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Drilling for data

The race to digitise
upstream oil and gas

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Drilling for data: The race to digitise upstream oil and gas

We spoke to:

Dan Brennan
Global Head of Strategy and
Marketing
BHGE Digital

Torbjørn Folgerø
Chief Digital Officer
Equinor

Jon Carpenter
Group Head of Strategy
Petrofac

Kieran Kavanagh
VP Digital Solutions
Wood

Senior Executive
Middle East National Oil
Company
(ME NOC)*

Chief Information Officer
Large European oil and gas
*company**

(*Cannot be named due to regulatory or confidentiality restrictions)

2

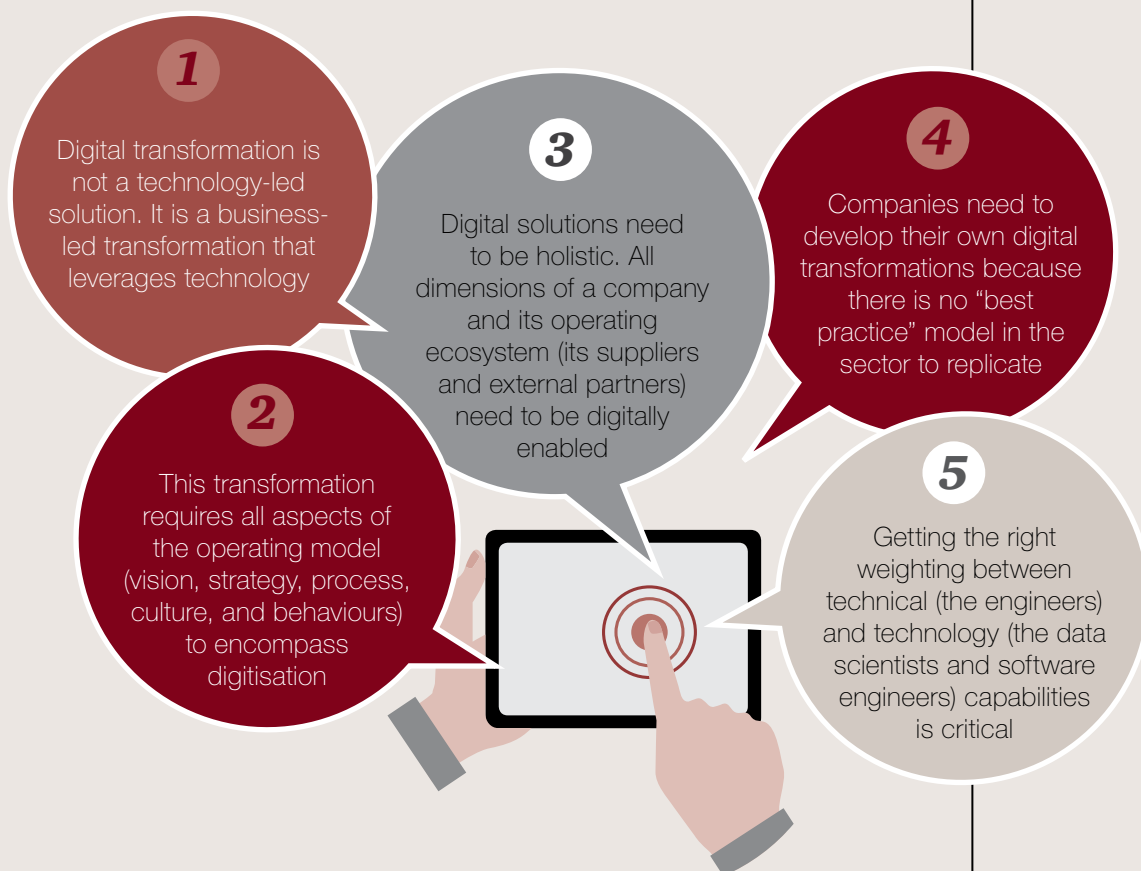# Six senior oil and gas executives share their digitisation journey

Upstream oil and gas executives agree that the need to digitise their businesses is now urgent. With up to $1 trillion in estimated savings in capital and operating expenditures up for grabs over the next seven years, companies that get a head start over their competition will have a distinct advantage.

But knowing where and how to start can be hard, particularly in an industry where no one has yet managed to completely 'crack' the digital transformation challenge.

To find out how upstream companies and oil service companies are approaching this issue, we spoke with a group of chief digital officers and leading executives responsible for digital enablement at six companies.* We asked each of them what they were doing to advance digital solutions and embed digital ways of working.

Our conversations were conducted through the lens of five guiding principles for digitisation, outlined in our recent report Drilling for data: Digitising upstream oil and gas.

