starting point for any business case discussion.

Leaders in the industry are going to need a strong proof of concept. They'll need to measure blockchain's successes or challenges against other industries and determine whether they can work with others in the market to adapt the technology.

Conventional wisdom, strategies, and tactics have fueled the success of this powerful industry for so many years. Change inevitably comes to all industries. How that change evolves and attaches will determine the direction an industry takes. Distributed ledger technology may be one breakthrough that drives the industry in a new direction, but it still has many hurdles to overcome.

The value proposition for oil and gas

Determining how and whether blockchain will work for a particular oil and gas company is a starting point. Four areas of consideration can help shape the discussion and lead key players to the right conclusions.

A Transparency and compliance

Blockchain technology, by design, should translate to greater transparency and efficiency. The sharing of digital blockchain information as required in joint operating agreements could lessen, if not eliminate, the need for reconciliations between companies and for data hubs controlled by third parties.

When it comes to regulatory oversight, blockchain technology can improve compliance within three reporting frameworks—the Dodd-Frank Act, the Extractive Industries Transparency Initiative, and European Union directives—through increased transparency and better reporting streams. Employing blockchain-enabled data sharing under MIT's proposed Trust::Data framework could dramatically reduce compliance costs and increase speed.

The more complicated question is this: can it provide the level of transparency necessary to achieve success while ensuring more efficient data and systemic security? It holds great potential, but risk-averse industries might react cautiously to systems built on rewiring a strategic operation.

B Cyber threats and security

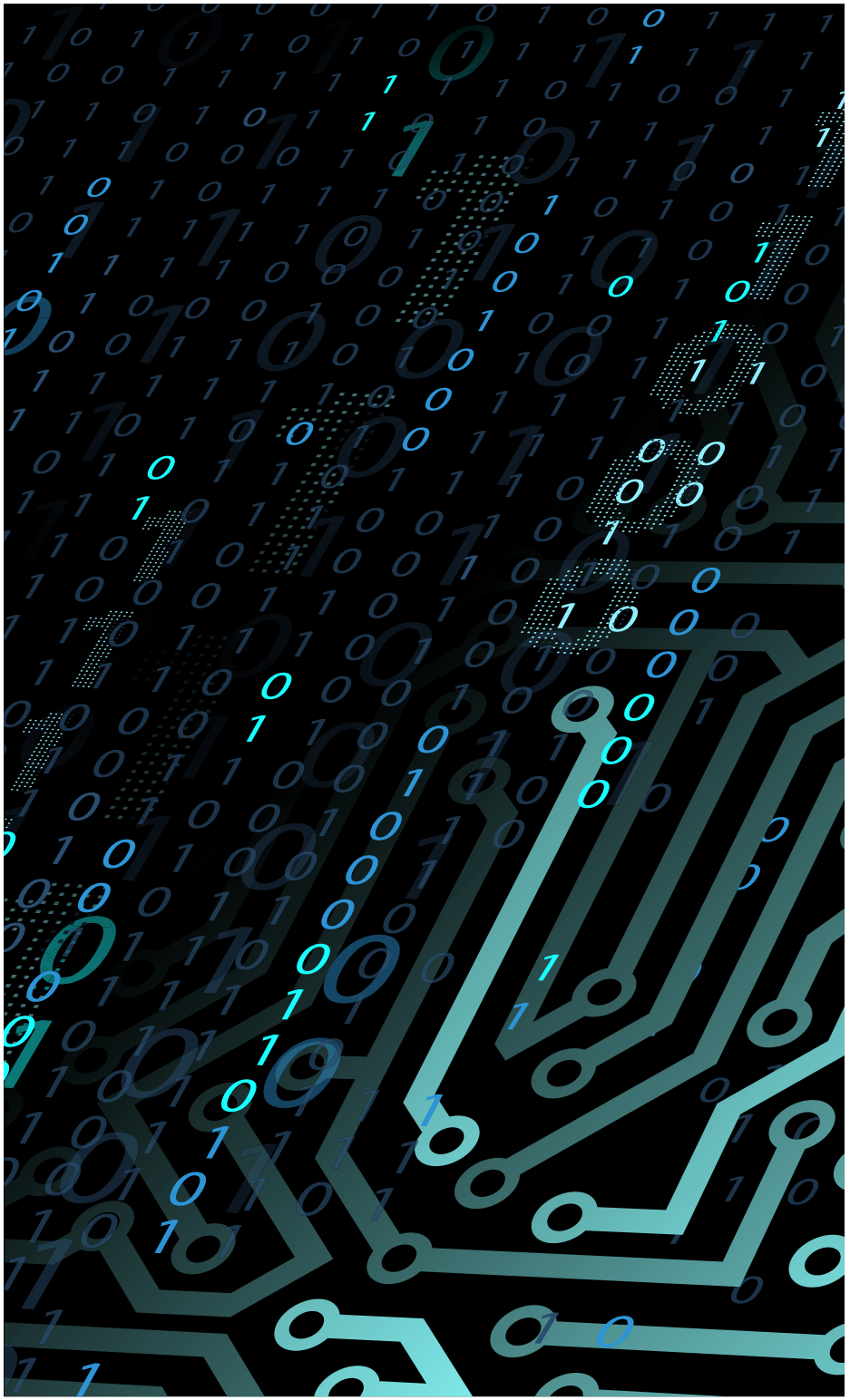
The flip side of the anti-corruption/transparency coin is data protection: how can new technology ensure that critical information remains safe?

