



Supercharging digital transformations in Oil & Gas

Executive Summary

All Oil & Gas operators have now embarked on some form of digitisation, capitalising on the promised gains of the fourth industrial revolution. Today, the shocks of oil price pressures and COVID-19, combined with growing momentum to transition to a low carbon future, accelerates the need for Oil & Gas companies to capitalise on promised gains and 'supercharge' their digital agendas.



In this paper, we focus on three common challenges that Oil & Gas operators are facing in achieving their digital strategies and identify steps they can take to address them to 'supercharge' results.



Data & infrastructure

Data quality is a major concern for decision makers. It is often poorly integrated, scattered across multiple systems, unstandardised and so unwieldy it is difficult to extract any value from it.

Key considerations:

- Master data management, governance and security
- Optimised digital architectures
- Clearly defined cloud strategy
- Standardisation and configuration when adopting software as a service (SaaS)



Business case realisation

Organisations often struggle to determine 'true' return on investment and build a strong, data-driven business case to secure stakeholder buy-in.

Key considerations:

- Design a holistic and coordinated digital programme
- Take a business-led (not technology-led) approach to requirements capture
- Establish strategic partnerships with win-win scenarios
- Reduce development cycle time with 'turbo-innovation'



People, organisation & culture

Many digital strategies underestimate the availability of talent in the right areas and requirements to drive end user adoption, as well as fit-for-purpose business models to truly enable digitalisation.

Key considerations:

- Embrace 'agile'
- Focus on behavioural change
- Consider a layered approach to upskilling
- Integrate and blend data scientists within business units and engineering teams

Introduction



Digitalisation is not new, however COVID-19 has sharpened the focus and accelerated momentum

By its very nature, the Oil & Gas sector has been at the forefront of the technological curve at many points in time. So much so that NASA has been working closely with Oil & Gas technologists to leverage their intellectual property in support of man's mission to Mars and beyond.¹ Paradoxically, however, the sector has lagged behind other industries when it comes to shifting towards 'Industry 4.0' and although the majority of Oil & Gas operators have now embarked on some form of digitisation, capitalising on the promised gains of the fourth industrial revolution, has alluded many and the pressure is mounting.

Once again, the industry finds itself in a bind. The dual shock of the oil price collapse and COVID-19 has forced operators to shed costs, increase efficiencies and drive shareholder value, all whilst keeping their employees and the public safe. Combine this with a growing momentum to transition to a low carbon agenda, reliant on new technologies to offer smarter optimised solutions and transparent reporting.

As a result, Oil & Gas companies need to capitalise on promised gains and 'supercharge' their digital agendas.

¹ "Aerospace Oil & Gas: Technologies for New Horizons," NASA, accessed March 2, 2021, <https://ntrs.nasa.gov/api/citations/20140004423/downloads/20140004423.pdf>



Key challenges and steps to take

With increased pressure on return on investment (RoI) realisation, Oil & Gas operators are experiencing common challenges in digital strategy implementation

While many challenges are operator-specific and even field or facility-specific, others are being experienced by Oil & Gas operators across the industry and its value chain. Common challenges include:



Data & infrastructure

Given increasing volumes and security risks, data quality, data management and actionable data insights are an ever-increasing concern for decision makers. Data often remains scattered across disparate systems and is not commonly or consistently structured, integrated or developed with a 'cloud strategy' in mind.



Business case realisation

Determining 'true' return on investment and building a strong, data-driven business case to secure stakeholder buy-in can be challenging. Momentum is often lost as organisations struggle to define and track use cases, and demonstrate tangible value, under aggressive timelines. Additionally, collaboration across business units can be challenging when levels of digital maturity and digital infrastructure vary.



People, organisation & culture

Instilling behaviours, ways of working, methodologies and approaches that embrace digital technologies and solutions within the organisation can also be challenging and result in low user acceptance. Many digital strategies underestimate the availability of talent in the right areas and requirements to drive end user adoption.

Within each challenge area, operators should consider the following core elements and what strategies they can employ to 'supercharge' digital transformation

Challenges		
Data & infrastructure	Business case realisation	People, organisation & culture
Considerations in addressing challenges		
<ul style="list-style-type: none"> Enhance master data management, governance and security Continuously map and optimise digital architecture Clearly define your cloud strategy Opt for standardisation & configuration of SaaS applications 	<ul style="list-style-type: none"> Design a holistic and coordinated digital programme Take a business-led (not technology-led) approach to requirements capture Establish strategic partnerships with win-win scenarios Reduce development cycle time with 'turbo-innovation' 	<ul style="list-style-type: none"> Adopt 'agile' Focus on behavioural change Consider a layered approach to upskilling Integrate and blend data scientists within business units and engineering teams

All organisations are at different starting points and stages along their digitisation journey; understanding where they stand and what progression challenges they are facing is imperative to moving forward.



