HOW TO UNLOCK THE POTENTIAL OF DIGITAL TRANSFORMATION IN OIL & GAS

Practical strategies to address the employee skills gap, mitigate equipment failure and optimise production

Rockwell Automation
Digital transformation is a key enabler for oil and gas companies to reduce costs, increase productivity and make better strategic decisions.

The oil and gas industry is no stranger to digital technology. Beginning as early as the 1980s, oil and gas companies invested in digital technology to better understand their reservoir’s resource and production potential and improve health and safety. Yet, a recent report by Accenture indicates that while most companies in the industry are capable of using digital technology to create efficiencies, few have fully exploited this to substantially improve performance in the long run.

Technology has the potential to reshape the operating landscape for the oil and gas industry, but the transition to become fully digital should be embraced as a transformative journey, not a piecemeal process.

It is crucial to have a strategic framework in mind that can address your near-term business objectives while also creating a pathway for the transformation of core operations.

While other industries can adopt the rapid prototyping approach of ‘fail early, fail fast, learn faster’, the capital-intensive oil and gas industry must be far smarter about where to invest attention and resources.

There are three areas which hold the potential to unlock long-lasting efficiency gains for the industry through digital transformation:

- **Addressing the skills gap**
- **Mitigating equipment failure**
- **Optimising production**

“We need to be excited about the unknown... we need to think big, even if we start with small steps.”

Michael Borrell, SVP E&P North Sea, Total

*Source: Forbes*
THE CHANGING WORKFORCE OF OIL AND GAS COMPANIES

Skilled workers are quickly becoming a scarce commodity in the oil and gas industry. 71 per cent of the current energy workforce are 50 years or older, with 50 per cent of skilled energy workers and managers forecast to retire by 2022. A generation of experienced employees will soon exit the workforce, leaving many oil and gas companies pushing to attract and train a new influx of workers.

It is predicted that in the next six years, the industry will need to hire an additional 25,000 workers to meet the workload demand. This has left many companies worried about an impending talent crisis. More than 40 per cent of respondents in a recent survey by Energy Jobline and AirSwift revealed that they are already witnessing a skills crisis unfold in their geographical area.

To attract new talent to the industry, upskill them over a shorter time period and reduce the need for staff during certain tasks, there is one clear answer: embrace digital transformation.

In a survey of 33,000 oil and gas workers, 90 per cent said that skills shortages were damaging their productivity.

Source: NES Global Talent
DIGITAL TRANSFORMATION CAN UPSKILL AND ATTRACT A NEW WORKFORCE

The oil and gas industry has struggled to attract young talent in a competitive landscape, but digital capabilities are a key driver of interest. Digital transformation curates a more modern image for the industry and represents an opportunity for new entrants to develop valuable transferable skills and handle cutting-edge technology.

Digital technology will also help to bridge the skills gap between the exiting experienced employees and the entering inexperienced recruits. Using digital technology, masses of data can be collated to help guide the decision making of newer employees. There are also a growing number of digital training methods, such as simulations and augmented reality. These are valuable tools to increase employee knowledge in a short space of time.

Digital technology is crucial in the retention of talent. A recent Skills Landscape report by the Offshore Petroleum Industry Training Organisation (OPITO) found that 28 per cent of energy workers’ time is spent on repetitive, transactional activities. If these tasks were to be automated, it could reduce the admin burden on employees and free up their time for more enjoyable value-adding activities. There is also the additional benefit of limiting the risk of human error for data processing and handling.

“HR executives in oil and gas need to begin systematically planning what the workforce of the future needs to be and shape their strategies to create that workforce.”

Source: Robert Bolton, KPMG
Companies are losing between three to five per cent of their production to unplanned downtime. 

Source: ARC survey

The growing need to manage and maintain legacy equipment

The oil and gas industry can realise significant gains by improving the optimisation of their equipment maintenance. With a vast amount of legacy equipment in operation, there is an increased risk of failure from wear-and-tear. To limit potential downtime, it is important that any issues can be managed and mitigated to maintain the longevity of critical equipment.

As many production assets are also situated in harsh operational environments, maintaining equipment can be an ongoing challenge. By monitoring crucial parts of machinery and leveraging an alerts system, the focus can be placed on fixing an issue before it is beyond repair.

Having increased oversight of the historic performance of assets can also help operators to spot patterns and start to address issues early on.

IBM believes that digital transformation can help manage and mitigate maintenance issues by:

- Connecting sensors, devices and equipment to offer real-time insights on performance
- Predicting and preventing issues and failures by looking for non-obvious patterns and trends to spot issues days or weeks in advance
- Gathering useful insights from documents, manuals and internal notes
- Delivering real-time updates and timely warnings

Companies are losing between three to five per cent of their production to unplanned downtime.
HOW THE INDUSTRY IS USING DIGITAL TECHNOLOGY TO IMPROVE MAINTENANCE AND MONITORING

- **Shell** are using artificial intelligence to predict when maintenance is needed on compressors, valves and other equipment. It has leveraged real-time data to help geologists chart a more accurate course for the well to boost productivity and reduce drill wear-and-tear.