*We spoke with executives at three leading operators and three leading oil services companies. Two operators cannot be named due to regulatory or confidentiality restrictions. The other operator is Equinor (formerly known as Statoil) and the oil service companies were Baker Hughes General Electric (BHGE), Petrofac and Wood.

1 Digital transformation is not a technology-led solution. It is a business-led transformation that leverages technology

2 This transformation requires all aspects of the operating model (vision, strategy, process, culture, and behaviours) to encompass digitisation

3 Digital solutions need to be holistic. All dimensions of a company and its operating ecosystem (its suppliers and external partners) need to be digitally enabled

4 Companies need to develop their own digital transformations because there is no "best practice" model in the sector to replicate

5 Getting the right weighting between technical (the engineers) and technology (the data scientists and software engineers) capabilities is critical

The discussions with the chief digital officers yielded some practical tips on how to approach digitising a company. *Here's what they had to say.*

Principle 1 – Digital transformation and the business

Digital transformation is not a technology-led solution. It is a business-led transformation that leverages technology

Too often, businesses view digitisation as a technology-driven exercise. But it's more a case of identifying the business challenge that needs to be addressed and assessing how digital technology can help. For example, several interviewees said their companies were looking to improve health and safety outcomes, while others were trying to increase the reliability, technical integrity, and operability of plants, including improving environmental outcomes.

Essentially, company executives need to ask themselves what the company is really good at and what it should be famous for — and then figure out how digitisation can help.
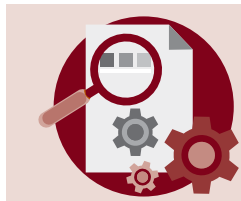
Start with a high-level, operational approach

For Jon Carpenter, Group Head of Strategy, Petrofac, a business-led approach just makes sense. "We realised it can't be technology first. It has to be 'What's the value? What's the customer proposition? And why is it good for us and our customer?' There is a constant focus on 'what's the value?'"

When describing the company's artificial intelligence and 'big data' centre, the Senior Executive from a Middle East NOC highlighted the importance of having business people, not technology people, defining the business needs. "You need to have people [who] can translate the business needs and data needs. And the IT experts and digitalisation experts are the not ones who can define your business case," he said.

Torbjørn Folgerø, Chief Digital Officer of Equinor, said "Our set up is to solve a business problem through a combined toolbox of 'lean', digital, and standardisation all together. It's the toolbox helping the business, not the single pieces".

"We realised it can't be technology first. It has to be 'What's the value?...'"

Principle 2 – Transformation and the operating model

This transformation requires all aspects of the operating model (vision, strategy, process, culture, and behaviours) to encompass digitisation

Some oil and gas companies still view digital technology as peripheral to their core business. But "siloed" digitisation does not provide the cross-functional insights across multiple assets that are needed to drive efficiency and value at the enterprise level. The digital transformation of a company therefore needs to be holistic and address all the elements of the operating model.

Collaborate to drive digitisation

Companies need to approach digitisation from the perspective of building new capabilities and leveraging technology across all key aspects of the value chain. The Senior Executive from a Middle East NOC saw digitisation as an opportunity to increase collaboration and break down old lines of demarcation.

"We have launched a huge bottom-up campaign of culture change across the company. This goes hand in hand [with digital] and is an ideal combination," he said. "I can also feel from site visits the time is ripe to do this, that there is a huge willingness in staff to bring teamwork and collaboration into an organisation which was traditionally much more in silos."

Digitisation as an opportunity to increase collaboration and break down old lines of demarcation.

Equinor's Torbjørn Folgerø recognised the need to put data and technology at the heart of the business to drive competitive advantage.

"In addition, how we collaborate and operate internally will also change in the coming years. We will become more of a data-centric organisation, and we will be a more team-orientated and fluid organisation compared to what we have been in the past," he said. "We believe the energy company of the future is the one [that] masters using technology and data in innovative ways to create value."

Be aware of the cultural element

The Chief Information Officer at a large European oil and gas company highlighted the strong connection between digitisation, strategy, and culture.

"In addition to operationally delivering the 'core' digitalisation projects, we decided to tackle digitalisation as not just a technological transformation, but also a strategic and organisational one. We are aware of the fact that the digital challenge is a large-scale transformation which doesn't only generate a technological or business discontinuity, but especially [also generates] a cultural one."

Principle 3 – Digital solutions and the ecosystem

Digital solutions need to be holistic. All dimensions of a company and its operating ecosystem (its suppliers and external partners) need to be digitally enabled

Building a digital organisation isn't just a case of applying the technology to one area of the business, or buying it off-the-shelf because it might solve a particular problem. Digitisation needs to encompass stakeholders beyond the company itself to unlock its full potential.