Smart sensors can provide critical information, such as real-time conditions for an undersea oil field operation, but such sensors currently are among the most insecure areas of a company's network. And the industrial espionage potential of a competitor gaining access to this information is substantial.

Even the nominally central areas of a company's network, its core IT functions, are vulnerable to hacking, as many have discovered over the past few years. Biometrics may help "harden" access control, but where should the biometric file be stored? Where should the most sensitive information about top company officials be secured?

That's where new solutions built on blockchain technology come in. MIT ENIGMA, for instance, was designed to be more secure than existing solutions in storing sensitive data such as biometric identity (a user's password) in an encrypted form in tiny fragments, while continuing to allow the data to be useful even when encrypted and broken into fragments. Storing data in fragments at multiple sites, rather than concentrating it one place, also raises the prospect of enhanced data security even without a fully encrypted system.

As an example of how technology responds to evolving enterprise needs, developers in the financial technology space are bringing code to data in what is known as the Open Algorithms, or OPAL project, which is also part of MIT Trust::Data. Rather than depositing key information in one centralized location, the operational codes are going to the source. Some experts believe this protects against placement of vital data in a singular location, which can be an invitation to hackers and increase fears of external breaches. It applies another coat of security to key company data.



C Mid-volume trading/ third-party impacts

Inefficiency isn't unusual along the trade process. It occurs far too often. These points of resistance are spotlighted where IT systems must network with an outside system or systems. The complexity inherent in the system slows the exchange of critical data, which is the last thing an energy trader wants.

Blockchain-enabled applications also can address other issues that need to be reviewed, including the removal or reduction of brokers' fees, reduction in fraud, error, and otherwise compromised transactions, and limiting credit risk and transacting capital requirements.

For energy market participants, the value derived through the application of blockchain applications is compelling.

Blockchain technologies will not simply make the current markets more efficient. They have the potential to radically disrupt and open up the energy markets in ways people have not yet even considered.

Boundaries between asset classes will blur as cash, energy products and other commodities, from industrial components to apples could all become digital assets trading inter-operably. If more value can be derived by not restricting activity to a single asset class, then that is where the market will go.

Blockchain will provide the platform.

D The smart contract

Years of volatility in commodity prices, growth stagnancy, and limited expansion have put exploration and production companies in a tough spot. They've been forced to drastically reduce drilling times and search for other means of reducing cost and expense to maintain (or come close to maintaining) acceptable margins.

The sheer size and volume of contracts and transactions to execute capital projects in oil and gas have historically caused significant reconciliation and tracking issues among contractors, sub-contractors, and suppliers. Challenges in managing logistics for supplies, tracking costs, and deploying inventory requires a heavy manual lift. Cascading POs, change orders, receipts, and other trade-related documentation and data on inventory could be achieved by following specific codified rules.

Drafting agreements that afford new tracking, bookkeeping, and automation methodology should create a more seamless supply chain, improved capital project spend analytics, and simplified contractual obligations at each point along the way. Simply put, knowing who gets paid what, why, and where; who is owed money; and who along the chain is performing as explicitly mandated by the agreement are potential game-changing elements of a distributed ledger strategy.

In Conclusion...

Important advances in technology rarely come with a full embrace at the start.

Computers began as enormous walls of wires and plugs, and no one had a complete idea of their eventual impact, how essential they would become to every aspect of people's lives. The Internet was just a jumble of algorithms in its formative days, a head-scratching newcomer that few would predict would become the transformative factor it has. Ground-breaking ideas, especially in their infancies, can yield as many doubters as disciples. It takes time, experience, growth, and eventual acceptance to turn an idea into reality.

Will that be the case with blockchain? Is it ready for prime time in an industry where wariness and healthy skepticism may be the first reaction? There is a strong and unmistakable momentum regarding blockchain technology in other industries, notably banking, technology, and, increasingly, health care and the life sciences.

The pivot point for oil and gas will be where potential and practicality intersect. Questions persist. Oil companies for years have been open to collaboration and creating successful partnerships with one another on joint ventures; how will they collaborate in the development of blockchain networks?

Will regulators take a dim view of distributed technology and the partnerships and agreements it will need to succeed? Will they view it as collusion?

Perhaps most importantly, who will be the first out of the blocks, the first mover able to set the agenda and drive the format?

For skeptics, and there are many still unconvinced about the long term, answers to those questions will determine whether the technology is the future or an idea eventually consigned to the scrap heap.

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