

Compelling opportunities in oil and gas present new challenges

How new data, technologies and processes can help you navigate volatile economics



orange™

Business
Services

Driving digital transformation in oil and gas

Oil and gas is embarking on digital transformation to exploit new onshore and offshore oil and gas assets, paving the way to streamlining existing extraction, refining and distribution operations.

The fundamental factors for success in the oil and gas industry are many: maximizing recovery for new deeper and alternative assets while introducing efficiencies into recovery and processing of existing resources; smoothing the flow-through of product between up-, mid- and downstream segments; and automating processes through better data collection and analysis.

Current volatile economics are taking organizations on a journey where new and future technologies can reduce market risk by delivering greater insight into field, processing and distribution through machine monitoring, and data collection and analysis, with the objective of streamlining operations and planning for future automation of some processes.

The internet of things (IoT) can be deployed for detailed oversight of many aspects of the operation and provide valuable insight into how today's processes are meeting new challenges. There's the potential for constant improvement from analyzing downstream information that improves upstream processes and makes the operation fitter through every cycle.

None of this digital journey will be successful without the human component. From training employees for the coming digital wave, raising the bar on health and safety, and addressing the need to attract and keep the upcoming generation of talent, people are central to this process. And in a wider sense, we need to look to digital to help protect the environment by preventing pollution and ecological damage.

Contents

Managing market volatility with technology	3
Going beyond the barrel	5
Better quality of operations	6
HSE: protecting workers and the environment	8
Emerging technologies coming down the pipe	9
Build smarter oil and gas operations with Orange Business Services	10



Managing market volatility with technology

In the face of tightening economics, relatively low recovery ratios, and more stringent environmental scrutiny, the oil and gas industry is exploring not just new physical territory but also new technologies to improve outcomes. Decisions about how to digitalize the operation will set in motion positive change in the industry which will affect energy resources for generations to come.

The amount oil and gas companies are spending in support of their operations has fallen by 25 percent since 2014, in response to overall business risk and volatile prices which have declined overall by about 50 percent since 2014.

“The (recent) downturn saw tremendous gains in cost containment, capital high-grading, and operating efficiency, according to Duane Dickson, vice chairman and principal at Deloitte’s oil and gas practice. “Will this discipline be maintained? Some costs will inevitably rise, not only to restore margins in the service sector, but also due to rising materials costs. The question is whether acceptable returns can be generated.”¹

Straightforward best practice cost-reduction methods have delivered results so far, but further reduction of headcount or maximizing production throughput using existing assets seems no longer a sustainable long-term strategy.

It’s becoming clear that leveraging competitive operations during higher per-barrel prices while being efficient during times of low prices are big challenges.

“While the supply glut may have ended, its after effects will continue, companies must maintain capital discipline and the focus on productivity improvements and applying new technology.”

Breaking down silos

A lack of visibility and cohesion between up-, mid- and downstream operations have effectively siloed operations at a time when more efficient and effective flow throughout these segments is the next step. There is no “big picture” view that indicates the general health of the operation as a basis for de-siloing and achieving greater, sustainable efficiencies.

Technology holds the key, but in a complex environment, where could it be deployed, and how does it help?

“While the supply glut may have ended, its after effects will continue,” concludes Strategy& in a recent report.² “Companies must maintain capital discipline and the focus on productivity improvements and applying new technology.”



1. <https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/oil-gas-and-chemicals-industry-outlook.html>
2. <https://www.strategyand.pwc.com/trend/2018-oil-gas>

Managing market volatility with technology

Automation is key

The biggest next step is automation, which will help deliver the “Digital Oil Field”. IoT devices and sensors can provide first-hand information about extraction techniques, equipment, pipes, storage, transportation and employee and environmental safety. Coupled with monitoring the state of mechanical, infrastructure and energy assets, this big picture is finally emerging.

Analysis of big data promises to help firms make better-informed technical and business decisions. Data analysis can provide the information required through extraction modelling, predictive maintenance, and can deliver increased throughput and downtime reduction across the board.

The global economic impact for oil and gas of leveraging connected devices and analytics could reach \$930 billion in the next ten years, lessening financial risk from exposure to market volatility, while instituting the new technology and process change that will makes gains sustainable.

