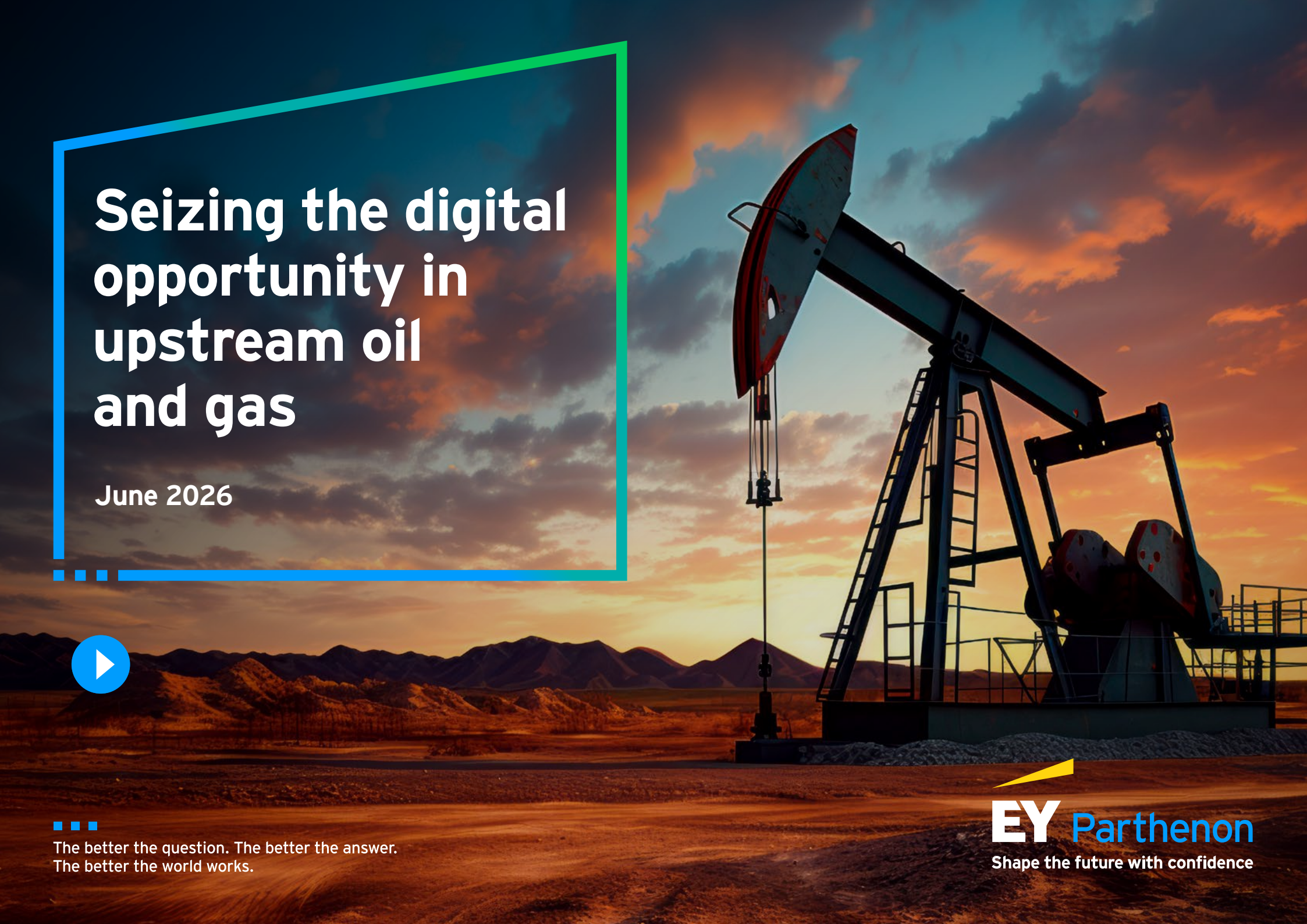
Seizing the digital opportunity in upstream oil and gas

June 2026



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Introduction

Oil and gas are pivotal to the world economy, providing over 50% of global energy supply.[1] Even under the stated energy transition policies of the world's governments, consumption levels are projected to remain at current levels until 2050.[2] The sector has long faced shareholder scrutiny and tight capital discipline, forcing companies to focus on margins, returns, and doing more with existing resources. The threat to supplies from the 2026 Middle East conflict only heightens the challenge. In the UK specifically, where oil and gas production has fallen by more than 70% from peak levels at the turn of the century[3], this recent geopolitical instability further highlights the importance of energy security and the need to make the most of the UK's oil and gas resources.

Oil and gas producers around the world are using digital solutions to help them respond to these pressures and are expecting increasing value to be generated from their digital investments.

This report reviews how the oil and gas industry can benefit from digital solutions, and quantifies the value at stake. It identifies the main barriers to deploying digital solutions, and considers how to unlock value through strategies that encompass people and processes alongside technology. The publication should be of interest to oil and gas producers, digital solution providers, investors, and governments seeking to make the most of their resources.

We would like to thank all those who gave their valuable time to provide essential insights that informed our research.

About the research

In March and April 2026, EY surveyed more than 200 professionals with decision-making responsibility for buying digital solutions in upstream oil and gas. Questions covered issues such as investment in digital solutions, digital value drivers, implementation challenges, and expected benefits.

We also held interviews with 65+ specialists with experience in upstream oil and gas or oilfield services, across the spectrum of industry players. Interviewees included key senior exploration and production decision-makers, with roles such as Director of AI, IT Director, Digitalisation Lead, and Senior Engineer across different operators (majors, national oil companies, independents) and across different global regions. Digital technology provider representatives included roles such as Director of Business Development in Digital and Vice President (VP) Sales and Commercial, in technology and oilfield services (OFS) companies.