Enhance master data management, governance and security

Data can only be valuable if it is processed and accessible. Ensuring master data management and governance fundamentals are in place will ensure secure and organised data of sufficient quality is available to all employees and machines in real-time. In order to build robust data management, all data sources must be understood and organised in terms of their purpose, criticality and connectivity.

As an illustration of effective data management and governance, Exxonmobil targets to achieve **95% time savings** due to their data quality centres.²

Data governance should focus on continuously evaluating and enhancing data assets, so users have the confidence that it is fit for purpose and decision-makers can steer the right course, grounded in a single version of the truth. Setting clear data governance principles and applying them consistently allows for more effective data mining. Without them, interoperability will remain a theoretical construct.

Finally, strong data management and governance are futile without adequate security. Cyber threats on industrial systems are becoming more targeted, and as a result, more potent and complex. Oil & Gas organisations are advised to implement strict security measures to secure all their networks, endpoints and controllers. While top-tier cloud providers do an excellent job of securing services, it is the client's responsibility to secure applications and data. Aligning the cloud security environment with the organisation's overall security strategy is key.

Continuously map and optimise digital architecture

Digital architecture is defined as the layout and integration of sensors, applications, databases, systems and networks across a company's operations. Visualising and analysing digital architecture helps identify optimisation and integration opportunities. Therefore, digital architecture should be continuously updated to maintain an accurate global view of a company's digital assets and their integration.

Oil & Gas operators should have an approach in place for IT infrastructure to 'keep up' with the business's digital ambitions, for example: to manage big data assets, to support planned digital applications and new ways of working. In some cases legacy systems will need to be replaced entirely, and in other cases, new systems and solutions can sit on top of existing hardware.

² "ExxonMobil Data Quality Center achieves 95% time savings," Tableau, accessed March 2, 2021, <https://www.tableau.com/solutions/customer/exxonmobil-data-quality-center-time-savings-huge>



Clearly define your cloud strategy

Today, most Oil & Gas organisations do not have a formal cloud strategy, which sets out a coherent approach to cloud usage – optimising resources and costs, while ensuring continuous access to real-time data for oilfield intelligence. A cloud strategy is an outline for the role of cloud in an organisation, not a plan to move everything to the cloud.

Digital leaders, such as chief information officers (CIOs), chief data officers (CDOs) and chief technology officers (CTOs), develop and update a cloud strategy to ensure cloud decisions align with corporate goals and account for all necessary factors and potential risks, and the C-suite buy-in. Some companies have even created a ‘Cloud Council’ composed of stakeholders from across the business, which demonstrates its importance beyond the core digital teams.

A clearly defined cloud strategy is also critical for preparing for and supporting artificial intelligence and machine learning solutions. A comprehensive cloud strategy includes a business baseline, service strategy, financial models, workload assessments, security assessments and requisite elements. For national oil companies specifically, cloud strategy has warranted renewed focus given the massive attainable benefits that can be achieved when deployed at scale across their organisations. This has had to be balanced with restrictions around data sovereignty and national regulation.

BP has seen **significant savings** in annual licensing, support and maintenance costs (over \$50,000 savings in hardware costs) by running the lubricants ECC system on AWS Cloud, and will now progress the entire SAP landscape to the cloud in the **next 18 months**.³

Opt for standardisation & configuration of software as a service (SaaS) applications

Standardisation in an enterprise digital environment allows faster scaling and time-to-value. Traditional solutions require a tremendous amount of customisation and a large amount of custom code. With enterprise SaaS solutions we observe a push towards standardisation and configuration as opposed to customisation. The more configuration is built in: the faster the time-to-delivery, the easier it is for customers to adopt and the more integration there is with existing processes. High standardisation and configuration also allows for easier version migration. When it comes to SaaS, less is often more.

³ “BP Case Study, Amazon Web Services (AWS),” accessed March 20, 2021, <https://aws.amazon.com/solutions/case-studies/bp/>



Design a holistic and coordinated digital programme

To reap the benefits of scale, a holistic approach to digital strategy across an organisation usually yields better results. Although, in some instances, a specific line of business may require a tailored approach and infrastructure. Digital strategy and transformation maximise benefits to the organisation when implemented across teams and functions, not in isolated pockets. While use cases clearly vary across the organisation, core technology enablers such as cloud and application development tools can be standardised and integrable.

