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# US\$414.5 billion

Barclay's estimates global  
E&P spending will reach  
US\$414.5 billion in 2019



# Digitalizing upstream operations creates a step change in oil and gas performance

Yet as critical as they are to a company's competitiveness, these upstream operations are often plagued by major data, technology and process management challenges (Figure 1) that can make it difficult for companies to minimize the time and cost it takes to find resources, get a well up and running, pump those resources out of the ground and deliver returns.

Exploration and production (E&P) is the lifeblood of upstream oil and gas. But it's also incredibly complicated, time consuming and expensive – and made all the more difficult in an era of volatile oil prices and evolving energy demand. In fact, as one of the most complex and asset-intensive industries, oil and gas spends literally billions on capital projects and operations every year, with payback often taking decades. Most of that money is earmarked for identifying promising new resource deposits and building and deploying new wells to extract those resources. Barclay's estimates global E&P spending will reach US\$414.5 billion in 2019.<sup>1</sup>

Oil and gas companies increasingly are turning to digital to address these obstacles. According to EY research, nearly 9 in 10 (89%) oil and gas executives expect their investment in digital tools to increase in the next two years, with a quarter (25%) foreseeing a significant jump. Just 11% see investment staying flat and, significantly, no one sees it declining. For a majority (55%) of executives, the key priority for investment is operations – their company's biggest cost center. These findings are consistent with EY experience: nearly all of the oil and gas companies EY works with plan on investing in digital technology in multiple areas of the upstream value chain.

## Figure 1: Myriad challenges hamper oil and gas companies' upstream operations

- ▶ **Enterprise systems:** hundreds of siloed in-house and third-party systems mean multiple disconnected data sources.
- ▶ **Source of the truth:** Disconnected data storage with multiple versions of data doesn't inspire confidence and trust.
- ▶ **Integration:** Disparate and incongruent operating tools across workflows and business units drive inefficiency and inconsistency.
- ▶ **Process management:** Low optimization in many areas results in long cycle times and risks eroding investor valuation which, because of the shale boom, is now driven by operating efficiency.
- ▶ **Data management:** Data is typically manipulated manually and Master Data Management is poor.
- ▶ **Visibility:** Inability to see across systems lengthens cycle times and undermines decision quality.
- ▶ **Decision-making:** decision-making is hampered by scattered reporting capabilities, sub-optimal decision-making processes and siloed operations.

# An integrated, digitally enabled approach to upstream

As they consider their digital investments, a number of forward-looking oil and gas companies are exploring how to use digital to accelerate the transformation of their upstream operations across the oilfield development life cycle (Figure 2). These companies are finding that by integrating and optimizing their upstream operational processes with digital technologies, they can dramatically enhance innovation and improve efficiency – and, in the process, reduce time by half and cost by as much as 30%.