Our research was mainly conducted during the first weeks of the conflict in Iran that began in late February 2026, and draws on market projections developed before then. At the time of writing, the situation continues to change rapidly. Therefore, our results should be read as a view of long-term trends from the vantage point of early 2026, rather than a forecast of the specific effects of the conflict.

Digital solutions are expected to create almost $800bn of value in the upstream oil and gas sector in the next 10 years.

1 Energy supply, International Energy Agency, accessed 29 April 2026.

2 *World Energy Outlook 2025*, International Energy Agency, 12 November 2025.

3 *Energy trends: UK total energy*, Department of Energy Security and Net Zero, 30 April 2026.

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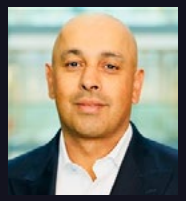

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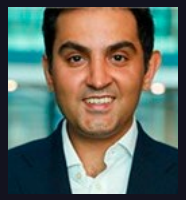

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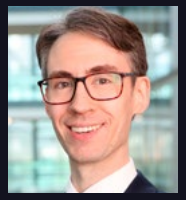

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Digital value creation and key value drivers

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Although digital solutions have been employed in upstream for some time, the value they create is growing rapidly, as companies apply them to address rising pressures on margins, efficiency and output.

The upstream oil and gas industry has a long history of digital transformation spanning more than 40 years.

Digital subsurface	Connectivity	Data platforms	AI
mid 1980s to early 2000s	2000s to mid-2010s	mid-2010s to early 2020s	mid 2020s onwards

In the **digital subsurface era**, from the mid-1980s to the early 2000s, long-standing investments in earth-science data, imaging and computing enabled companies to start digitising subsurface analytics. This led to increasingly sophisticated modelling, driving better exploration and development.

The early 2000s to mid-2010s saw the emergence of the **connectivity era**, characterised by digital oilfields and integrated operations. Real-time data, transferred from sites in the field to operations centres, enabled live operational decision support, to optimise drilling and production.

In the **data platforms era**, from the mid-2010s to early 2020s, upstream companies built the foundations of enterprise-level data, and introduced open data platforms. This helped operators progress from narrow, domain-specific tools towards cross-domain workflows benefiting from consistent data sets. Cloud services became more widely adopted following initial proofs-of-concept, and machine learning (ML) usage started to grow rapidly.

Today, enterprise transformation and artificial intelligence (AI) have ushered in the **AI era**. Companies are expanding their AI usage, thanks to the increasing availability of high-performance computing. A range of generative AI (Gen AI) applications have been introduced upstream, including 'troubleshooters', and assistants for engineering workflows. Adoption is gradually developing from office productivity towards core operational workflows.

Driving value from digital

According to our survey, digital solutions in upstream oil and gas are expected to add over $790bn of value over the 10 years to 2035, with the annual value realised rising to around $100bn by 2035.[4]

Annual global spend on digital solutions in upstream oil and gas is expected to reach $24bn in 2026, and increase by 60% to $38bn in 2035. On average, survey respondents stated that, for each $1 spent on digital solutions, their companies gained $2.8 of value (implying $67bn of value from spending in 2026), although many suggested $3–5 or more. This value was typically gained within 4–5 years of the associated spending.

The value generated can take different forms. Digital solutions can help raise production and recovery rates, save time (reducing both time to first oil and unproductive downtime), improve energy efficiency, and increase the efficiency of both capital expenditure (capex) and operating expenditure (opex), as well as freeing the workforce to focus on higher-value tasks.

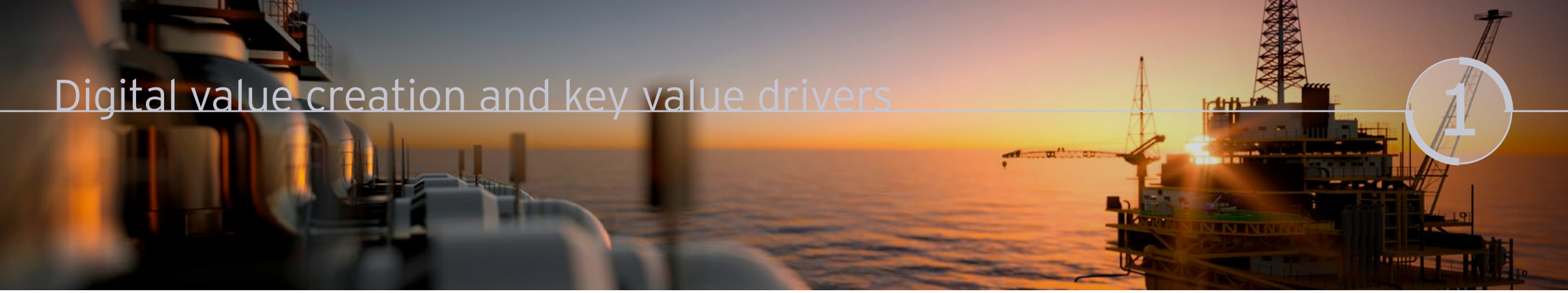
Our survey respondents believe the most important value drivers from digital solutions to be improvements in oil and gas production and recovery, capital efficiency and time savings (Figure 1.1 on page 4).

At the production and development stages of the upstream lifecycle, over 60% of respondents reported gains of at least 10% on these dimensions as a result of digital solutions.