Shell has worked with Microsoft to leverage products such as Azure Boards and Azure Pipelines to ensure their digital transformation team is well equipped to **fast-track their digital journey**, by reducing their development cycle from months to weeks.⁴

Take a 'business-led' (not technology-led) approach to requirements capture

Typically, technology-led approaches result in lower user adoption and behavioral change, since end-users do not see a clear link between deployed solutions and their day-to-day requirements, challenges and opportunities.

Digital strategy implementation should be led by the business and its core business units, particularly those that impact bottom-line spend most heavily and/or can directly contribute to production and efficiency increases. Moreover, core business units are becoming more digitally fluent, utilising an array of systems and tools that allow them to better shape requirements for digital solutions being implemented by technology providers or in-house digital teams.

OMV conducted an **in-depth business-wide analysis** to identify the areas of its business where **digital transformation** would have the **greatest impact**. This then guided investment and the definition of high-impact digital initiatives followed, all driven by business unit requirements. Notably, OMV considers 'digital ways of working' as a key pillar in their digital transformation journey.⁵

⁴ "Shell gives developers freedom to create, reduces IT costs with dev-test solution in the cloud," Microsoft, August 21, 2018, <https://customers.microsoft.com/en-us/story/shell-mining-oil-gas-azure>

⁵ "Innovation, Technology & Digitalization," OMV, accessed March 2, 2021, <https://www.omv.com/en/our-business/upstream/innovation-technology-digitalization>



Establish strategic partnerships with win-win scenarios

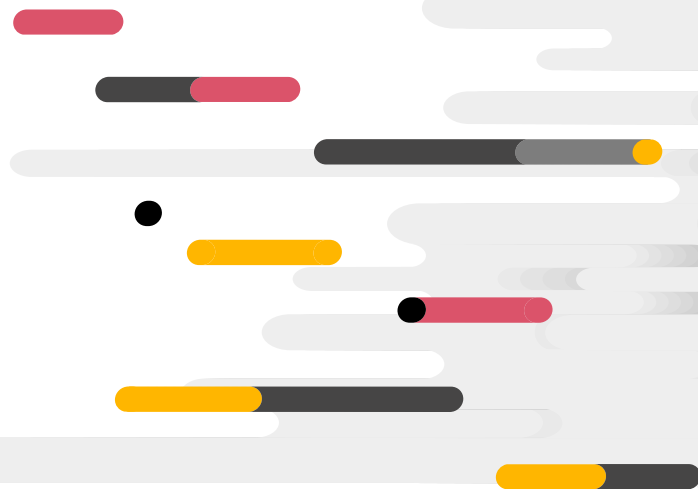
This foundational element cannot be stressed enough in terms of its criticality. Given the rate at which the digital ecosystem is expanding – to now include large corporations, small-to-medium sized vendors, integrators, startups, think-tanks, research bodies and universities – the organisations that will win at digital strategy implementation are those that intelligently build partnerships that complement their offering rather than those who attempt to build all capabilities and solutions in-house. These partnerships often yield win-win situations through the design and roll-out of high-RoI solutions, where both parties have a vested interest in sustainable implementation performance rather than just an up-front deal. An appropriate balance should be struck between the protection of proprietary technology and the development of high-performing solutions.

“C3.AI CEO Thomas M. Siebel: “This initiative is about combining the efforts of global leaders to accelerate the digital transformation of the energy industry to new, safe, and secure energy and to ensure climate security.”⁶

Shell have recently launched Shell ai, an ‘Open AI Energy Initiative’TM (OAI) in partnership with Baker Hughes, Microsoft, and C3.ai – a first-of-its-kind open ecosystem of artificial intelligence (AI)-based solutions for the energy and process industries. The OAI provides a **framework** for energy operators, service providers, equipment providers and independent software vendors for energy services **to offer interoperable solutions**, including AI and physics-based models, monitoring, diagnostics, prescriptive actions and services.⁶

Reduce development cycle time with ‘turbo-innovation’⁷

‘Turbo-innovation’ is an approach to reduce the innovation cycle time in building digital platforms and solutions. This is done through strict scope, data source management and leveraging ‘pre-fabricated’ front- and back-ends, resulting in increased success rates, reduced time-to-value and overall de-risking of initiatives. ‘Turbo-innovation’ utilises a framework that aims to realise tangible solutions and value over six weeks. Early phases are completed in a cross-functional setting, with rapid innovation cycles that allow frequent course corrections based on insights gained.