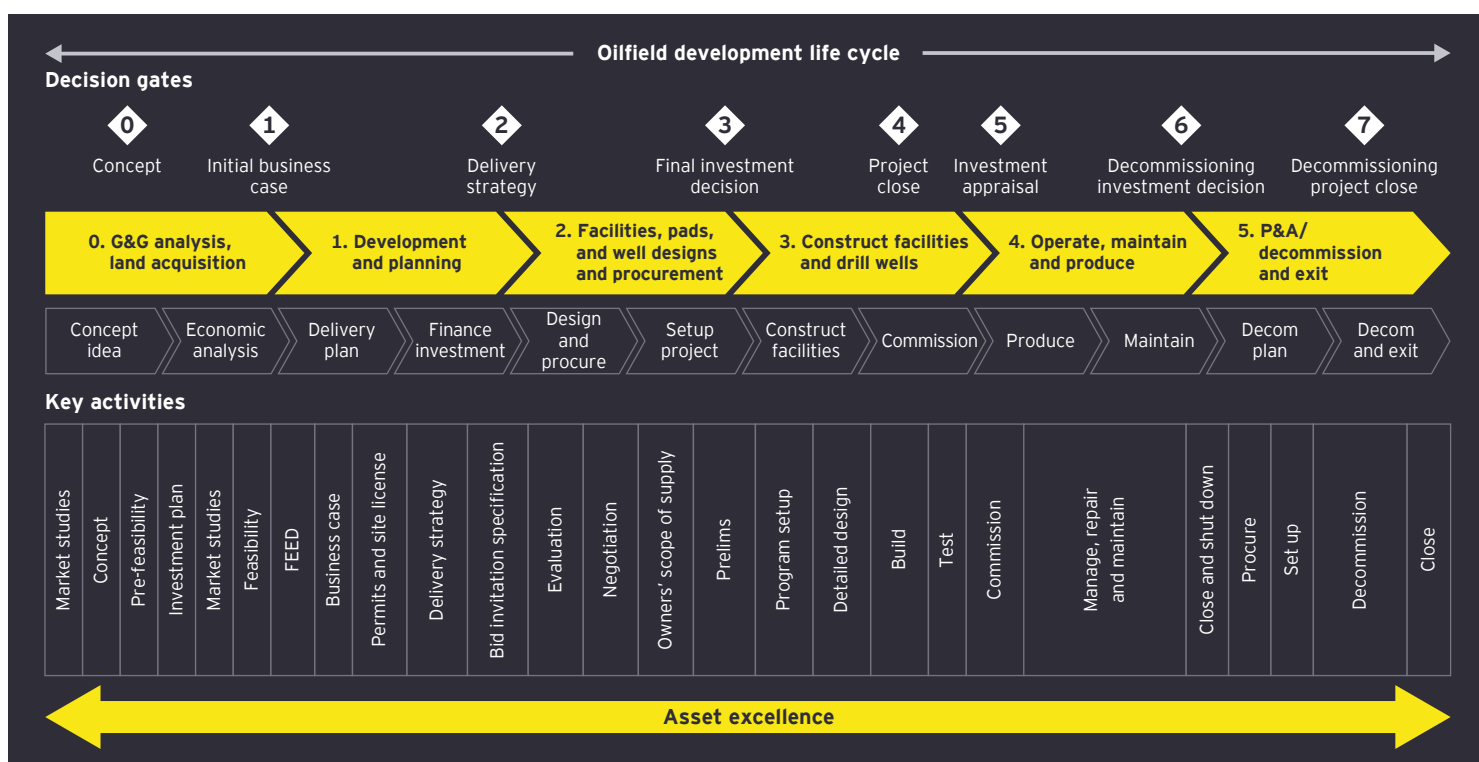
Many of these companies are benefiting from the EY Digital Energy Enablement Platform (DEEP), which can help accelerate that transformation. EY DEEP gives oil and gas companies an innovative solution that enables them to digitally transform their upstream operations more quickly with less risk so they're

positioned to survive and thrive in the energy sector of today and tomorrow.

At the core of EY DEEP are Microsoft technologies. Hosted on Azure Cloud, the Dynamics 365 Enterprise Platform serves as the technology foundation. It ties together myriad Microsoft back-office applications – including the Office 365 Productivity Suite, Microsoft Power Apps, Microsoft Flow and Power BI – as well as industry-specific engineering software. It also can accommodate future uses of other digital enablers, such as artificial intelligence and predictive analytics. A common, extensible data model provides unified navigation across applications; uses operator information to drive consistent protocols for data capture and future utilization; and allows easy access to a cloud-first, single source of centralized data.

With a new approach enabled by core digital technologies, oil and gas companies can connect and integrate different siloes of information, tools and workflow to ultimately optimize their entire upstream value chain – from geological and geophysical analysis to well decommissioning – not just individual segments of it. With the typical upstream company carrying a US\$100 billion capital portfolio, that's a true game changer for the oil and gas industry. It enables companies to allocate that capital more effectively and substantially shorten the time it takes to turn natural resources into a sellable commodity – which is significant in an industry whose average return on assets is only around 7.5%.<sup>3</sup>

Figure 2: A typical field development life cycle and constituent activities





30%

reduction in cost for oil and gas companies, by integrating and helping optimize their upstream operational processes with digital technologies

# Case study: Well planning and design

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Engineers can enjoy a streamlined workflow thanks to a new unified interface for engineering operations, which enables them to spend less time on tedious manual activities — cutting, pasting and tracking disparate data — and more time engineering.



US\$83,000

lost every hour a rig sits idle

The impact digital can have is illustrated at one integrated oil and gas company, which worked with the EY and Microsoft team to use EY DEEP to integrate all of the relevant data and workflows across the company's well planning and design process. This is an extremely complex process that includes many equally complex sub-disciplines (Figure 3).

At the time, the company's engineers used dozens of disconnected tools, multiple inputs and numerous spreadsheets to track thousands of individual data points from many different sources to design and plan a well. Considering planning a single well typically requires 10 to 15 iterations of the design, this approach was inefficient and time consuming and created numerous opportunities for error.

Powered by Microsoft Dynamics 365, EY DEEP enabled the company to integrate and automate well planning and

design and its related workflows and data, while eliminating the myriad disconnected tools engineers were forced to use. The real-time well-planning dashboard, based on Microsoft Power BI, gives engineers access to the project schedule, status and financial overview, while Microsoft Dynamics 365's API enables engineers to connect third-party engineering software to perform complex engineering simulations and calculations.

