

Digital Oil and Gas

Volume V Blockchain



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INTRODUCTION

Blockchain creates a distributed, peer-to-peer network of records, removing the need for a central approval authority, reducing complexity for multi-party transactions

There is little doubt that blockchain has become one of the most widely discussed technologies of the 2010s. While many associate it with the financial services industry from which it was born, it also offers other industries secure solutions to existing, multi-party complexities. Blockchain is a technology concept that describes an immutable, distributed, database structure¹. A blockchain implementation provides a platform for multiple parties to transact with one another, without the need for third party validation, creating a ledger of record that is, by design, more secure than other approaches. This security is driven by its structure: a peer-to-peer, distributed, timestamped network of records, each containing a sequential hash, which cannot be changed, without modifying the entire chain of hashtags¹ (see figure 1).

By distributing the ledger, no single party has the entire transaction record, and there exists a platform that every party can connect to, and in which the security enables the trust required for all parties to retain confidence in the transactions and data found there. It also shifts the balance of power from third party, centralized entities, and distributes it to the parties involved in the transactions².

Blockchain is enabled by the proliferation of next generation of networks, being driven by extensive advancements in computing power required to process validation of the chain.

Figure 1 – Current State vs. Blockchain

INTRODUCTION

Given the oil and gas industry's use of various partnerships, even with its challenges, blockchain offers opportunity to dramatically reduce the manual effort required to manage those partnerships

For all of its potential value, blockchain is not without its challenges, however. It requires an incredible amount of computation speed and power to validate the chain of continuous hashtags³. This vast computational requirement also drives incredible power consumption: a single bitcoin transaction is estimated to consume as much electricity as the daily consumption of 1.6 American households, and just bitcoin (a single application of blockchain) could drive more electricity consumption than Denmark by 2020⁴. Also, one security risk is the connection between the real and digital worlds (for example, a modified smart meter could provide false consumption data to the platform, that would then become the official record of liability). Finally, blockchain transactions can be slow, depending on the complexity of the chain. For example, between May, 2016 and May 2017, the average conformation time for a bitcoin transaction was 43 minutes⁵. While not all enterprise transactions must occur in real time, if chains become complex enough, then benefits from reducing manual work may be replaced by delays waiting for blockchain confirmations.

Given the extensive multi-party activity in the oil and gas industry, it appears to be a natural fit for adoption of blockchain applications. The industry has always been an inherently collaborative endeavor, with joint ventures, regulatory interaction, and commodity trading. Each of these relationships results in complex transactions and related communications that must be accounted for correctly and often lead to extensive manual interactions and interventions. With global oil supply and demand depressing prices and keeping the outlook low, oil and gas entities cannot afford to have undue complexity and inefficiency in core processes within the organization.

It is likely, however, that blockchain will face an uphill battle working its way into an industry that is often guilty of a "wait and see" attitude towards new enterprise technology (in comparison to other industries). Those organizations and partnerships that identify small, manageable areas to test the technology are most likely to be those that realize early benefit from it, while building competency that can be exploited later, as the technology itself continues to mature.

BUSINESS CHALLENGES

Blockchain can help the oil and gas industry improve process efficiency and effectiveness, reduce complexity, simplify coordination of information, and lower risk

Blockchain provides a secure solution platform for any business scenario that involves transactions between two or more parties. That platform creates a home for a single version of transactions and data that all parties can connect to, reference, and interact with.

In today's world, when oil and gas organizations transact with each other, typically both organizations store records of those transactions on their own systems. Often this is achieved by one or more communications between the organizations with the details of transactions. This communication can be via email, portals, fax, and an almost endless array of solutions that attempt to make these communications easier.

Blockchain-enabled platforms help to resolve the complexity surrounding these transactions. While the idea of multi-party networks certainly is not new, and the oil and gas industry has implemented many technologies to help in this arena, blockchain provides a unique solution in that it is an inherently more secure architecture, without the need for a third party to act as a middle person, introducing trust into the transactions and data.

Some of the challenges that these secure platform address include:

- 1. Inefficiency and ineffectiveness in manually processing transactions across organizations
- 2. Complexity in completing reconciliations introduced by cross organization interaction
- 3. Coordination of information
- 4. Introduction of risk due to potential inconsistency in data

POTENTIAL VALUE

Platforms built on blockchain provide secure, simplified, efficient networks to improve the way in which organizations work with one another

The potential value delivered by blockchain platforms can be summarized into five categories:

SECURE, MULTI-PARTY PLATFORM

INCREASED EFFICIENCY	INCREASED SECURITY	REDUCED COMPLEXITY	INCREASED ACCURACY	REDUCED RISK
Reduced Work	Data Security	Reporting	Human Error	Up Front Agreement
 A single platform for transactions and data reduces duplication of entry efforts Reduced need for reconciliations and cross organizational audits 	 Hash based chain incredibly difficult to modify any single transaction, since entire chain would have to be modified No single party holds all details of all transactions 	 Simplified reporting repository for all transactional information Single source for master data management Elimination of third parties to act as a source of trust and confirmation 	 Fewer re-key / re-entry requirements mean fewer errors Sources of transactions and activities integrated into platform to add entries as they occur 	 Secure platform to capture all details Transactions are recorded and agreed to by all parties, reducing exposure for future liabilities

Figure 2 – The Value of Blockchain

While there is a clear value proposition for blockchain based solutions, many oil and gas organizations are primarily trying to understand the use cases that are most relevant for its use within the industry.

