



Enterprise Blockchain Streamlines Oil & Gas Market Transactions



CHRISTOPHER H. SMITH
EVP BUSINESS DEVELOPMENT



TODD COOPER
CEO AND CO-FOUNDER



JB SLOAN
EVP PRODUCT MANAGEMENT

The oil and gas industry (O&G) shares many of the same operating challenges as multi-national conglomerates with a network of geographically dispersed manufacturing facilities interconnected only by information technology. Often each well, for example, is a separate business unit under intense pressure to maintain high levels of production while also managing the flow of financial information to its various stakeholders. The list of stakeholders in a single oil well may include mineral rights owners, royalty owners, joint venture partners, banks, regulators, tax agencies, operators, and land managers. Each of these stakeholders has a vested interest in the success of the business enterprise.

A typical O&G company may own hundreds or thousands of wells, and each well often has a unique set of stakeholders. A typical oil company leases the mineral rights from the “interest owner” and, after permits and construction, begins production. On the production side of the business, the O&G well operator is responsible for recording production data and issuing a “division order” that specifies the distribution of the income received from the sale of the oil from that well to the interest owner and other stakeholders. The same process is repeated for each active well.

On the financial side, the well operator is tasked with accurately distributing contractual payments and royalties to the well’s stakeholders. The volume of data to be managed is significant, prone to error, and payments disputes are common and often costly to resolve.

These problems are common in the O&G industry as financial payment data typically has to pass through multiple systems and often through the hands of third party data processors before reaching the hands of the mineral rights owners. In addition, over half of all payments are still issued via paper checks which adds further costs and delays to the receipt of royalty payments.

In addition, paper checks are issued that add a further delay to the receipt of royalty payments. The intangible side effect of payment errors is a loss of trust in the legitimacy of the well owner.

A BETTER WAY

NuArca was founded on the desire to leverage blockchain, artificial intelligence (AI), and other transformational technologies to solve real-world problems to create value for businesses. Blockchain, AI, and other new technologies will disrupt the everyday business practices of every data and transaction-related industry, such as O&G (**see sidebar: What is Blockchain**).

WHAT IS BLOCKCHAIN?

The concept behind blockchain is quite simple. A blockchain is a type of database. A simple database, such as an Excel spreadsheet, makes searching and filtering data easy for a single user. More extensive databases are installed on servers that can connect to hundreds or even thousands of computers for increased computational power and data storage for many simultaneous users. Usually, a single database administrator controls the entire computational system.

Blockchain structures the data differently. The data collected is formed into groupings that hold a finite amount of information called “blocks.” When a block is filled, a new block is “chained” with the previous block to form a “blockchain,” and the process continues. Instead of data storage in a series of tables, data is now stored in a series of interconnected blocks. Block data can be in many forms, such as contracts, product inventory, bank transactions, medical records, property records, supply chain records, and the like. Unlike a conventional database, individual blocks can be stored apart from each other. Most importantly, however, is that there is an irreversible timeline attached to the blockchain. A filled block is permanently closed and written on the timeline (**Figure 1**).

NuArca, voted as IBM’s 2019 New Partner of the Year 2019 and 2020 Blockchain Partner of the Year, has developed PipelineDL (Distributed Ledger, PDL) to address current transactional inefficiencies in the upstream tracking of production and payments of mineral rights. In sum, PipelineDL fundamentally transforms how well operators handle production payments, billings, statements, and reports. IBM blockchain services support locally hosted peer nodes or those hosted in various cloud providers, including AWS, Azure, Google Cloud, and IBM Cloud Services. NuArca’s PipelineDL solution leverages IBM’s blockchain cloud infrastructure enabling the partnership to pursue blockchain and AI technology applications in many industries in addition to O&G. This versatile platform leverages the power of blockchain technology to provide a unified source of truth for all the stakeholders associated with individual wells across the value chain.