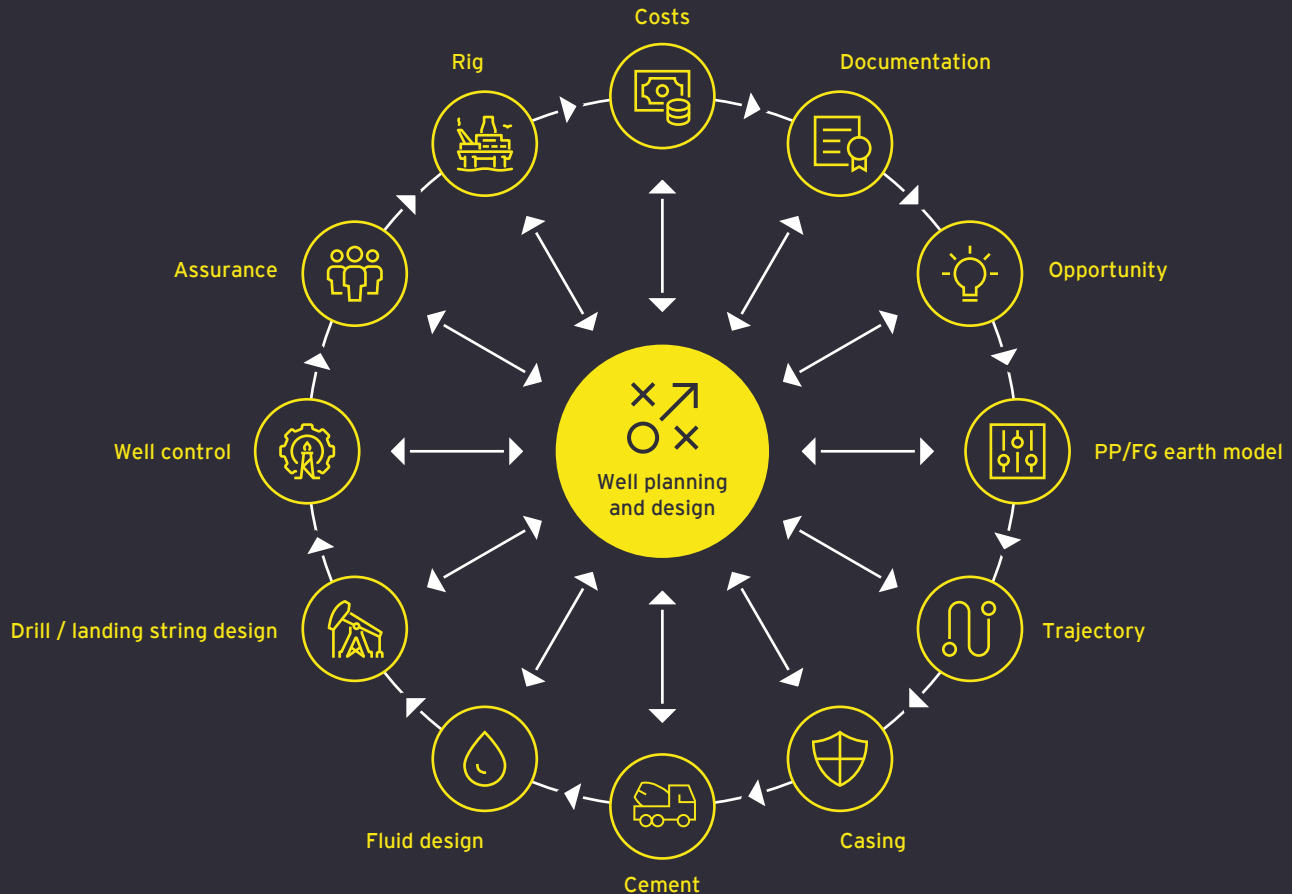
Furthermore, well planning and design can now be integrated with ERP systems, connecting engineering with the supply chain. Engineers can visualize, track, order and maintain the inventory of parts and equipment needed to build a well, and quickly scenario plan a well's design based on availability. This enables the company to more effectively plan the sequence in which wells are built and, consequently, determine how to best allocate its capital budget throughout the year.

As important, engineers also can create many more designs at once, and simultaneously optimize each on performance, cost or any other relevant metric. Using robust scenario modeling, they can develop and test multiple design contingencies before drilling starts so the company is prepared for what it might encounter underground.

Engineers also enjoy a streamlined workflow thanks to a new unified interface for engineering operations, which enables them to spend less time on tedious manual activities – cutting, pasting and tracking disparate data – and more time engineering. They also have access to both standard and custom data analysis with improved data visualization. And internal and external reporting now take mere minutes instead of days or weeks.

Overall, the company expects to cut well planning time in half – a dramatic time saving.

Figure 3: Well planning and design sub-disciplines



# Case study: Production Operations Intelligence Hub

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Having both real-time and historical information in one place allows the company to address issues more efficiently, reduce downtime and perform preventive maintenance based on prioritization logic.