> **"The expected return is roughly five times over a 3 to 5 year period."**
>
> *Business transformation executive, Major*

> **"I have seen a good digital solution being deployed where a company has made a three times return on investment over 5 to 6 years."**
>
> *Director of AI, Innovation and Digital Enablement, Integrated E&P operator*

4 Survey respondents were invited to consider different drivers of value (e.g., time savings, greater quantities produced or recovered, capital efficiency improvement, opex or workforce efficiency improvement, energy efficiency improvement), and to quantify overall value created by their company's current set of digital solutions, as a multiple of spend, relative to how things were done before these solutions were in place. The value represents a combination of increase in revenue and decrease in cost.



Digital value creation and key value drivers

1

Digitally-driven improvements through the upstream oil and gas lifecycle

Lifecycle stages	Examples of where digital solutions are applied
Exploration	▪ Seismic interpretation ▪ AI-assisted screening ▪ Portfolio high-grading
Development	▪ Integrated subsurface-well-facilities planning ▪ Scenario modelling and risk analytics ▪ Design collaboration
Drilling and completions	▪ Real-time drilling optimisation ▪ Remote operations ▪ Logistics co-ordination
Production	▪ Exception-based suveillance ▪ Artifical lift optimisation ▪ Flow assurance analytics

> "The number one source of value from digital is production and recovery improvement."
>
> *Business transformation executive, Major*

Figure 1.1

Relative importance of value drivers within the oil and gas field lifecycle

	Lifecycle stage					
Value driver	**Exploration**	**Development**	**Drilling**	**Completions**	**Production**	**Overall emphasis**
Production and recovery improvement						
Capital efficiency improvement						
Time saving						
Integrity, assurance and compliance improvement						
Opex and workforce efficiency improvement						
Energy efficiency improvement						
Overall emphasis						

"Integrity, assurance and compliance" covers improvements in reserves assurance, well integrity, process safety, maintenance compliance, emissions and regulatory reporting, and the auditability of digital decisions.

Relative importance: Lower → Higher

Production and recovery improvement

The production stage is where our survey respondents expect the most value to be created and also most digital spend to be allocated (one third of the 2026 total). This reflects a wider industry focus on production, driven by the immediate increase in revenues associated with production and recovery improvement.

Production rates are being improved through increasingly sophisticated AI-enabled systems, which can monitor the wealth of available data and help optimise system parameters, e.g., through artificial lift optimisation and flow assurance analytics.

Digital approaches to reservoir management are also helping to slow production decline, and to boost incremental recoverable barrel numbers, because of improved intervention targeting and optimisation across reservoirs, wells and facilities.

Success stories:

- One oil Major achieved a production uplift of 2–5%, by using predictive maintenance to avoid unplanned shutdowns.
- A National Oil Company (NOC) used a digital solution to reorganise its production processes, and was able to increase output by 2%.

Capital efficiency improvement

With the industry's continued focus on reducing costs and increasing returns on capital, survey respondents rank capital efficiency improvements as the second most important driver of value from their digital investments. Value is expected throughout the lifecycle of a field, with a slightly greater focus on the development and drilling phases, where significant capital expenditures are incurred.

Given the volume of data available and the impact of exploration decisions on returns and costs, digital solutions are also adding value at the exploration and appraisal stage of the lifecycle. The deployment of advanced analytics and screening tools is significantly improving the understanding of uncertainties in resource and reserve estimation, resulting in faster, more accurate and more reliable exploration decisions and project prioritisation, and greater capital efficiency.

Meanwhile, remote operations, real-time drilling optimisation and workflow automation are driving significant capital efficiencies in the drilling stage. Digital twins and reservoir modelling also allow more value to be extracted from capital sunk into wells, facilities and infrastructure, extending asset life and deferring the need for replacement capex.

Success stories:

- An NOC used ML to assess correlations in production across 20 wells in a field, to determine whether incremental wells were needed to optimise production. This approach improved capital efficiency by limiting the number of additional wells drilled.
- Another NOC used digital solutions to achieve cumulative capital efficiency improvements of 40% over 6 years by comparing performance between fields to identify opportunities for transferring best practices.

Time savings

Time savings represent another significant area of value creation from digital solutions, in terms of reducing both time to first oil and unproductive downtime.

Time to first oil is being reduced by digital solutions for integrated subsurface-well-facilities planning, scenario modelling, and schedule risk analysis. These help reduce the number of design iterations and allow producers to achieve revenues faster, as well as lowering development cost per barrel.

Downtime is being reduced by advances in AI-enabled data analysis. At the drilling stage, these are improving real-time decision-making and preventing predictable failure modes. At the production stage, companies are seeing improvements in uptime, and reductions in deferment, using tools that support real-time, operational visibility and predictive maintenance. Such technologies help avoid downside surprises and stabilise cashflows.

Success stories:

- Using ML tools applied to integrated datasets, an NOC reduced the time for some stages of exploration by 20%.
- Another NOC employing digital data reduced timelines for delivery from over 60 days to below 40 days per well.
- One oil and gas Major improved drilling times by 3.5% through AI drilling optimisation.

Other value drivers: Opex and workforce efficiency improvement; integrity, assurance and compliance improvement; energy efficiency improvement

The oil and gas sector globally faces constraints in engineering expertise, with insufficient new people joining to balance retirements and departures of experienced staff. Digital solutions are increasingly used to capture knowledge and increase the efficiency of the current workforce.

Digital solutions are improving reserves assurance, well integrity and maintenance compliance, through reliability analytics, corrosion monitoring, better targeting of inspections based on risk, and streamlined technical assurance workflows.

