



HOW SENSORS AND EDGE COMPUTING ARE MAXIMIZING OIL AND GAS DATA

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INSIGHTS FROM BDO'S NATURAL RESOURCES PRACTICE

The oil and gas industry is contending with a new pricing paradigm driven by a marked shift in supply and demand fundamentals.

In this new low-price environment, growth is no longer defined by sky-high production volumes, but by operational efficiency. The key to unlocking untapped efficiencies is hidden in the ever-expanding universe of production data, not just within the enterprise, but across the entire supply chain. When applied to its full potential, this data can help oil and gas companies maximize production, improve worker safety, heighten asset investment returns, and drive growth in numerous other areas.

The big data phenomenon—the massive increases in the volume, variety, and velocity of data—is hardly new. What *is* relatively new is the ability to digitize physical data via sensors and edge computing technologies. The result is more complex data sets than ever before—but also vast opportunities to convert that data into value, from analysis of rock formations and identification of oil-rich areas and reservoir models that can maximize production, to automating operations making them safer and more efficient. Data volumes are now **exceeding 10 Terabytes (TB)** of data per day for a single well, which put in perspective, is equivalent to 6.9 million images uploaded to Instagram or the digital data storage required for 22,000 episodes of Game of Thrones.

However, oil and gas companies are leveraging just a tiny fraction of the data available to them. While they don't have issues

gathering the data, they lack the resources to properly manage and explore its benefits.

HOW CAN DATA ANALYTICS IMPROVE THE E&P PROCESS?

Data analytics has the power to transform oil and gas production systems' fundamental operating models, providing vital information about what *has* happened and what *could* happen in the future, as well as insight on what to do about it. Advanced analytics, powered by machine learning, can identify patterns across variables in continual conditions. Machine learning algorithms can comb data for correlations and causalities that can be applied to find bottlenecks constraining production and determine prescriptive action.

Intelligence uncovered can be used to make better decisions, mitigate risk, and improve efficiency. Applying these insights in a predictive manner is valuable in preventative maintenance to determine critical issues, such as when a machine might fail or a safety incident could occur. For example, analytics can be used to predict maintenance windows for equipment like offshore drilling rigs, which allows for planned downtimes of much shorter durations—a few hours compared to up to a few weeks, depending on repair crew availability.

Analytics can also reverse declining process inefficiencies, optimize production settings, and increase average production output. This



includes anticipating daily and weekly fluctuations in production and getting to the root cause of variations in performance between operator crews.

In addition to enhancing skills and capabilities, there are various factors essential to harnessing the power of advanced analytics, such as the availability of data, analytics infrastructure, redesigned work, and governance and business-driven agility.

Of course, the advantages of data analytics are not limited to the field. Applying analytics to tax and financial information, for example, can yield significant time and cost savings, and improve financial discipline. Hedging strategies informed by real-time price risk analysis and predictive modeling can help companies balance their spending and cash flow.

THE DATA WAR

The rise of big data has led to increased discussion around data ownership—particularly surrounding the so called “[data war](#)” in the oil field, between oilfield services companies and E&P companies. Production no longer involves two resources, but three. It's clear that oil and gas belong to their respective operator, but data ownership remains blurry.

Traditionally, oil companies have purchased data such as seismic files or drilling logs that contractors gather for their customers. However, more recently, data is captured from oilfield equipment such as rigs, pipes, and pumps—an area of untapped potential for the industry. Cloud and AI systems further complicate the picture when it comes to data ownership, particularly with the use of algorithms for learning. One party may own the learning system, but another owns the resulting data.

Eventually, the rules of data ownership will need to be redefined. Every entity in the oil and gas supply chain will need to reach beyond their four walls to share data and other resources that

can lead to more efficiencies and better outcomes. Information hoarding will ultimately prove a self-defeating approach.

WHAT'S AHEAD?

Data analytics is just the beginning of the digital revolution in oil and gas. The insights extracted from data can inform wide-scale transformation, subsequently streamlining operations and spawning new business models.

It's also enabling the next generation of disruptive technology. Data visualization is a powerful way to quickly understand multivariate correlations, clusters, and outliers, but it's limited to two dimensions. With the application of augmented reality or mixed reality, data analytics can render 3D simulations, enabling users to perceive and interact with the information in entirely new ways. A mixed reality headset called the Microsoft HoloLens, for instance, can transform the E&P process by allowing remote monitoring of sites.

According to [Softweb Solutions](#), the HoloLens has the ability to:

- ▶ Interact with oil drilling and exploration equipment
- ▶ Analyze core samples of drilling platforms with geographic information systems
- ▶ Make product configurators for equipment manufacturers
- ▶ Place holographic projections on a specific surface

The Economist recently stated, “The world's most valuable resource is no longer oil, but data.” We'd argue that oil *plus* data is the real MVP.



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