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The digital oilfield finally comes together

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The digital oilfield finally comes together

BY DAN LARSON • FOR ENERGY PIPELINE

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Technology that monitors and controls oilfield equipment is nothing new, and now it is finally fulfilling its promise to fully automate and connect an entire field with operations offices.

At the Rocky Mountain Energy Summit in Denver this summer, three oil and gas technology leaders described how cloud computing, data warehousing and analytics and the applied knowledge of industry experts are transforming oilfield operations.

The change has been a long time coming.

Like many of those with decades of experience in the oil and gas industry, Don Paul recalls a time when companies operated autonomous internal computing networks that were closely controlled by a small group of technical experts.

"It was like a priesthood that spoke a different language," says Paul, the executive director of the Energy Institute at University of Southern California. He retired from Chevron in 2008 as vice president and chief technology officer after a 33-year career.

"Now, data access and analytics provide insights into all levels of operations," he says. "It also puts pressure on companies to transform their culture. We already see less emphasis on the traditional professions like geologist and petroleum engineering and more on developing expertise that is a blend of earth sciences with strong skills in data management and analytics."

As an academic leader, Paul concludes that "the traditional petroleum engineering degree must account for a digital future."

What most industry people recognize today as the digital oilfield has been around for a decade, according to Binu Mathew, digital strategy leader at GE Oil and Gas. What has changed is the tremendous leap within just the past year in the ability to connect all parts of the operation and then gain insights from the wealth of data available.

"When you look at the flow of oil and gas from the ground to the refinery to the consumer, there needs to be data flowing in parallel at every step of the way," Mathew observes. "The concept is not new but we can now apply analytic models to that data and get real-time insights. Use these insights to take action and you take a giant step forward."

That coming together of access to data in real time through use of new, inexpensive sensors combined with the ability to connect from nearly everywhere provides the fuel that is revolutionizing oil and gas industry, says Brian Pugh, chief operating officer for BP's new Lower 48 business unit. The company is relocating Lower 48 headquarters to downtown Denver from Houston.

The spark that sets it all in motion is access to the cloud-based computing power needed to plow through massive amounts of data while applying the algorithms that allow the field operator and support staff in the office to make sense of it all, Pugh notes.

"These enabling technologies are coming to fruition in weeks and months, not the years in the future that we used to think," Pugh observes. "It is a new way of operating that automates the routine tasks we thought were unavoidable. It frees up people to solve tough new problems and lets us work safer and with more regard for the environment."

Pugh describes a system that connects large, disparate data sets and gives workers the ability to visualize what is happening and to quickly spot trends. He adds that these systems can capture solutions to problems that operators already know how to solve and not only

A technician reviews a live image of a control box sent by a field operator using BP's "virtual assistant" technology. Repair steps can then be returned to the operator, improving efficiency and safety.

VIRTUAL REALITY COMES TO THE OILFIELD

What happens when you link mobile connectivity, virtual reality glasses and the expertise of the industry's sharpest field operations?

You get a new way for lease operators to manage routine tasks such as equipment breakdowns that improves efficiency and enhances safety.

At this year's Rocky Mountain Energy Summit in Denver, Brian Pugh, chief operating officer at BP Lower 48, was asked for an example of how Big Data is changing the way companies manage field operations.

His example showed how companies can combine existing products into something new that enables a solution to a vexing problem.

The company's "virtual assistant" technology relies on a truck-mounted booster package that creates a Wi-Fi hotspot at a far greater range and turns the operator's vehicle into a "mobile data center."

The company worked with a supplier of safety glasses to develop glasses that incorporate virtual reality technology and allow the operator to interact with support staff using real-time images of components and how they can be serviced.

"Previously, when an operator ran into something he couldn't fix on the spot, he had to write up a ticket and turn it in when he got back to the shop," Pugh says. "Later, someone else went to the site to make the repair and the well might be down for a week."

"Now, we can walk the operator through the repair because the technician can see the same thing the operator does," he says.

The virtual assistant system also allows the operator to annotate the part needing repair so when the same issue is encountered at another site, the operator can be shown how to make the repair along with any safety notes that may be needed.

Another advantage of the system, Pugh says, is that it allows the operator to look at a storage tank or separator and see important measurements such as pressure, temperature or flow rate.

"Once an operator tries the virtual assistant, it's like a light bulb is turned on," Pugh concludes. "We enable them to work at a much higher level."

— By Dan Larson

BP's "virtual assistant" technology uses VR-equipped safety glasses to share what the field operator sees on location with a technician at the operations center.

predict when a problem might occur but give the operator a solution before arriving on location.

Companies recognize they are dealing with systems on existing wells that are 20 years old or older, Pugh says. What has changed is that they can now "drop wireless sensors that used to cost thousands of dollars and now go for tens of dollars on top of existing equipment and connect the entire location. We can then use the cloud to warehouse the data and run the analytics. It is fundamentally changing the oil and gas business."

Routine assignments such as an operator's daily route for well visits can be optimized, Pugh adds.

Historically, a route was mapped out based on geographic boundaries and often included arbitrary or personal preferences, such as proximity to a good place for lunch, he notes.

"On any given day, 60 percent of the well visits were not necessary and did not add value," Pugh observes.

"The company brought together engineers, data scientists and operators and asked, 'Why do you need to go to that well?' Then we mixed in safety and environmental regulations, production volumes, the skill sets of our operators, even the tools and materials on the truck and road conditions. Our data specialists turn that into a value added, optimized route that tells the operator which wells to go to, in what order and what to expect when they arrive," he notes.

Brian Pugh, COO at BP Lower 48, says connectivity and data management are fundamentally changing how the oil and gas business operates.

"By maximizing their time on location, helping the operator solve problems instead of simply repeating the same task, we have seen 40 percent improvements in cash flow, increased production and better HSE performance," Pugh says.

"For those willing to get on board now, there has never been a more exciting time to be in this industry," Pugh concludes.