AI-enabled monitoring can provide early warnings of risks based on live video footage, while remote operations require fewer people to attend hazardous sites, all of which improves safety. Emissions management can be enhanced via sensor networks and imaging that can track methane leakages, and systems that propose interventions or simplify reporting processes.

Together, these solutions enable operators to protect their employees, reduce downtime, minimise loss-event exposure, and reinforce their license to operate.

Success stories:

- Using a remote inspection tool, an Independent increased by 40% the number of site inspections that could be conducted with the same number of people. Additionally, inspectors avoided having to work at height on ropes on offshore oil rigs, improving safety.
- A drone, coupled with ultrasonic and light detection and ranging (LiDAR) scanning, enabled a Major to carry out tank inspections in just two days — a task that would previously have taken a seven-person team one week.

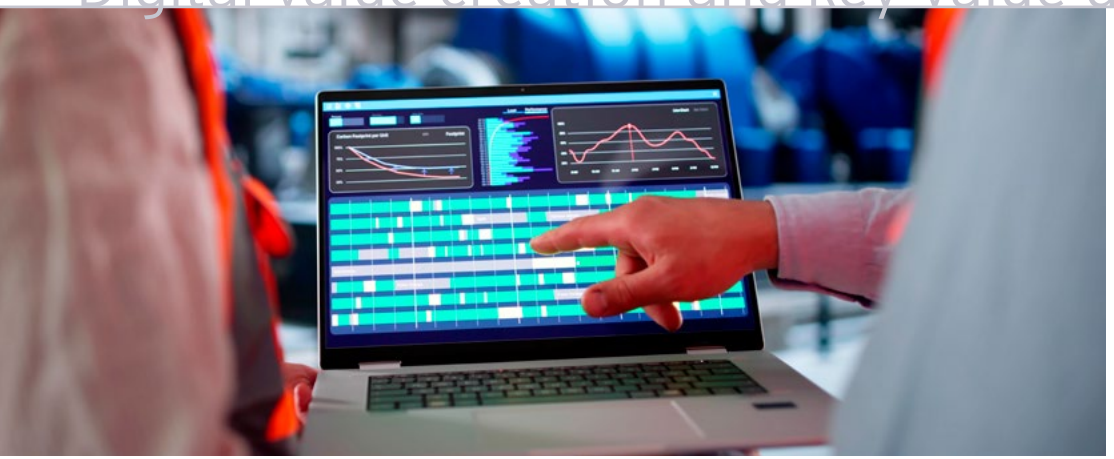
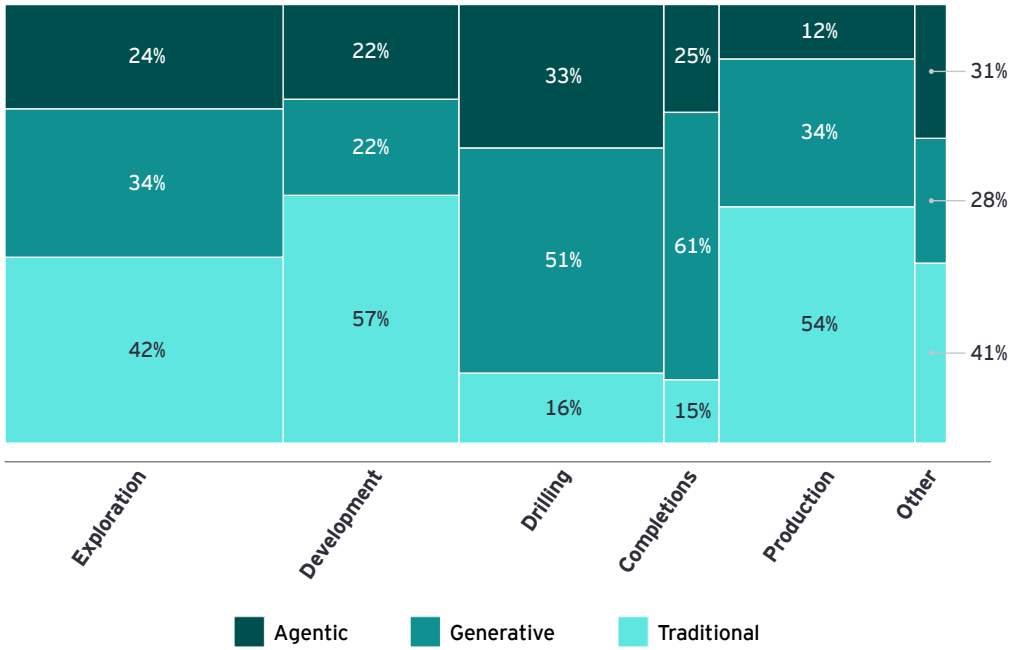


Figure 1.2

Distribution of 2026 spend on AI through the upstream lifecycle



Leveraging the potential of AI

'Traditional' AI

AI is not new to the upstream oil and gas industry, with forms of ML in use for several decades, to identify patterns, forecast production, and predict operational issues like safety risks or asset performance. 'Traditional' AI supports core analytical and decision-support processes through the oil and gas value chain. The vast quantities of data generated by sensors on oil and gas fields can be efficiently assessed and interpreted by AI.