⁶ “Shell, C3 AI, Baker Hughes, and Microsoft Launch the Open AI Energy Initiative, an Ecosystem of AI Solutions to Help Transform the Energy Industry,” Baker Hughes, 1 February 2021, <https://investors.bakerhughes.com/news-releases/news-release-details/shell-c3-ai-baker-hughes-and-microsoft-launch-open-ai-energy>



Typically the framework aims to realise tangible solutions and value over six weeks

Alignment and scoping

Front-loading (1-2 weeks) Understanding issues and ensure manageable week 1 scope

Week 1 Strategic alignment and prioritise problem portfolio

Execution, implementation and testing

Week 2 Identify and prioritise potential solutions, including data validation

Week 3-4 Develop front-end/UI, test and iterate

Week 5-6 Develop back-end, test, iterate, finalise MVP

Week 7-8 Implement, test and initiate rollout

Continuous prioritisation of scope and deliverables

Stakeholder management

People, organisation & culture



Adopting agile culture

The pursuit of real and rapid innovation through digital will inevitably result in some failures – an agile culture can support the celebration of failing and the ability to fail fast. Organisations with an agile culture can adopt innovative solutions to internal and external challenges more easily and build their flexibility to alter direction mid-stream if conditions change. Enabling, and in fact, encouraging teams to fail fast fosters innovation and is a cornerstone to an agile culture.

Achieve behavioural change

When it comes to digital strategy implementation, the dissemination of information and the communication campaign are not sufficient for ensuring results. Rather than just knowing a digital strategy exists in the organisation, people need to feel that they are a part of it and understand how it will benefit their team – this paves the way towards behavioural changes and the modernisation of traditional day-to-day tasks.

Taking one end of the extreme, tech companies like Google have transformed their entire workforce into an innovation churning machine that rapidly produces new products, tests them, fails, succeeds and implements every single day. These behaviours have been embedded into the culture at Google through many years of identifying ideal behaviours and driving campaigns to cement them. Oil & Gas operators should reflect on these practices and look to adopt a similar approach.

Total has established ‘**Booster Spaces**’ in the heart of their key locations, accessible to all, as they focus on innovation, incubation, and hackathon spaces.⁸

Executives responsible for digital enablement at Baker Hughes have spent **25% of their time** working with **corporate communications** to limit the confusion around the term ‘digital’ and to talk about the potential opportunities.⁹

⁸ “Total launches a “plant 4.0” corporate incubator,” Total, December 18, 2015, <https://www.total.com/media/news/press-releases/total-launches-plant-40-corporate-incubator>

⁹ Strategy & Katzenbach Centre



Consider a layered approach to upskilling

Investment in capability-building should occur across the organisation, particularly in core business areas, driving up the overall digital acumen in order to accelerate adoption. A layered approach to upskilling can be taken, whereby everyone receives, at a minimum, basic digital awareness and skills. Digital enthusiasts are then enabled to pursue their interest by enrolling in further training and digital accelerators in order to drive change within their teams. Focus should be applied to developing a pipeline of future digital leaders and innovators. Starting with graduate positions focused on digitalisation and the application of an innovative mindset, organisations should increasingly see digital as a core competency for future leaders.

Equinor established a **digital academy** and its employees have clocked a total of **150,000** digital learning sessions since 2018, approximately 7 sessions per employee.¹⁰

Integrate and blend data scientists within business units and engineering teams

Data science is a key aspect of the skill-set needed to design and implement digital solutions. With that in mind, data science should be seen as a capability pillar in organisations with true digital ambitions. Furthermore, data scientists themselves should not be seen as an extension of IT teams. Data scientists should be blended into business units, geological & geophysical specialist teams and engineering teams, working collaboratively from an early stage of challenge or opportunity capture, all the way through to testing and roll-out.

Strangely enough, blending will likely reveal new opportunities for performance improvement through digital that were not initially obvious to business units. Given that the systems used by operations staff and technicians are now increasingly digital, blending of data scientists allows teams to better leverage valuable new operating data being churned out.

A key subject to address in this area has been the availability of data science talent, specifically focused on the Oil & Gas industry – a scarcity which has been brought about by both a crew change and an inclination for younger graduates to gravitate towards industries perceived as ‘cleaner’. Data scientists that specialise in Oil & Gas applications are not plentiful in number, nor evenly distributed across global Oil & Gas hotspots.

Data scientists should be embedded permanently into teams where they can be used continuously. For instance, Shell has a network of around **800 data scientists deployed across the business** to help scale their transformation journey.¹¹

¹⁰ PwC Academy

¹¹ Shell Investor Day, 11 February 2021

Final thoughts

While Oil & Gas companies look to bounce back post COVID-19, gearing towards the new normal, it is time to accelerate the implementation of digital strategies in order to reap the benefits promised by 'Industry 4.0'. Having a strong digital strategy is nothing without robust implementation. A weak strategy executed perfectly is better than a strong strategy that has failed to implement – one is digital progress and the other is a report gathering dust.

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