For example, all stakeholders around new field development — including the host government and the oil service providers and contractors — need to be digitally enabled. It may even be necessary, and profitable, to partner with other stakeholders in the ecosystem.
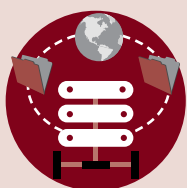
Start a conversation about data sharing

Torbjørn Folgerø at Equinor regarded collaboration with suppliers along the oil and gas value chain as being as important as internal collaboration, expecting that teams will become more fluid and organised around data. While questions around how much and what data to share are the subject of much discussion and some contention, Torbjørn argued that a closer, more productive relationship with suppliers must begin with a more open discussion about data sharing.

"Together with several operators and suppliers on the NCS [Norwegian Continental Shelf], we have initiated a joint industry project named DataLink to develop standards for data exchange and identify use cases to enhance collaboration in the ecosystem."

Kieran Kavanagh, VP Digital Solutions at Wood explained how collaborative partnerships are helping to harness the power of digitisation: "Our partnership with a major technology firm is part of our thinking of tooling up our organisation to be ready for rapid digital change. The industrial domain knowledge and digital solutions of Wood, combined with the digital skills and resources of our technology partner, create a formidable synergy of combined domain and digital knowledge to deliver solutions at scale across multiple industries."

Digitisation needs to encompass stakeholders beyond the company itself to unlock its full potential.

Principle 4 – Digital solutions and best practice

Companies need to develop their own digital transformations because there is no "best practice" model in the sector to replicate

There is no single digitisation template to follow. Exploration and production companies have taken different paths when it comes to embracing digitisation, in part because they need to be sure that digital technologies can be deployed without risk to operations. But companies also need to acknowledge the value of making a bold move. As the Senior Executive from a Middle East NOC, said: "It creates pressure for action, and without such pressure, things develop too slowly".

Find an approach that works for you
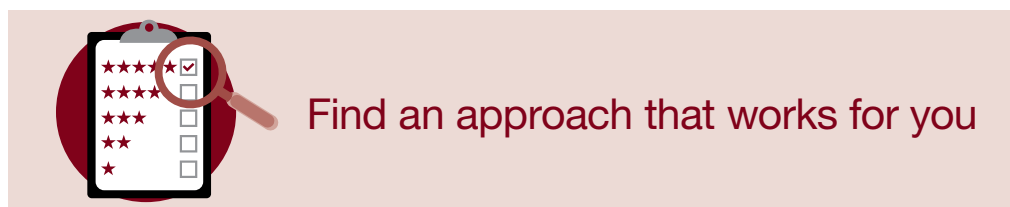
The companies that we spoke to had unique perspectives about creating their digital transformation roadmap. Torbjørn Folgerø explained the Equinor approach, which involves a company-wide digital roadmap and a centre of excellence.

"The roadmap is based on six programs and three enablers. Our programs are digital, HSE, subsurface analytics, drilling well, field of the future, data-driven operations, and process digitalisation and commercial insights. Each program has a program manager setting the digital ambition together with the business area, incubating new opportunities and enabling the business to deliver on the project."

"In addition to the six programs, we have three enablers: data utilisation, digital ecosystem, and digital academy," said Torbjørn. (*See the discussion under Principle 5 for more details on the digital academy*).

There is no single digitisation template to follow.

Jon Carpenter highlighted the evolution of Petrofac's formerly unconnected approach, stating that the company was applying "a massive shot of steroids to turbo charge our evolution, which we expect will lead to a revolution, focused on using digital to differentiate our offering to customers, drive productivity and build a 'digital by default' culture. We have recruited a chief digital officer, and are building a data science team. We are building a centre of excellence for data architecture, data science, and data analytics, and marrying it with the operational excellence team, so the two groups work together towards these goals".

Petrofac will seed 'agile' development teams working on various applications in different businesses to deliver digital transformation. It is also experimenting with new ways of working using technology. One pilot is around 'connected construction' and involves WiFi-enabling a construction site of several thousand workers using radio-frequency identification, so that movement of people, tools, and equipment can be tracked to improve health and safety performance and overall productivity.

Likewise, the Chief Information Officer at the large European oil and gas company, which is at a relatively advanced stage of digital development, said that its investments in digital technologies across the board are yielding results: "The successes obtained in recent years in the field of exploration, on the back of investments in competences, data governance, development of proprietary algorithms, and computing power, demonstrate how early digitalisation of data, competencies, and processes has enabled a structural competitive advantage."

Equinor was quite deliberate about seeking external input, as Chief Digital Officer Torbjørn Folgerø explained. "[We had] 11 senior executives focused on the topic of digital transformation. During the first few months, we only met external people and most of them outside of the oil and gas industry. We visited a large mining organisation, as well as big banks who set up agile factories and autonomous teams. We made several visits to a global technology leader to learn about innovation culture. We are still in regular contact with the mining and technology companies."