As Figure 1.2 shows, respondents are applying traditional AI across the lifecycle, with most of the spend in exploration, development and production. Some of the more common uses are:

- **Subsurface analysis:** ML enhances subsurface forecasting and modelling, for example using seismic interpretation. It is also applied to reservoir simulation, production forecasting, and decline curve analysis.
- **Operational optimisation:** AI can recommend optimal parameters to allow wells to be drilled more quickly, and to increase output in the production stage (e.g., in well flow and artificial lift).
- **Predictive maintenance:** AI can predict faults and detect anomalies (e.g., on pumps and compressors), helping reduce downtime and save costs.
- **Health and safety:** AI-enabled real-time video analytics identify risks on sites, such as non-compliance with protective equipment rules, or emergence of leaks.

> "Industry-wide AI adoption is moving from nascent to widespread rapidly. We use traditional machine learning models to analyse sensor data from pumps, compressors, and rotating equipment. These models are able to predict failures before they happen... they have helped us save almost 20% to 30% of unplanned downtime."
>
> *Information architecture executive, Major*

Digital value creation and key value drivers

1

Generative and Agentic AI

Generative AI (Gen AI) and agentic AI are at a more nascent stage, and showing exciting potential to support productivity and insights. As shown in Figure 1.2 on page 7, an especially large share of AI spend is going to generative and agentic AI at the drilling and completions stages of the lifecycle.

Despite their potential, deployment of generative and agentic AI is uneven in upstream oil and gas; many companies do not yet use generative or agentic AI, while others have only introduced initial applications.

> "We are predominantly in the testing phase for lots of AI software. Most of our current tools are administration-focused and not oil and gas-specific."
>
> *Former Data science and analytics executive, Integrated E&P*

By increasing the accessibility of pertinent information to the right colleagues at the right times, Gen AI can save time and drive more accurate decisions. However, companies looking to scale up Gen AI face data security and regulatory constraints, for instance associated with cloud computing facilities based overseas.

Key applications for Gen AI include:

- **Content management:** to help engineers more easily access relevant information from their companies' repositories of standard operating practices.
- **Analysis and reporting:** to support engineers in interpreting and contextualising field data, and generating richer reports, faster.
- **Functional support:** to improve productivity in document preparation in departments such as HR, Legal, and Procurement.

> "We have implemented generative AI models... for reading engineering drawings, maintenance logs, and inspection reports. The models can then generate recommendations and summaries, and provide troubleshooting steps."
>
> *Contract management executive, NOC*

Although mostly in the early development stage, agentic AI can potentially shift AI from analysis into workflow orchestration and action, boosting productivity and operational efficiency. Our interviews with oil and gas specialists emphasised the importance of human accountability for operational decisions – even as more extensive workflow automations emerge – and the potential constraints from regulators and insurers.

Among the more popular uses of agentic AI are:

- **Production:** to assist engineers in their workflows, identifying and proposing actions to optimise production, and triaging alarms from across multiple systems, prioritising the most important.
- **Maintenance:** to execute bounded actions (where there are defined, finite limits), in response to sensor data, such as operational adjustments to protect equipment.
- **Logistics and procurement:** in development and drilling, to anticipate and address logistics and procurement needs (e.g., ordering parts automatically when operational data suggest a replacement may be needed soon).

> "In drilling optimisation, drilling agents monitor real-time drilling data and adjust parameters like weight, revolutions per minute, and weight on bit (WOB). For maintenance, agents are used to predict equipment failures, create work orders, and schedule crews and parts."
>
> *Account leader, Oilfield services provider*

2

Digital maturity across the upstream oil and gas ecosystem

Leading Middle East National Oil Companies (NOCs) and Majors have the highest perceived digital maturity levels; they prioritise value and ease of integration.

The speed of adoption of digital technology – and subsequent investment levels – vary significantly between different upstream oil and gas players. Our survey indicates that Middle East NOCs are the most likely to spend a greater share of their opex and capex budgets on digital, and especially on AI (Figure 2.2), followed by the Majors.

When asked to rate their own company's level of digital maturity, respondents from the Majors gave the highest score, with those from Middle East NOCs in second place (Figure 2.3).

Figure 2.1

Share of digital solutions market by customer archetype (2026)