Another example of the power of EY DEEP's integrated approach to upstream operations is its deployment at a large oil and gas company to create a Production Operations Intelligence Hub, which is helping the company achieve the efficiency gains critical to the industry. This system is a robust manage-by-exception workflow management solution with value-added and actionable alerts to drive measurable improvement in performance, integrity and safety.

The Production Operations Intelligence Hub was built on Microsoft Dynamics 365 and takes advantage of the platform's field service functionality. It not only can pull in information from various siloed systems – including the oil and gas production third-party system, SCADA – but it can also alert the company to

production deviations in real time via Microsoft Dynamics 365 analytics capabilities. Once the company is alerted, the field service module can use its GPS functionality to dispatch vendors or production supervisors to address the issue at hand. Production supervisors can also see past alarms and how those previous issues were resolved. Having both real-time and historical information in one place allows the company to address issues more efficiently, reduce downtime and perform preventive maintenance based on prioritization logic.

In addition to boosting production operations efficiency, the common data model in Microsoft Dynamics 365 enables the company to reuse specific well data in other parts of the upstream value chain. For example, by combining production

data with reservoir estimations, the Production Operations Intelligence Hub can identify underperforming wells, and subsequently coordinate efforts to address the issues and loop the information back into future planning. This helps the company manage asset performance and maintain visibility of key performance indicators in real time to inform both tactical and strategic longer-term decisions.

By breaking down data silos and connecting complex relationships, the Production Operations Intelligence Hub gives the company a new way to manage an asset based on automatic prioritization. And by providing key information to make better decisions, more quickly, the system helps keep the well operating consistently at the highest levels.



# trans



## Conclusion

It's not a stretch to say that how well an upstream company manages the process of finding deposits of natural resources below the ground, building a well to extract those resources, and keeping the well pumping for as long as it can largely determines the company's success or failure. That's why it's critical for oil and gas companies to continue to look for ways to transform their operations to stay competitive.

# Transform



EY believes a new integrated approach to upstream activities, powered by digital technologies, is one of the biggest and most impactful of these opportunities. With the help of the EY and Microsoft alliance, oil and gas companies can address the myriad challenges that have long hamstrung E&P – connecting disparate data sources and automating and optimizing process flows to improve decision-making, increase efficiency, cut cycle time, and reduce overall costs.

As EY research and experience show, there is, indeed, significant momentum among oil and gas companies toward investing in digital to develop best-in-class operations. Although the oil price environment has improved from where it was just a few years ago, oil and gas companies remain relentlessly focused on cost reduction and efficiency improvement all along the value chain. Upstream capital efficiency, refinery performance and value extraction – transformed by digitalization – likely will be key priorities for oil and gas companies for many quarters to come.

To find out how the EY Digital Enablement Energy Platform (DEEP), powered by Microsoft's scalable, enterprise cloud platform, can help you accelerate your digital transformation and amplify business performance, explore: [ey.com/oilandgas](https://www.ey.com/oilandgas)

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EYG no. 008760-20GbI

2012-3651053  
ED None

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## For more information, contact:



**Erik Funfar**  
EY Global Oil & Gas Advisory  
Digital and Emerging Technologies  
[erik.r.funfar@ey.com](mailto:erik.r.funfar@ey.com)



**Oscar de Lucio**  
Consulting, Business Consulting,  
Transformation Execution  
[oscar.delucio@ey.com](mailto:oscar.delucio@ey.com)



**Vivek Malhotra**  
Microsoft Alliance Director  
[vivekma@microsoft.com](mailto:vivekma@microsoft.com)



**Jim Burkeholder**  
Microsoft Alliance Oil & Gas Lead, NA  
[jimburbk@microsoft.com](mailto:jimburbk@microsoft.com)

<sup>1</sup> "Barclays Forecasts Rise In Global 2019 E&P Spending," Velda Addison, Hart Energy, January 9, 2019, <https://www.hartenergy.com/exclusives/barclays-forecasts-rise-global-2019-ep-spending-31738>

<sup>2</sup> "Technology Can Light the Way, but Do You Know Where You're Going?" Jeff Williams, EY, January 9, 2019, [https://www.ey.com/en\\_gl/oil-gas/technology-can-light-the-way-but-do-you-know-where-you-re-going](https://www.ey.com/en_gl/oil-gas/technology-can-light-the-way-but-do-you-know-where-you-re-going)

<sup>3</sup> "Is AI the Fuel Oil and Gas Needs?" Jeff Williams, EY, January 8, 2019, [https://www.ey.com/en\\_gl/oil-gas/is-ai-the-fuel-oil-and-gas-needs](https://www.ey.com/en_gl/oil-gas/is-ai-the-fuel-oil-and-gas-needs)