Blockchain potentially provides a platform to dramatically reduce the complexity surrounding interparty relationships for oil and gas companies

JOINT VENTURE BUSINESS NETWORK

BUSINESS CHALLENGE

Multiple joint venture partners relying on individual systems to capture and record events and related costs that must be allocated across partners

SOLUTION DESCRIPTION

- Blockchain-based platform for all joint venture activities
- Platform holds: agreement contracts (with all related details); master data related to joint venture play, assets, and equipment; transaction details from operator, which result in impacts for non-operating partners; financial position of each partner; payment engine to facilitate payments between partners
- Operator integrates to platform to upload transaction details, which are pushed through rules based on contract
- Non-operators integrate to platform to draw down transaction details, and receive notifications regarding required payments, which can be approved, driving an automated payment to the operator

- Decreased manual management of partnership-related data
- Decreased time for payments between parties
- Decreased effort to manage communication between parties

The handover from capital projects to operations is complex and frequently considered incomplete

CAPITAL PROJECTS HANDOVER

BUSINESS CHALLENGE

The handover from capital projects groups to operations are meant to include all relevant documentation, but are typically incomplete, complex, and difficult

SOLUTION DESCRIPTION

- Blockchain enabled platform to store all details regarding the project: design documentation, as-built documentation, project plan, project resourcing information
- Platform is leveraged by projects parties (EPC, owner) and operations parties, and is used as the sole repository throughout the project (as opposed to a place where only final documents are stored)
- Party responsible for design provides design documentation through the platform
- Party responsible for construction accesses design documentation, provides relevant project plan documentation, manages project budget and financial reporting, integrates into procurement platforms, integrates into talent platforms, provides as-built documentation for all equipment and assets
- Party responsible for operations takes over and moves final assets and equipment into the operational ERP through integration

- · Increased visibility into project performance
- Decreased effort for transition to operations
- · Increased quality of transfer of information to operations

In the same sort of way that financial institutions are leveraging blockchain, so too could oil and gas organizations, to help reduce risk and increase visibility in trading groups

ENTERPRISE TRADING

BUSINESS CHALLENGE

Trading and movement of physical product still includes extensive manual process to validate agreements, contracts, and physical movements, often across multiple platforms

SOLUTION DESCRIPTION

- Single platform, integrated with ERP and key financial systems, to handle trading and physical movement of product, underpinned by blockchain
- Provides a view of what capacity is available for various transportation and storage offerings, based on timelines, for a range of products for suppliers and buyers
- Integrates into relevant financial systems to capture cost factors to facilitate pricing
- Provides repository for contracts, with the ability to provide smart contract capabilities to automate the execution of some contractual clauses
- Integration into the ERP facilitates the automation of scheduling physical flows

- Decreased manual efforts through automation
- · Simplified visibility into available capacity
- Improved efficiency through application rationalization and integration

Moving land and title registries to a blockchain-based platform could dramatically simplify the complexity of transfers and record keeping

LAND AND TITLE REGISTRY

BUSINESS CHALLENGE

Land and title registries are currently extremely manual, difficult to navigate due to extensive use of paper, and reasonably at risk for forgeries

SOLUTION DESCRIPTION

- Blockchain based platform for recording property transactions, storing registry documentation, and providing smart contract automation
- The platform for act as a source of record when land or titles change hands between parties
- Instead of traditional methods of contractual agreement, smart contracts on the platform could be used with digital signatures to transfer titles from one party to another
- Searching for records would become an automated, self-service process, providing transparency
- Additional integration could be added for other government agencies, such as tax authorities, and planning organizations

- Simplified registration administration
- Reduced cost to management paperwork and processing
- Decreased time to complete a transaction

To leverage blockchain, organizations need foundational technology in place that will enable the business processes and opportunities being targeted

To fully take advantage of blockchain, organizations must have a strong foundation in place that establishes the enterprise landscape, and provides the tools and structures required for advanced technology applications. There are eight elements to this foundation:

MASTER DATA	ENTERPRISE DIGITAL	REAL TIME TRANSACTION	REAL TIME ANALYTICAL
MANAGEMENT	CORE	PLATFORM	PLATFORM
Simplified, standardized, complete, and cleansed data; master data governance structure	Single source of enterprise truth for all transactions related to finance, supply chain, logistics, maintenance, and projects	Transactional platform must have the computational power to allow for real time posting and analytics (no batch jobs)	Analytical platform must have the computational power to allow for real time replication of relevant data, with appropriate data tiering
WORKFORCE	STANDARD PROCESSES	ENTERPRISE CLOUD	ENTERPRISE INTEGRATION
MANAGEMENT PLATFORM	AND TOOLS	STRATEGY	STRATEGY

Blockchain applications are typically built upon existing blockchain platforms that have been established. These development platforms provide the core technical architecture that the application and logic are then built on top of.

WHAT YOU CAN DO NOW

There are immediate, actionable steps you can take to start exploring blockchain

Figure 3 – Technology Transformation Methodology

- 1. Strategy Alignment: Translate corporate priorities and initiatives into technology priorities
- 2. Opportunities Assessment: Explore opportunities based on strategic initiatives and prioritize based on value
- **3.** Solution Roadmap: Document end-state solution, qualitative and quantitative benefits, and strategic roadmap
- 4. Value Realization: Measure value delivered through transformation
- 5. Governance: Maximize and accelerate value from investments with governance based on executive engagement, value delivery and continuous innovation

Here is how you can get started with blockchain:

- 1. Identify potential use cases by thinking of areas of the organization in which you are interacting with multiple parties, and are driving extensive manual effort, such as data re-entry or reconciliation with your partners
- 2. Consider business process that you have identified as high risk due to the potential for misalignment with other parties that you transact with
- 3. Explore potential blockchain use cases with vendors, partners, industry groups, and consultants

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