This is a challenge because digitalization can be complex within a highly specialized industry which itself has unique requirements and is extremely risk averse. But it's already on the horizon.



Spearheading positive change

One of the world's biggest oil and gas organizations has been exploring efficiencies in field extraction, improved process throughput, and applying downstream information to upstream processes to provide continual production improvement.

Firstly, it sought an improvement in overall drilling operations and processes. Reliability and granularity of data were important in order to measure asset performance. This included the weight of the crane, productive drilling time, depth and speed of drilling, and time to change the drill itself.

Video analytics captured the start and finish of operations and allowed for more straightforward analysis. In the future, managers will be able to see unique extraction issues through digital visual modelling in virtual and augmented reality scenarios.

Secondly, this organization realized that a greater degree of operational transparency could lead to reduced production downtime if there was a timelier, coordinated response to change management during challenges. The performance of subcontractors could be monitored, and discrete KPIs could be displayed on-site to help worker communications, offering better handling of change management during a job, and then forecasting the effect of change management on similar future tasks.



Going beyond the barrel

Oil and gas companies are under pressure to go “beyond the barrel”³. They need to physically exploit more remote resources, which have become cost-effective to recover, optimizing recovery operations using insight from data, and also paving the way to diversity options that de-risk the business.

Today’s objective is to improve the oil recovery ratio from an average 30 percent to up to 50 percent, and data collection and analysis play a pivotal role here.

A single large offshore rig can generate terabytes of daily data. Yet only 1 percent of it is currently used for better decision-making due to major bottlenecks in how it is communicated. Most of this data remains untapped, leaving the overall picture incomplete and ignoring optimization and prediction, where it has the greatest value.

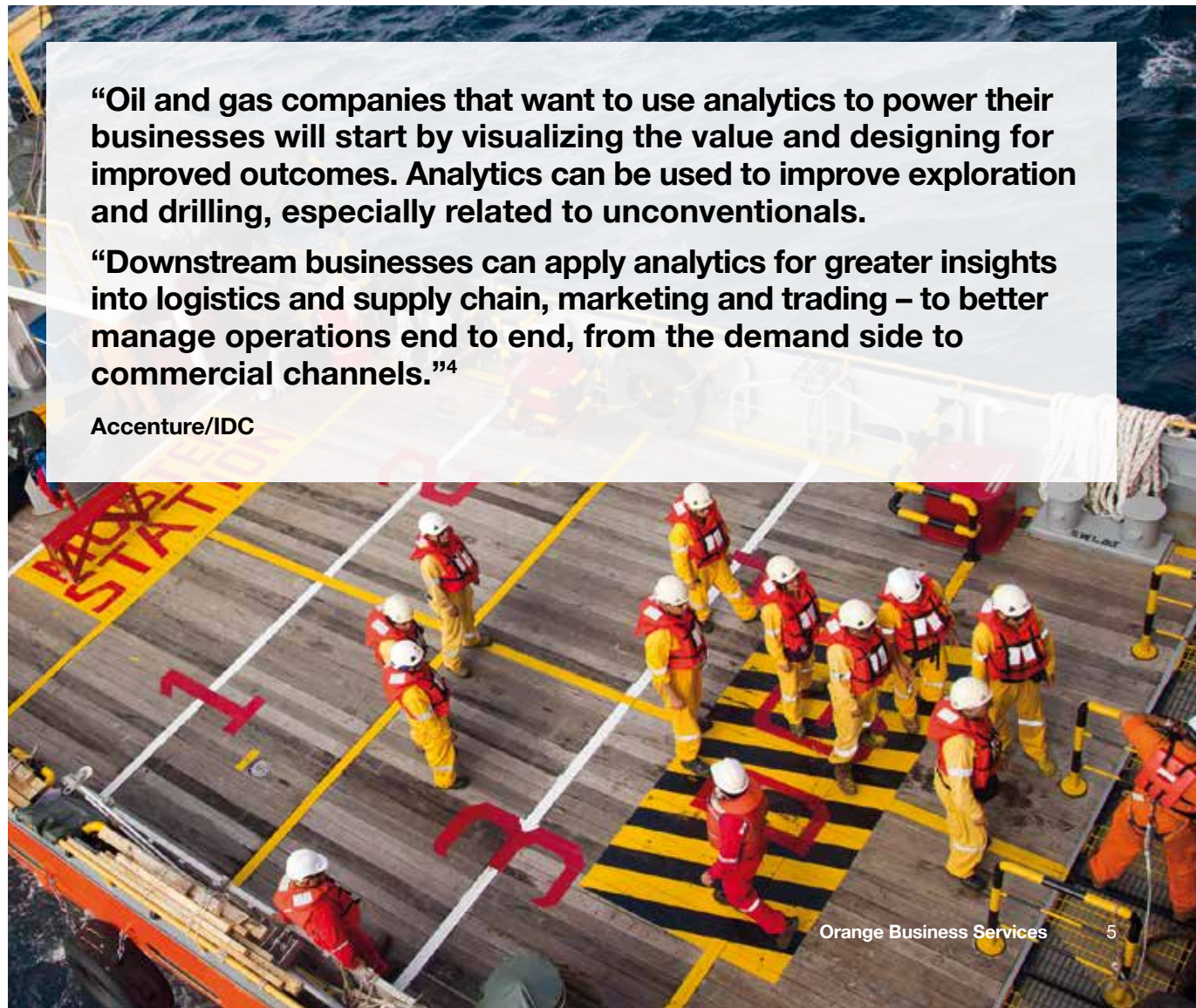
Companies are discovering alternative ways to analyze data – for example, processing it at the geographical point it is collected, and sending only the relevant information to a central database. Soon, artificial intelligence (AI) chips in remote sensors will quiz data where it is collected, using the network itself as an analytics engine.

