3 WAYS TECHNOLOGY IS GOING TO SHAPE the Oil and Gas Industry

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The oil and gas industry has a long history of volatility, and it's often hard to identify a momentary fluctuation versus a long-term trend. The industry took years to recover from the price crash of 2014, which forced companies to drastically cut overhead to survive.

Additionally, the margin between profit and loss in a bad – or even stagnant – year remains razor thin. Even now, oil prices are barely half of what they were over ten years ago, and the way forward requires careful thought and planning.

Running a lean operation is essential for success. At the same time, only so many budgets can be slashed, personnel reduced, and remaining corners cut. The other crucial element required not just to survive but thrive is the integration of emerging oil and gas industry technologies, everything from the Internet of Things (IoT) to 4D seismic surveying to employee wearables.

Still, it can be hard to know what's for real versus what's interesting but offers little actual return on investment (ROI). With that in mind, here's an overview of three rapidly developing oil and gas technologies to keep an eye on.

Oil and Gas Industry **Emerging Technologies**

Oil and gas operations are commonly found in remote locations far from company headquarters. The common denominator with the technologies below, however, is "connectivity."

Now, it's possible to monitor pump operations, collate and analyze seismic data, and track employees around the world from almost anywhere. Whether employees are in the office or in the field, the internet and related applications enable a greater multidirectional flow of information – and control – than ever before.

01

INDUSTRIAL INTERNET OF THINGS (IIOT)

When it comes to online connectivity, the first internet prototypes in the late 1960s were developed for scientists to disseminate research via file sharing. Since then, as hardware and software capabilities increased, so did the types of applications by which data could be shared, everything from ecommerce to wikis to streaming videos.

The next development was the Internet of Things (IoT), the process by which traditionally disparate systems are connected into one seamless network. For example, a home's thermostat, lighting, security, and plumbing are usually standalone "dumb" systems requiring individual manual control. Thanks to home technology integration via the IoT, all these systems can be networked together using desktop software or even a smartphone app.

The Industrial Internet of Things (IIoT) takes this concept one step further by uniting multiple company operations into a single control and analysis system. Typically, there will be four components:

- Data communication infrastructure
- "Smart" assets – machines, systems, sensors – which transmit data
- Analytics software to evaluate data
- Human operators

Just like the traditional home, oil and gas operations typically consist of multiple independent systems: wellheads, storage tanks, pipelines, power generators, skids, and more. With the IIoT, these can be combined into a unified system.

Not only does this permit greater human oversight, it also allows for increased automation. Much of the decision-making process can be done on the spot as events occur without the need for human intervention.

For example, Rockwell Automation employs IIOT solutions to create what it calls "The Connected Enterprise": the collection of 24/7 digital operational intelligence from all systems resulting in greater productivity and enhanced risk management.

Rockwell partnered with Microsoft's IIoT services to increase productivity and reliability in the following areas:

PUMP OPERATION:

A malfunctioning pump at an offshore platform can cost up to $300,000 of production per day. By using sensors connected to the cloud, Rockwell can monitor pumps' variable speed motors from its command center in Cleveland, Ohio to immediately identify and deal with problems.

LEASE AUTOMATIC CUSTODY TRANSFER (LACT) UNITS:

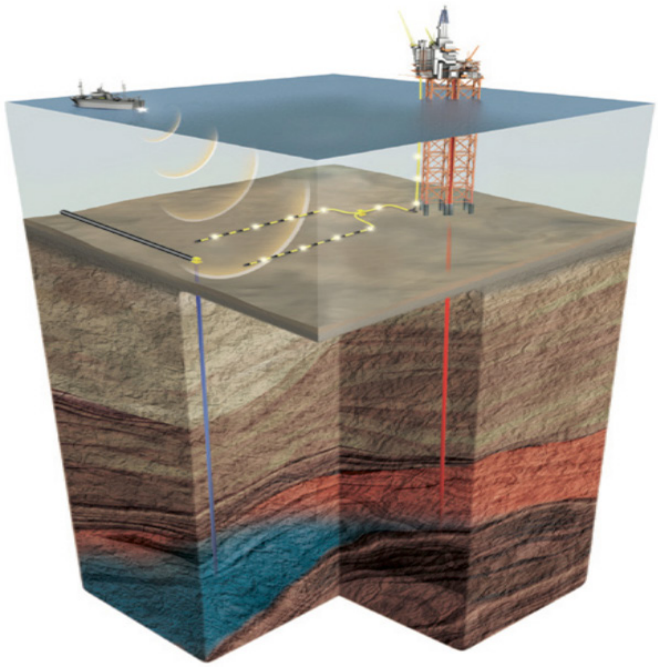
LACT units – aka "skids" – measure the amount of product transferred from one container to another as it moves downstream. Typically, these operate independently of each other with only paper records and in-person maintenance, leaving them susceptible to being inaccurate or operating inefficiently. Rockwell partnered with Trigg Technologies to automate these.

LIQUID NATURAL GAS (LNG) PUMPS:

Rockwell is creating smart LNG pumps at gas stations which allow data to be transmitted about vehicles in delivery fleets including fuel consumption, vehicle performance, and fuel inventory. This information can be used to schedule vehicle maintenance to prevent equipment failure as well as improve gas station pump design.

02

4D SEISMIC TECHNOLOGY



The successful commercial application of seismic prospecting began in 1923 when the Royal Dutch Shell Company began using refraction techniques in Mexico to identify salt domes. Over the next 60 years, 2D seismic surveys were developed to show ground composition along a single line.

With subsequent 3D technology, a grid of data is analyzed to produce a three-dimensional subsurface picture with greater accuracy. Even 3D seismic data, however, is subject to the limitations of computer models and filters that affect data interpretation for readings taken at different times.

Now, 4D seismic technology produces a 3D grid which can be viewed over time to identify these errors as well as monitor underground reservoirs.

For example, Shell partnered with Concept Systems to improve the quality of its seismic data sets for deepwater fields in the Gulf of Mexico. Factors such as tides, weather, and survey geometry can cause significant seismic data variations.

By utilizing software developed by Concept Systems, Shell was able to identify problematic data sets thanks to real-time analysis by onshore geophysicists. Then, infill areas could be reshot while the ship performing seismic tests was still on location.

03

ENERGY, RESOURCE, & MARINE (ERM) SAFETY

The development of wearables – smart personal protective equipment – is increasing in the oil and gas industry.

These wearables have the potential to monitor vital signs, hazardous gas levels, and send alerts in the case of health or lockout/tagout emergencies. Plus, Daqri already makes industrial-grade "smart glasses" that incorporate augmented reality and voice-activated commands so work such as monitoring gauges, dials, and sensors can be done hands-free.

In addition, ERM-related travel safety can be enhanced in three basic areas:

- All employees can be digitally tracked in real time, especially when traveling in high-risk areas.
- Employee fitness can be continually tracked to anticipate and avoid health-related issues.
- As female employees become more prevalent in the oil and gas industry, they have the extra security of knowing their safety and conditions in the field are being monitored.

As workforce numbers overall decrease, employees are seeing their areas of responsibility expand. They are, therefore, even more valuable, increasing the need to ensure their safety.

Working **the Odds**

Everyone who's spent time in the oil and gas industry knows there is no crystal ball for making guaranteed pronouncements about the future. Even under the best of circumstances, predicting what will happen with a given exploratory well or wholesale prices six months in the future, is at best, an educated guess.

As technology continues to evolve, the odds can be improved to allow decisions to be as informed as possible. While investment in these different technologies can seem like a luxury, especially in times of flat or declining revenue and increasing costs, their implementation can ultimately be the difference between thriving versus not being able to survive.

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