PipelineDL enables an oil or gas company to record the production volume, sales volume, and price from a well and issue division orders, which interest owners then confirm. A smart contract is then established on a distributed ledger representing the terms agreed to in the division order, which then records transactions and executes payments according to the contract terms. The digitally shared ledger is updated and validated with each transaction, resulting in a secure, permanently recorded exchange. This process streamlines the conventional filling out, sending, and tracking of individual paper check payments. As a result, the payment process is inherently secure, transparent, authenticated, and reduces settlement time (Figure 2).

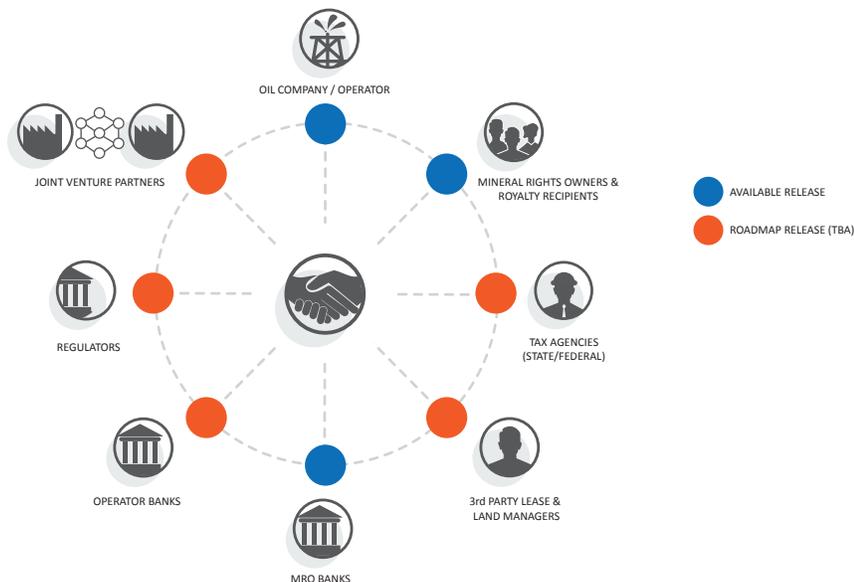


FIGURE 2. THE PIPELINEDL ECOSYSTEM EXCHANGE. THE FLOW OF INFORMATION AND FINANCIAL TRANSACTIONS ARE MANAGED BY PIPELINEDL THAT IS BUILT UPON ENTERPRISE BLOCKCHAIN TECHNOLOGY. SOURCE: NUARCA



SHARED LEDGER
Append-only distributed system of record shared across business network.



SMART CONTRACT
Business terms embedded in transaction database & executed with transactions.



PRIVACY
Ensuring appropriate visibility, transactions are secure, authenticated and verifiable.



CONSENSUS
All parties agree to network verified transaction.

FIGURE 1. THE KEY PROMISES OF BLOCKCHAIN TECHNOLOGY. SOURCE: NUARCA

The attraction of blockchain technology is that the computational power and storage capacity required may be distributed to a system of peer-to-peer computers (nodes) located across the globe. For example, in a financial system, once a transaction is determined to be legitimate, the data is clustered into one or more new blocks and timestamped. These blocks are then permanently chained to related transactional data, and the completed transaction is stored on a node. If an error occurs at a node, intentionally or unintentionally, all the other nodes cross-reference each other, and incorrect data on that node is rejected. The result is a digital shared ledger that is secure, updated, and validated with each transaction stored permanently. The result is faster, permissioned, and auditable transactions that are visible for all concerned parties.

There are other advantages that PipelineDL provides to the well operator. For example, PipelineDL significantly reduces the cost of owner relations, particularly with ownership tracking and maintenance. Further, PipelineDL minimizes the burden on owners as inquiries may be submitted on a custom portal.

AN ORDERLY PROCESS

The oil company automatically issues a division order through its portal, and the interest owner confirms the order, also through the portal. When the division order is approved by the contract parties, a smart contract is established on the distributed ledger. This process produces an unalterable, secure, and transparent record of the division order and its confirmation.