With more representative analysis of data, the oil and gas industry has more facts at its fingertips and can discover ways to innovatively exploit previously unrecoverable assets. The data analyzed here can also play a part in identifying new sources of energy beyond oil and gas, focusing research into sustainability and alternative resources.

Then, there’s the reach that organizations have right through to the consumer forecourt, where data analysis can lead to consumer marketing offers where, instead of refueling from the pump, cars are being recharged. Alongside a transaction for this, there are also numerous offers which can be made through behavioral analysis. Given the pressure electric cars exert versus traditional refueling, there’s also competitive pressure from start-up firms already attuned to this environment and which also have no legacy technology to transform.

3. <http://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/dti-oil-and-gas-industry-white-paper.pdf>

4. <https://www.accenture.com/us-en/service-taking-analytics-journey-roi-energy>



“Oil and gas companies that want to use analytics to power their businesses will start by visualizing the value and designing for improved outcomes. Analytics can be used to improve exploration and drilling, especially related to unconventional.”

“Downstream businesses can apply analytics for greater insights into logistics and supply chain, marketing and trading – to better manage operations end to end, from the demand side to commercial channels.”⁴

Accenture/IDC

Better quality of operations

Time is money, and the industry has traditionally tried to minimize non-productive time to realize cost savings. The availability of deeper data which shows exactly what is happening in the operation promises to maximize productivity and provide previously impossible operational insight.

According to Anders Brun at McKinsey, “The key to unlocking full digital transformation across the oil and gas sector will involve both soft and hard automation technologies as well as require more nimble work practices.

“We have seen that for a business like the typical well organization, completion of tasks that used to require months might soon be possible in mere days or weeks.”⁵

Managing downtime

The costs of downtime, over time, really add up. According to a recent study by Kimberlite⁶, “The industry has grappled with quantifying the cost of unplanned downtime, but (this reveals) that just 1% of unplanned downtime – or 3.65 downtime days per year – can cost organizations over \$5 million each year.”

Sometime, downtime is the result of an unforeseen or new issue. Other times, it’s unavoidable due to the current risk margin. But resource development and recovery lead times can be reduced, change management due to unforeseen circumstances can be better handled, employee downtime can be cut, and human resources can be right-sized for the task.

The volume of big data is exploding, and organizations are finding it difficult to realize the value in their everyday operations. But data analysis is beginning to spot patterns that help resolve issues as they occur. Further into the future, this data can be used to provide predictive assessments before extraction jobs even start. Eventually, AI will be used to make automated recommendations to humans who are then better informed when they decide whether to green light a project or not.