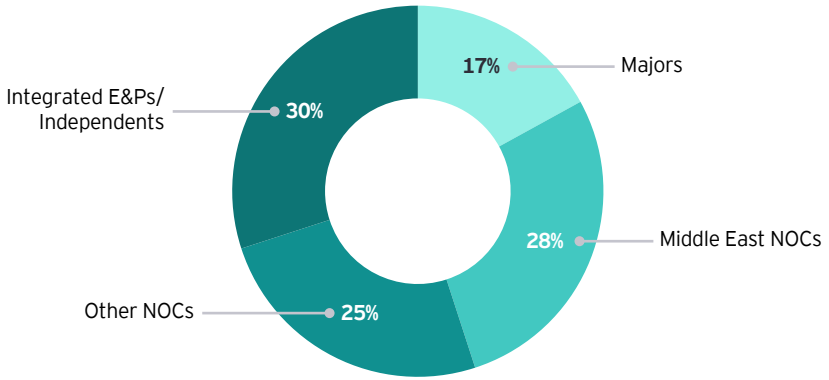


Figure 2.2

Share of total Capex and Opex budgets spent on digital solutions, 2026

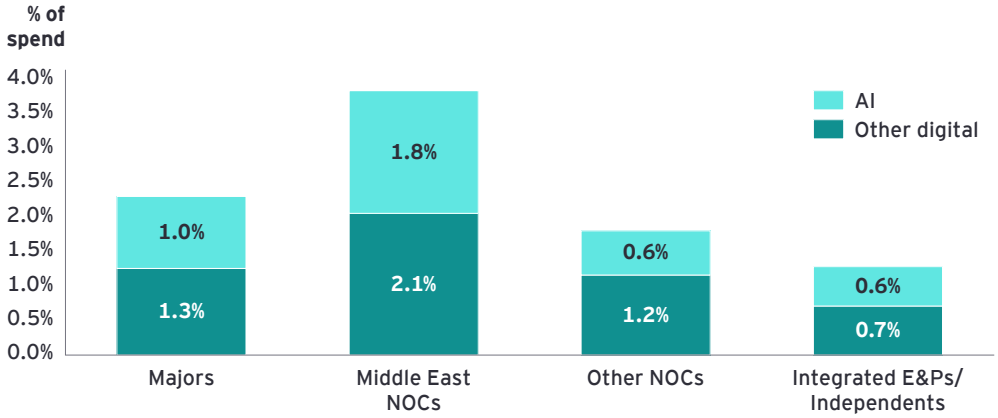
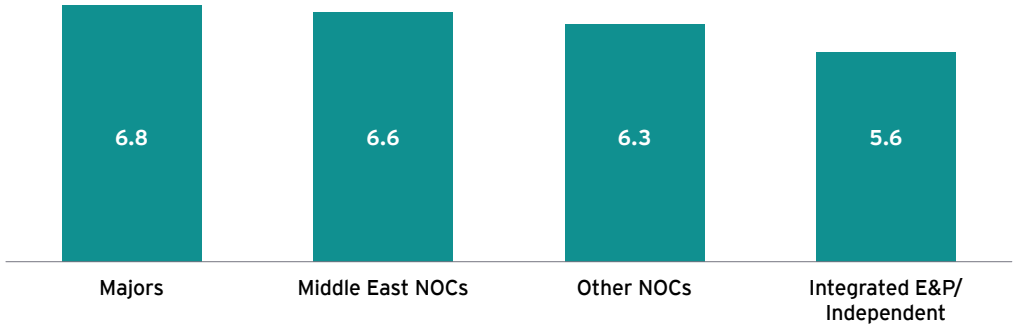


Figure 2.3

Respondent's view of their companies' digital maturity (scale of 1 to 10)



Digital maturity across the upstream oil and gas ecosystem

2

Majors

Our conversations with specialists from the Majors suggest that, while cost is important in digital purchasing decisions, value and ease of integration are also high priorities. These companies are seeking highly-customised, partnership-led digital solutions, to build on their already-scaling AI efforts, and their evolving GenAI and agentic AI pilots. Some organisations have sought to develop their technology internally, while others have consistently outsourced.

> **"Majors are the most mature … Due to the size of their portfolios, they can also afford to run more trials without impacting their bottom lines."**
>
> *Information architecture executive, Major*

> **"Majors require enormous, customised solutions. They are more mature in AI, but less agile in general."**
>
> *Former head of data and AI, Major*

Middle East NOCs

For Middle East NOCs, the key objective of digital solutions is to optimise their sovereign resources, and create as much in-country value as possible, through developing their workforce and supply chain. Cost and production gains also remain a priority. When purchasing digital solutions, Middle East NOCs place considerable emphasis upon data control, sovereignty and security: they often see upstream cybersecurity as a national risk, and require in-country facilities for cloud processing. The rapid take-up of AI is led by top-down national and executive mandates, although limited availability of in-country computing power is a continued constraint. There is quite a variation in digital maturity levels, with some companies only at the start of their digital journey, and others much more advanced.

> **"My company's vision is to be a pioneer in AI and digitalisation, and this is the direction of the country's leadership. We are not allowed to use data centres or clouds outside our country."**
>
> *Senior drilling engineer, Middle East NOC*

> **"The key constraints are safety and the level of risk appetite we are willing to accept. The complexity of our reservoirs and facilities is huge, and there are also cybersecurity concerns."**
>
> *Contract management executive, Middle East NOC*

Digital maturity across the upstream oil and gas ecosystem

2

Other (non-Middle East) NOCs

As with their Middle East counterparts, data security and sovereignty remain paramount for other NOCs. In buying digital solutions, there is a tendency to look for affordable, proven and scalable solutions. AI adoption remains uneven, hindered by legacy infrastructure and regulatory and organisational barriers. It is a similar story with overall digital maturity, where the gap between pioneers and laggards is significant.

> **"As an NOC, the strategic drivers of digital solution adoption are cost reduction and solution scalability across our entire organisation."**
>
> *Senior reservoir engineer, Non-Middle-East NOC*

Integrated E&Ps and independents

Due to limited budgets, many companies in this category lack the digital maturity of their larger peers. On the other hand, their leaner structures and faster procurement cycles give them greater agility to take on new technologies as they emerge. Size also influences the way they integrate digital solutions. With their smaller in-house development teams, they have a preference for off-the-shelf, 'plug and play' solutions that are easier to implement. The diversity of integrated E&Ps and independents also impacts their technological needs: some have activities across multiple continents and a range of asset types, while others are highly specialised. For example, many small independents exclusively operate onshore in the US, pursuing shale oil and gas, and seek more targeted digital solutions.