The optimized process begins with the automatic monthly download of production data from any number of wells monitored by the PipelineDL platform. The process seamlessly integrates and distributes production data eliminating manual data collection. Further, the platform records sales volume and price from each well.

Finally, the distributed ledger records transactions and executes payments based on the smart contract terms in seconds. The digital ledger is updated and validated with each transaction, resulting in a secure, permanently recorded exchange. Further, revenues and other expenses are visible to interest owners.

Fully electronic processing of royalty payments is accelerated over paper checks and production statements for each well are eliminated, as are payments to third parties. In addition, payments to multiple owners at a single institution can be grouped into a single EFT (electronic funds transfer) for thousands of wells and

then credited to sub-accounts, streamlining the entire revenue payment process. A further benefit is that the platform provides a central source of truth acceptable to all members, minimizes royalty payment disputes, and delivers integrated tax and regulatory reporting.

From a stakeholder perspective, PipelineDL automatically determines revenue and expense sharing among joint partners, provides automated annual tax reporting for payees, can send monthly tax reports to state and federal entities. Overall, PipelineDL reduces the cost of owner relations, eliminates redundant reports, and increases efficiencies between the well operator and various stakeholders. In addition, all disputes, mistakes, and corrections can be settled real-time through PipelineDL, replacing the current manual process that can take weeks or months. One O&G CIO is quoted as saying, “[PipelineDL] could save operators millions of dollars annually in data/software licensing costs and employee labor while also increasing data security, data quality, reporting obligations and a quicker time to market (i.e., plan to produce).”

A CASE STUDY

Zavanna LLC, a Denver, CO based producer with over 120 active oil and gas wells in N. Dakota and Wyoming, is an early adopter of PipelineDL.

The benefits of PipelineDL to Zavanna include defining company-specific production monitoring and reporting that was operated in parallel with the existing manual reporting systems for several months to avoid the possibility of disrupting the flow of royalty payments. Further, the testing function confirmed the proper operation of PipelineDL's various data handling and reporting functions.

Zavanna was responsible for providing existing data in the current format, and NuArca managed the conversion and implementation tasks. After consulting with Zavanna, the PipelineDL implementation was configured to include:

- An Operator's Portal allowing O&G operators to bring in property, division orders, production, and sales data to share with the appropriate banks and mineral rights owners.
- Integration with source systems such as SAP PRA, W Energy Software, P2 BOLO, or other solutions involved in managing the relevant data.
- A blockchain system of record built with Hyperledger Fabric calculating the payment amounts using "Smart Division Orders" and making the relevant data available to the approved parties using channels to protect the privacy of data interactions.
- A Private Banking and Trust Portal and a Mineral Rights Owners' Portal allowing the authorized parties to access and check data elements for the appropriate properties and achieve a holistic view of owner rights across wells, operators, and geographies.

Since the implementation of PipelineDL, Zavanna has seen significant reductions in the cost of owner relations and a reduction in the time to process royalty payments. Zavanna has also received praise from mineral owners concerning data transparency and security and the overall improvement of their overall experience.

A BRIGHT FUTURE

A disruptive technology describes an innovation that changes how consumers, industries, and businesses operate fundamentally, such as the personal computer, email, and cell phones. Blockchain promises to disrupt how the O&G industry currently operates but the technology also promises to disrupt many others beyond cryptocurrency exchanges. For example, blockchain technology promises the secure sharing of medical data, personal identity security, supply chain, logistics monitoring, original content creation, real estate process, and a secure voting environment mechanism. If a secure and transparent database is required, blockchain technology developers will soon have an app for that.

ABOUT NUARCA

NuArca is a leader in delivering marketplace defining solutions utilizing Blockchain, AI, and other emerging technologies.

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FOR FURTHER INFO ON PIPELINEDL BLOCKCHAIN PLATFORM, PLEASE CONTACT:

Christopher H. Smith

Executive Vice President

NuArca Inc.

Tel: (303) 808-3710

Email: chris@nuarca.com

Website: www.nuarca.com