Extraction

Exploitation of new fields is proving cost-effective, but in parallel, new techniques are required to boost reach and output, and that’s placing additional strains on existing machinery and assets. In addition, data collection presents challenges when operations are particularly deep or remote, leading to risky operational blind spots.

Maintaining very remote machinery and assets is a constant challenge, but new technologies such as LoRa, which delivers very long-range data communications using very low power consumption, make them more reliable assets.



5. <https://www.mckinsey.com/industries/oil-and-gas/our-insights/a-new-operating-model-for-well-organizations>

6. <https://www.bhge.com/sites/default/files/2017-12/impact-of-digital-on-unplanned-downtime-study.pdf>

Better quality of operations

Continuous asset flow

Oil and gas pipeline flow across the value chain can be made more consistent, by communicating real-time volume information ahead of delivery so the refinery can provision its operation accordingly.

Leakages that may harm the environment and eat into potential energy revenues can be more rapidly resolved. In today's lengthy, remote and diverse pipelines, an average leak detection time of 1 minute per 10m is not timely when pipelines stretch thousands of kilometers.

Using flow/pressure and pipe vibration tools, coupled with IoT sensors, detection times are reduced, even when there's no electric power to these locations.

Drones are now being used by some of the biggest oil and gas companies in the world to spot leaks, providing visualization of the issue so remote maintenance workers can be prepared before they arrive. This can save millions of dollars and make inspections far safer than before.

Theft reduction

Every year about \$133 billion from the global industry are stolen, defrauded or adulterated⁷. The entire transport and delivery ecosystem of tankers, barges, trains and delivery vehicles are at risk. But this can be reduced by devices which offer up any deviation to the route or location of the delivery route, or any change in the constitution of the cargo.

7. <https://www.visualcapitalist.com/global-black-market-fuel-theft/>

Transportation

Other field assets, such as distribution vehicles, must be safe from physical or fuel theft, but moreover function safely while they're in transit. Companies are looking closely at keeping more vehicles on the road using remote maintenance monitoring to indicate mechanical faults and scheduling vehicles for regular maintenance as a preventative measure.

Cargos must meet specific travel safety and security regulations and remote monitoring helps decrease the number of potential errors. It does this by constantly monitoring for irregularities including changes to cargo volume or pressure, or if the load shifts dangerously. Environmental risks to cargo, such as dramatic changes in temperature, can be monitored by sensors and adjustments can be made on the road before a dangerous situation develops.



Smart fleet management

Improve transportation and delivery across the value chain with smart fleet management.



Reduce fuel costs: routes can be GPS-optimized, even when they change due to temporarily impassable roads



Increase longevity of vehicles: regular maintenance can be enforced with direct feedback from the vehicle



Employee safety: drivers and crew can and receive advanced information about hazards, and ultimately, push an emergency GPS button to call for help



Streamline operations: information about assignments can be easily communicated, especially during change management operations which are otherwise costly



Driver behavior: feedback on driver activity can help enforce safety standards.

HSE: protecting workers and the environment

Employee rights and welfare have always been at the core of oil and gas industry values. Regulation places a considerable burden on organizations, but new technologies promise to reduce this and even raise the bar to define higher levels of health and safety.

Hazards in the field include vehicle accidents, employees struck by equipment or caught by it, explosions, fires and electrical hazards, falls, risks related to confined spaces and chemical exposure. Many of these risks are due to unwanted proximity to dangers, and the Digital Oil Field uses technology that proactively cuts exposure to threats.

Tracking worker safety

Predictive risk minimization through positioning technologies gives deeper visibility into employee placement, locating them wherever they are on the site, and creates geofences that warn employees when they are about to enter a restricted or dangerous area.

Visual mapping of this data allows managers to track workers and keep them safe from harm. If there is an incident, maps are immediately updated to show the issue, and workers who are now in proximity can see where they need to move to for safety. Any workers involved in an incident can push an SOS button on their belt and medical help can be accurately dispatched to their exact location.