> **"We always start with off-the-shelf solutions. We will ask for some customisation, but that is cost dependent, and we prefer subscription models."**
>
> *Senior asset integrity engineer, Independent*

3

Challenges to digital adoption – and how to overcome them

Challenges to digital adoption – and how to overcome them

3

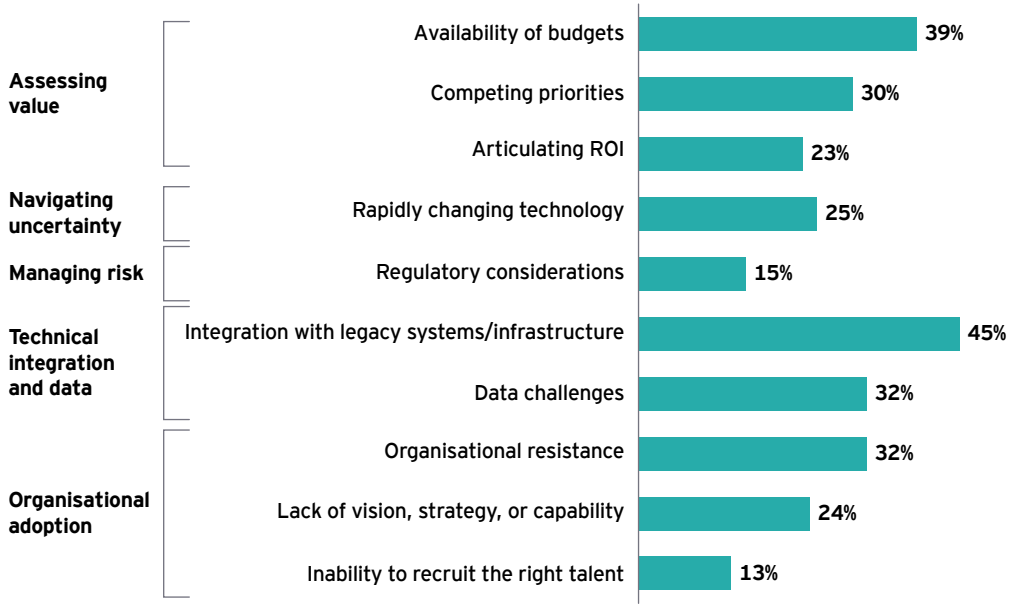
Unlocking value from digital solutions requires an informed, flexible strategy and an approach to deployment that encompasses people and processes as well as technology.

Despite its technical sophistication, the oil and gas sector can be slow to adopt new digital technologies. A 2025 study by the International Energy Agency found that "only 2.3% of energy start-ups have an AI-related value proposition, lower than the 7% for life sciences and 4.3% for agriculture".[5]

As they chart their digital future, upstream businesses need to choose the right digital solutions, and introduce them in a way that delivers value. Figure 3.1 highlights the survey respondents' views of the largest barriers to digital implementation in their organisations. Number one is integration with legacy systems/infrastructure (45%), followed by budget availability (39%), data challenges (32%), and organisational resistance (32%).

Figure 3.1

Proportion of respondents that saw each of the following as among the top three challenges to implementing digital in their organisations



5 *"Energy and AI"*, International Energy Agency, April 2025

Challenges to digital adoption – and how to overcome them

3

Barriers to adoption

1. Assessing and demonstrating value

Given the pressures to achieve capital efficiency, investments in digital solutions must meet a high threshold for return on investment (ROI) – something that the industry often struggles to measure. Before committing funds, oil and gas companies often ask for evidence of a solution's effectiveness for other producers; although this can lower risk, waiting too long may see them lose ground to competitors. It is especially difficult to show value for solutions that simplify workflows across multiple domains, where their impact cuts across different value assessment mechanisms in the organisation.

> **"Measuring the ROI of digital solutions is hard… it gets more difficult with efficiency gains. For example, if you enable a reservoir engineering team to do forecasting more quickly, a lot of times the team just ends up doing more forecasting. It is very difficult to measure whether that increased activity is actually resulting in better decisions. I have rarely seen people truly nail that part of the measurement."**
>
> *Former data science and analytics executive, Integrated E&P*

2. Making the right investment bets at the right time

The speed of innovation can, understandably, make buyers nervous about committing large sums to solutions that could soon become obsolete. There is additional concern about the oil and gas sector's historical boom and bust cycles, which can disrupt a steady stream of investment in long-term digital transformation.

> **"The pace of technological change is accelerating… The dependence on these new technologies has become so high that it's very hard for normal companies to keep up, whether it is with talent, resources, skills, or investment."**
>
> *Digital executive, Major*

Challenges to digital adoption – and how to overcome them

3

3. Managing technology risks

In a risk-averse sector, where mistakes can be life-threatening and downtime carries high costs, new ways of working are often regarded with caution, potentially stalling the introduction of transformative technologies. Digitisation also opens up new cyberattack surfaces, which can delay deployment of new solutions until they have been fully tested. AI brings further uncertainties, with concerns about data security and sovereignty, regulatory restrictions on where data is located, and reliability of new large language models.

> **"An error could cost millions of dollars. If you make the wrong decision, you could lose a turbine, which would cost $20 million. If you make a wrong decision and lose a well, you're looking at $20 million to drill a new one, plus the $100 million in lost production from that well being down for six months."**
>
> *Former head of digital delivery, Independent*

4. Integrating systems and data

The different specialisms in upstream oil and gas often act in siloes. Fragmented legacy systems and application centric data storage exacerbate this challenge, hindering the ability to integrate new solutions that connect all the domains. Without strong data infrastructure and governance, there is often uncertainty over the accuracy, veracity, and consistency of data. This holds back automated analysis and decision making, particularly across assets, jurisdictions, or supply chain stages.

International oil companies typically operate a wide range of assets in varying conditions, making it hard to compare the value from digital solutions across the portfolio, and slowing the scale-up of solutions. Furthermore, organisational complexity, along with disjointed structures, can lead to cost overruns and implementation delays.