- **BP** have collaborated with Silicon Microgravity to manufacture and deploy special sensors to help reservoir engineers mitigate the potentially damaging results of water reaching a production well. This then improves oilfield reservoir surveillance.

- In remote or inhospitable operating environments, oil and gas companies are looking to increase their use of automation. This can mitigate risks and prevent HSE incidents, by reducing the number of people needed to carry out the more dangerous aspects of fieldwork. The World Economic Forum believes that the combination of drones and autonomous robots will lead to a 25 per cent reduction in inspection and maintenance costs and a 20 per cent lower employee count.

- **Apache Corporation** are using predictive analytics to anticipate the failure of critical pumping equipment, such as electronic submersible pumps (ESPs). ESP failure was causing losses of 10,000 barrels per day for Apache. To identify actionable variables to improve the ESPs, they tracked the location and operating conditions of more than 100,000 pumps. Following this, they were able to increase equipment uptime and reduce production losses.

- Companies are beginning to leverage remote operation centres (ROCs) to control operations and make decisions in real time. By collating information from multiple assets companies can make more effective decisions and limit the number of field personnel required.
**WHY THE INDUSTRY NEEDS TO MAXIMISE THE PRODUCTION VALUE OF CURRENT ASSETS**

With oil prices flat and margins tight, the oil and gas industry has faced growing pressure to improve operational efficiency. Given the large production volumes, marginal improvements can have a significant impact.

At present, the production segment of oil and gas consists mainly of brownfield wells, platforms, instruments and control systems. The prevailing strategy for many companies used to revolve around chasing growth in greenfield projects. However, according to PwC, the drop in capital expenditures for exploration signals that the new focus is on maximising the production and throughput of existing assets.

Considering the complexity of the infrastructure across the industry, this is a task beyond the ability of humans. To secure efficiency benefits, oil and gas companies need to shift their attention to digital technology which can simplify, automate and optimise their operations.

40 per cent of global crude oil and natural gas production comes from fields that have been in operation for over 25 years. 175 fields have been producing for more than 100 years.
THE INSIGHT AND INTELLIGENCE DIGITAL TECHNOLOGY CAN HAVE ON OPERATIONAL EFFICIENCY

Oil and gas companies produce a wealth of data about their operations, but it takes digital technologies to transform this data into actionable intelligence.

If companies can take a birds’ eye view of their operations, they can more efficiently respond to production failures, optimise the parameters of low-rate wells, streamline oil distribution and identify profitable opportunities.

Having this enhanced insight will then allow companies to oversee, predict, plan, act and learn how to improve their current operations.

- Saudi Aramco have employed digital surface and subsurface technologies to optimise field development and operations. They are also using a Reservoir Engineering Integrated Environment tool to help their engineers improve the planning, management and development of fields and resources.
- ENI have employed predictive analytics systems to increase production rates and reduce asset downtime.
- Deloitte shared an example of an operator in Kazakhstan facing poor pump pressure and production deferment in several mature gas wells. The operator used real-time analytics to make proactive adjustments to electrical submersible pumps (ESPs) and motor amp modifications to suit the changing reservoir conditions. This additional layer of intelligence led to a 27 per cent reduction in downtime, beyond the benefit of the ESPs.

“Visualisation and modelling will take away a lot of the uncertainty and bring more reliability... as a consequence, companies will be able to deploy capex more efficiently.”

Source: Archana Deskus, Vice-President and Chief Information Officer, Baker Hughes
ARE YOU READY TO UNLOCK THE POTENTIAL OF DIGITAL TRANSFORMATION?

According to Deloitte’s digital maturity index, the oil and gas industry is lagging behind other sectors. With many digital transformation efforts focused on tactical solutions for incremental gains, the industry can stand to vastly improve success rates by taking an overarching approach to transformation.

IBM notes that to thrive in both current and future market conditions, it will not be enough to simply enhance the way oil and gas companies currently operate. Instead, there needs to be an effort to combine technologies in innovative ways to magnify their capabilities exponentially. Rather than limit their effectiveness through separate, fractured deployments.

In this eBook, we’ve showcased three areas where success can be found through digital transformation. By making strategic improvements across each of these areas, oil and gas companies could achieve substantial efficiency gains.

"The industry could benefit from pursuing a revolutionary agenda with digital as a backbone."

Source: World Economic Forum

“Digitalisation has the potential to create around $1 trillion of value for oil and gas companies”

Source: World Economic Forum

There are some critical success factors to keep in mind for your digital transformation

1. **Make digital a priority** – create and follow through with an overarching digital strategy; be prepared to adapt processes where necessary

2. **Carry momentum from one project to the next** – begin a digital focus with key achievable KPIs and use the success of this project to bring forth the next

3. **Encourage cross-functional collaboration** – bring together different functions of the business to share ideas and collaborate on new tools and implementations

4. **Democratise your data** – accessible and contextual data is key and in the hands of your employees it can transform the calibre of their decision making