It will also become easier to check workers that are encountering too much downtime, and that they're performing tasks as they should be. This stops any disrespect in safety procedures and can help right-size crews dependent on a more accurate view of the task ahead.

Companies may soon help workers stay fit with new personal devices and ensure that they're healthy when they're at work. Bracelets which monitor blood pressure, blood/oxygen saturation level and pulse show general health, and help companies proactively avoid issues such as fatigue, illness and tiredness.

Protecting the environment

Environmental reputation is key, with research showing a growing desire for stricter environmental standards⁸. The industry is under increasing scrutiny after several notable incidents of pollution, and regulators are requesting more accurate data on risks and reporting from incidents.

In order to make compliance more straightforward, companies are deploying sensors into the field that notify of incidents, can measure them more accurately, and which provide early warnings before the situation worsens.

Previously, oil and gas companies would need to physically inspect an extraction or processing site to ensure regulatory compliance. Now, IoT devices can be deployed in the field to remotely monitor essential compliance metrics, such as oil leaks and gas emissions.



Emerging technologies coming down the pipe

Advanced digital technologies are making their way out of the lab and promise to open new doors. We have listed seven of the hottest developments. Which will you choose?

Digital modeling

How can companies predict the future? 3D computer models are helping to estimate reserves and make more accurate decisions in field development, right through to predicting anticipated production. There are substantial economies to be gained from modeling, since it provides visualization from representative historical data, offering the visibility to triangulate towards a higher chance of success.

Augmented reality

This enables workers to visualize the job ahead of them, “see” inside equipment, streamline tasks to meet best practice, and help with troubleshooting guidance in novel situations. Use of AR can reduce the risk of worker injury, quicken the time to successfully troubleshoot an issue, and help teach proper procedure in the field.

Video analytics

Footage of operations is proving crucial in streamlining operations by troubleshooting issues of record, for example, and then extending that knowledge into the current field. In the future, AI will be taught to spot visual indicators of hazards from video during production, so they can be mitigated in real-time before they occur

Biometric platform security

Employee biometrics for secure areas is now a reality, as unauthorized access can cause safety problems related to no-go areas or places where operational information is stored. Biometrics used can include face, fingerprint and iris, which all have their own particular advantages and drawbacks.

AI and granular data analysis

As more data is captured from machines in the field, employees on site, refinery and transport operations, automation becomes possible. Routine tasks can be carried out more efficiently and safely, and eventually, AI will assist managers interpreting complex data towards making judgment calls. At the moment, data is a flood. In the future, it will be lifeblood of the organization

Digital twinning

The increased penetration of IoT devices in oil and gas has speeded the development of digital twins – digital replicas of the physical devices that represent their real-time status, working condition or position. Twins gather physical data in real time, keeping devices online and also providing data that simulates different conditions for the IoT device. These virtual replicas could become as commonplace as routinely checking physical plant and machinery

Drones

Having a privileged view of any operation is crucial. The more visual insight, the more control can be exerted over variables such as environment, equipment status or troubleshooting. Drones are becoming the eyes and ears in today’s remote regions when it’s not possible or cost-effective to be everywhere at once.



Build smarter oil and gas operations with Orange Business Services

Orange Business Services has extensive experience working closely with the oil and gas industry around the globe.

With our wide range of services, we can help you overcome today's challenges, making your company more agile and ready to take advantage of new business opportunities and succeed against current competition.

As a global provider of digital services and a carrier-grade integrator, we help the oil and gas industry achieve growth and create competitive edge by enabling knowledge sharing and innovation, safely, securely and responsibly.



We are powered by data, driven by people; global in our reach, local in our approach.



Unique expertise as a global infrastructure operator



700 developers, integrators and specialized IoT experts



Asset virtualization of your equipment and pipes



2,400 data intelligence experts



Comprehensive fleet management services



1,600 cloud experts, engineers and project managers



Large catalog of wearables with ability to provide IoT managed connectivity



Over 5,000 researchers and engineers focused on innovation in research centers around the world.



Expertise in managing over 11 million B2B active objects and 65 million data bytes per minute



1,200 cyber defense experts

**For more information available to the oil and gas industry visit:
www.orange-business.com/en/focus/natural-resources-transformation**





**Business
Services**