What It Takes To Leverage E&P Big Data

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INTRODUCTION
Big Data is one of the most talked about technology topics in all industries, and upstream oil and gas is no exception. The growing need to better understand the subsurface, have cost-effective drilling operations, and achieve highly efficient reservoir management has led to the creation of huge amounts of data. This data is coming from a large number of sensors, devices and equipment at higher frequencies than ever before, inundating existing information infrastructure. Yet, the oil and gas industry generates value from a mere 1% of all the data it creates, according to the McKinsey Report 2015, [CNBC 20154].

Recently, upstream oil and gas companies have begun to focus on creating more value from Big Data, trying to grasp the concept and what it means for their business and the industry as a whole. But, compared to other industries that have already successfully leveraged Big Data — such as the financial sector, digital media, healthcare, etc — the oil and gas industry is much less mature.

The challenges and obstacles faced by upstream oil and gas with respect to Big Data could be overcome with the following types of solutions:
» More efficient processes and workflows across the upstream oil and gas lifecycle
» A higher degree of ‘real-time’ actionable insights
» A consolidation of data (rather than data silos, data lakes and remote data stores)

BODY HEADER
While many definitions of Big Data are used in the industry, the most common misconception is that it involves “lots” of data. If it were just about lots of data and the processing of it, then the oil and gas industry would be considered a pioneer of leveraging Big Data, as it has accumulated lots of data over the last couple of decades. However, in the present context, this is not true. So, what exactly is Big Data?

Priyadarshy definition of Big Data leaves no room for misconception or confusion about the meaning of Big Data:
“Big Data is about all the data whose scale, variety, source, context, and complexity needs emerging technologies and solutions for creating actionable insights to enable business growth and innovation.”

Industry reports will talk about Big Data in terms of the three Vs, four Vs, etc., where the V’s are Volume, Velocity, Variety and Veracity.

However, a more appropriate description is to see them as pillars of Big Data. Based on the above definition, the seven pillars (CIO Review 2015, PR 2015) are:
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UNDERSTANDING BIG DATA

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» Volume (small to large),
» Velocity (slow, to fast, and data in motion),
» Variety (unstructured to structured),
» Veracity (the truth in the data),
» Virtual (data anywhere, not in silos and lakes only),
» Value (the value for business growth/innovation) and,
» Variability (the unique mix of Volume, Velocity, Variety, Veracity, Virtual and Value for the specific context).

CREATING VALUE FROM UPSTREAM BIG DATA

The E&P oil and gas industry has done a great job of managing its data and information because of products and solutions from companies like Landmark, a business line of Halliburton. Landmark pioneered the storage of exploration data and over many decades built a strong foundation for creating value from multiple data sets, depending on the phase of the oil well life cycle. To truly benefit from Big Data, however, a paradigm shift is required in order to address the many challenges.

INTERCONNECTIVITY OF DATA COLLECTED DURING MULTIPLE PHASES OF THE OIL WELL LIFECYCLE

Upstream oil and gas has multiple phases, from exploration to drilling to completion to production and beyond. Each of these phases is equivalent to an industry vertical by themselves; so on a scale basis, exploration alone could be much more complex and bigger than the digital media world. Hence, the solutions that the digital world uses could not be easily translated to solve challenges in these phases. There are a number of niche solution providers for managing data – whether to store, transform or mine data. Solutions from these providers are generic and require a large degree of customization for the upstream oil and gas industry. As it exists today, this customization could lead to cost over-runs, ineffective use of technology, and unwanted complexity.
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MANAGEMENT OF UPSTREAM OIL AND GAS SCIENTIFIC WORKFLOWS

Scientific workflows play a more critical role in the upstream oil and gas industry than other industries. These workflows are quite complex, computationally intensive, and time consuming in terms of interpretation. Their interplay is also important. With the ever-increasing data in terms of volume and dimensionality, the execution and management of workflows could become much more cumbersome.

The data-intensive scientific workflows are a good target for leveraging Big Data technologies, such as distributed computing, cloud resources, etc. However, the implementation of these technologies requires a significant amount of domain knowledge in order to adapt the scientific workflows on such systems.

LEVERAGING THE APPROPRIATE ANALYTICS VALUE CHAIN

Interpreting seismic data with high accuracy requires efficient computational processing and extensive domain knowledge. To date, there is not much tacit knowledge that is captured for building highly cognitive systems. Hundreds of papers have been published on attempts to build various predictive models for rate of penetration for drilling performance; predicting the occurrences of unwanted stuck pipe events; and estimating the invisible lost time by using various descriptive, predictive models and machine learning algorithms. The success of models is yet to be realized by the industry. One of the reasons for minimal value from such analytics modeling is a lack of domain expertise and holistic domain knowledge that must be incorporated when creating data driven analytics modeling. A large number of vendors and solution providers can provide the analytics modeling, but not the domain expertise. For example, topological data analysis algorithms have provided some value in cancer research; but, when one applies these algorithms to seismic data, the resultant topological maps require a significant input of domain expertise to make sense and do not add much accuracy in subsurface interpretation.

USING THE SMART APPROACH

Landmark has successfully built and deployed one of the most integrated and modular solutions for the upstream oil and gas industry, called the DecisionSpace® platform, using a SMART approach. So, what does SMART stand for?

» Simplification of the underlying technology infrastructure to address all phases of the oil well life cycle, scientific workflows and analytics value chain. This simplification is done in a manner so that anyone from exploration to production can use the same platform to create value, which many of the niche solution providers cannot do, as they lack significant domain knowledge and experience in the field.
» Management of data silos, data lakes and data stores through the DecisionSpace Integration Server, with a single data view; thus, addressing the Virtual pillar of Big Data. The DecisionSpace Integration Server provides access to data without the need for moving massive amounts of information from the field to the back office, etc. It leverages a virtual cube concept that can be saved to do repeated data mining on required attributes. It also provides for handling data in motion, an important component of the upstream oil and gas industry, which is an ability that outside vendors and niche solution providers lack.

» Agility of combining logs from multiple sources and addressing the contextual data quality that increased the time to value from E&P Big Data. Many solution providers have data quality tools and technologies, but not E&P Big Data.

» Reduce costs and risks associated with managing data, data mining, and analytics and increase efficiency in creating actionable insights from data sets that was not possible before.

» Technology platform that is scalable, expandable to adapt and incorporate new data ingestion technologies, data storage solutions, big data analytics tools and technologies, and insights visualization and interpretation platform that provides access anywhere.

SUMMARY

In brief, many niche solution providers for Big Data technologies exist and have solutions to meet one or more of these challenges; but, no one besides Landmark has the comprehensive domain expertise critical to creating value from E&P Big Data. Contact www.Landmark.Solutions to leverage 80+ years of experience in creating the value and insights that will take the E&P industry to the next generation.

REFERENCES