> **"Datasets are spread across numerous legacy systems. This makes integration into new platforms complex. A lot of time goes into cleaning, standardising, and differentiating the data before any real value can be delivered."**
>
> *Information and data architecture executive, Major*

5. Organisational capabilities and cultural resistance

A combination of lack of technological expertise and employee resistance can also slow down digital transformation. Without a clear change roadmap, or an explanation of how new solutions drive better results and value, deployment may be stalled. Additionally, if the organisation deploys new tools without evolving workflows and behaviours, results may be compromised.

> **"In-house expertise is the limiting factor for us. Oil and gas companies typically do not have much software proficiency because it is not our core area."**
>
> *Director of AI, innovation and digital enablement, Integrated E&P*

Accelerating digital solutions in upstream oil and gas

Despite the challenges to adoption, over 90% of our survey respondents expect their organisation's digital spending to grow in the next 5 years, and 46% expect faster growth than in the last 5 years. To assist with creating the right conditions to overcome the challenges and unlock value from digital solutions, we see five key enablers.

1. Measure value in a consistent way

Digital solutions have significant potential to improve collaboration between domains. To measure the value of the digital investment, companies need frameworks that can assess the overall benefit to the organisation (and not just the benefit to a single domain or project lifecycle stage) and to use these to develop their business cases for digital investments.

2. Make your digital strategy adaptable

A flexible strategy includes options to scale up/down or alter course, to suit changing circumstances. This often involves identifying "no-regrets" moves, like setting up a consistent data foundation that will have value even if the technology landscape changes. It can also mean pivoting solutions or capabilities to other applications if needs and ambitions shift, to avoid writing off investments and starting from scratch.

3. Refine risk frameworks

Operators recognise the new risks associated with connected oilfield sites, cloud-based data and autonomous digital solutions, and many are addressing these challenges, through testing and heightened cybersecurity. Risk management processes should be holistic – covering solutions that connect across domains or lifecycle stages – and proportionate, focusing on risks with the greatest potential impact. They should also be set up to swiftly bring together the required insights and decision authority, enabling progress without excessive approval cycles.

4. Reinforce data foundations

Companies also need to unlock the potential of their data. Leading oil and gas companies have already started building more robust data foundations, standardising core systems and introducing centralised data governance and storage. Once consistent data platforms are in place, they can be accessed and interrogated by applications across the organisation, enabling efficient use of data and sharing good practices. The largest operators strive to combine tailored content for specific domain needs, with high interoperability and shared standards.

To make the most of the latest AI solutions, businesses need a semantic architecture that captures the meaning and context of data, while also tracking the origins and transformation of data. Those operators with more mature data foundations, for example those that have already invested in cloud digital solutions, are likely to harness agentic AI solutions faster.

5. Manage change effectively

Much of the value of digital solutions in upstream oil and gas comes from enabling new, more efficient workflows that fundamentally change how teams work together within and between domains. This typically requires robust change management, so that teams understand the value of new digital solutions, buy into new ways of working, and develop appropriate skills. Such programmes may entail a cultural shift, led from the top, as well as suitable incentives to foster new behaviours.[6]

6 In a forthcoming publication, we plan to discuss in more depth what is needed for effective change management in this sector.

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Key steps to gain more value from digital solutions

Key steps to gain more value from digital solutions

4

To compete in upstream oil and gas in the next decade, producers need to secure ever greater value from digital solutions — in turn creating opportunities (and challenges) for digital solution providers, investors and governments.

Here are some recommendations for the industry which may help to unlock value from digital solutions.

Oil and gas producers

- Unify frameworks for assessing value, developing business cases and assessing returns on investment.
- Conduct rapid cashflow assessments to help determine gaps in capital efficiency and productivity; use these to set goals for digital solutions.
- Build strategic flexibility, refine risk frameworks, and reinforce data foundations.
- Build a change management programme to enable effective scaling of digital solutions across the organisation.
- Ensure that solutions are business-led, with close support from the digital or IT functions, and address workflow, data and IT issues in parallel.

Digital solution providers

- Build a deeper understanding of how different customers define value, and shift the sales message from selling solutions to creating value.
- Co-create business cases with customer teams, to support articulation of value and help evolve trust and customer relationships.
- Provide customers with 'digital business case validation clinics' to map the pathway to deployment and help uncover the main challenges to adoption and integration.
- Continue to invest in innovation, to build new generative and agentic AI use cases, and improve service reliability and cybersecurity.

Investors

- Assess digital maturity and evaluate how producers and digital solutions providers can unlock upstream digital value and gain competitive advantage; determine companies' ability to overcome barriers to digital solutions deployment.
- Review companies' ability to adapt and drive change within their organisations.
- Assess the potential of companies' partnership arrangements to drive digital value creation.

Governments

- Re-assess the value from sovereign resource basins in light of increased digitally-driven value creation.
- Review upstream data regulation to realise value from cloud and AI workflows, while addressing cybersecurity risk and data sovereignty challenges.
- Analyse potential value from research and development (R&D) investment or subsidy, to support targeted adoption of new digital solutions in NOCs.

Key steps to gain more value from digital solutions

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The mounting pressures on oil and gas companies and the rapid pace of technological development, including AI, are increasing the importance of realising value from digital solutions. However, there are major challenges to overcome in order to translate digital spending into better corporate performance and competitive advantage. To succeed, companies need to build robust, integrated data foundations, and to enhance their management of processes and people alongside their technology.

Ultimately, no single company can go it alone in realising the potential of digital solutions, partly because of the scale of investment and partly because of the range of capabilities needed (e.g., in cloud infrastructure, data contextualisation, domain experience, and organisation design). This makes partnerships more essential than ever to unlock the value that remains in the upstream oil and gas sector.

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