Principle 5 – Digital and capabilities

Getting the right weighting between technical (the engineers) and technology (the data scientists and software engineeres) capabilities is critical

In the past, capabilities may have focused on technical expertise to deliver excellence in engineering projects. Now, with a growing focus on data analytics, companies will need engineers who are more digitally savvy. Senior executives need to make sure they have the right capabilities in place when it comes to the mix of engineers and data scientists required for the digital journey. Finding this balance between traditional engineering and new technology capabilities is likely to prove one of the trickiest challenges for chief strategy officers and chief information officers.


Recognise that data scientists and software developers are in high demand

Our interviewees broadly agreed that the industry will need more software developers and data scientists for a long time to come.

Torbjørn Folgerø said that those with more digital skillsets in their domain – data scientists and software developers –will be increasingly important for Equinor: "We are opening digital innovation labs where we have a 'sprint room' to deliver minimum viable products. It is also a trigger for new ways of working and collaborating. The aim is to get the end users in the same room as the software developers and data scientists together from day one and get them into a new setting to solve the problems."

The Middle East NOC's Senior Executive said he sees value in working with people from both digital and engineering disciplines. "You need to have people [who] can translate business needs and data needs. And the IT experts and digitalisation experts are the not the ones who can define your business case. You need to be very careful to connect the correct people where the value can be gained."

With a growing focus on data analytics, companies will need engineers who are more digitally savvy.
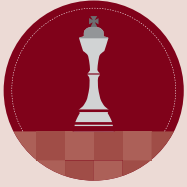
Pay attention to strategies to attract and retain talent

Above all, our interviewees emphasised the importance of employee engagement in delivering a successful digital transformation and the need for diverse strategies and programs to attract and retain employees with technology skills.

Dan Brennan, Global Head of Strategy and Marketing at BHGE Digital, said that, although the company recruited digital talent, it needed to completely overhaul the human resources (HR) and talent management processes to retain them. "We have 200 employees currently in San Ramon, CA [who] we have hired from Silicon Valley. The skill sets include software engineers, software architects, software product management, and obviously, the hottest skill sets are the data scientists. The compensation structure for them is very different than the traditional skill sets that we compete for in the labour market. Over the last four years, we have implemented a completely new set of talent management practices for these employees including compensation plans, career planning, and learning and development programs. We had to completely revamp every incumbent HR and talent management process we had."

"The reality is [that] across a global workforce there is a tremendous amount of confusion around what this term 'digital' is. We are spending 25% of our time working with corporate communications doing things like [a] leadership video series, talking with our regional and business leaders about the opportunity with digital, and weaving in elements of our corporate and digital strategy," said Dan.

Torbjørn Folgerø believed that engaging the workforce is critical. "We have established a digital academy which will provide training for our current workforce to equip them for a more digital future. We will recruit new competence to the company, but just as important is to really engage our current workforce. There are so many clever minds in our company, and the academy will make training and new tools easily accessible to them."

A final word

One interesting topic that emerged from the interviews we conducted with leading operators and oil services companies was data sharing.

However, while many of those interviewed saw value in sharing more data across the ecosystem, there was a degree of reticence about sharing certain types of data. There appears to be a spectrum of data sensitivity in this regard. At one end, there is data on equipment performance, which is not considered too sensitive and which some operators may be willing to share. At the other end, we see interpreted subsurface data, which operators are highly unlikely to share, given the commercial sensitivity associated with it. However, in one interview, there was a sense of operators opening up to the sharing of data if oil services companies could demonstrate value in their analytics.

Data and commercial sensitivity

Low Commercial Sensitivity	High Commercial Sensitivity
Operations	**Exploration**

Selected examples:

Equipment Data and Specifications	Raw Subsurface Data	Interpreted Subsurface Data
Drilling Rig Fleet Logistics/ Configurations		Early Kick Detection

In an era in which oil and gas companies are focused on cost and driving productivity enhancements across their businesses, digital technologies have a critical role to play. Digitisation not only improves efficiency but also helps address other fundamental operational areas, such as safety.

Across all the interviews, it was clear that digitisation should be delivered as part of a broader enterprise-wide transformation. And while there is no single best practice approach to digital transformation, the interviews unearthed seven practical tips about how to approach digitisation in your company:

7 practical tips

Start with a high-level, operational approach

Collaborate to drive digitisation

Be aware of the cultural element

Start a conversation about data sharing

Find an approach that works for you

Recognise that data scientists and software developers are in demand

Pay attention to strategies to attract and retain talent

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