Digital transformation in upstream oil and gas companies means working in both exploration and production to build a resilient and scalable support system for rapid innovation.

Managing Digital Transformation in Upstream Oil and Gas

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Introduction

Digital transformation (DX) is a generic term for change driven by the business environment and enabled by digital technology. The upstream oil and gas space is going through a digital transformation that is happening faster than anyone expected. Two years ago, when I discussed DX with several oil and gas CIOs, they felt they had 7–10 years to adjust their IT operations to cope with the change. In a recent conversation, some of those same CIOs indicated that they think they have less than two years to transform their IT operations. As commodities have entered a period of low but stable prices, exploration and production (E&P) companies are looking for digital technology to bring transformation to how they operate.

Commodity prices have stabilized somewhat in the past few years, with more recent prices fluctuating between $40 per barrel and $80 per barrel (see Figure 1). That gives oil and gas companies a better ability to predict and operate in a stable financial environment. But the lower prices also provide a significant incentive to invest in DX to drive optimization and value from the large amounts of data being generated in E&P.

### AT A GLANCE

KEY STATS

40% of oil and gas companies have analytics as their top transformational investment.

WHAT'S IMPORTANT

Oil and gas companies approaching digital transformation and going digitally native must focus on infrastructure, organization, and governance.

KEY TAKEAWAYS

» Investment in transformational technology is critical.

» Analytics and data management are areas that drive digital transformation.

» Managing cloud is an important part of the transformed governance model.

Figure 1: *U.S. Oil Prices*

Cushing, OK WTI Spot Price FOB (Dollars per Barrel)
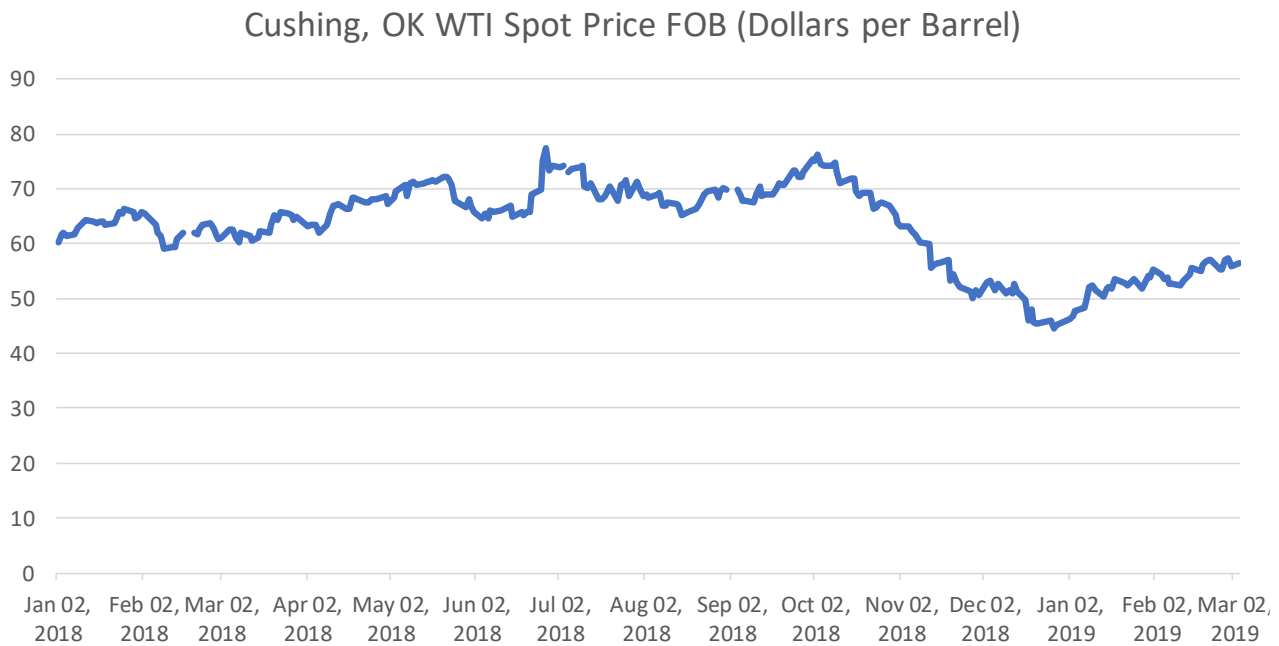
Source: U.S. Energy Information Administration (EIA) website for spot pricing oil, 2019

Challenges for Upstream Oil and Gas

DX isn't easy. There are infrastructure, governance, and organization challenges to overcome. This document looks at how leading companies are developing DX strategies and implementations to make themselves not just digitally transformed but also digitally native. In detail, the three core transformation areas that oil and gas companies must address are:

» **Infrastructure.** Companies must have a road map for their communications, security, development operations, and storage.

» **Governance.** Creating workflows and guidelines for data accessibility and ownership is one of the biggest hurdles for oil and gas companies, especially in managing data across traditional IT and operations boundaries.

» **Organization.** Developing an organization that works across traditional silos and uses data as a value generator is a critical step.

These challenges are about breaking down silos between functional areas and the data they hold in those silos. The infrastructure aspect is about getting cloud organized with a platform in place to support multicloud access, data management, ecosystems, and development environments. The governance and organization aspects are about ensuring that everyone in the company uses data assets and applications in an organized and secure manner.

Investing in DX

Investing in DX means investing in several areas. But one of the core capabilities of DX is around data. In fact, in IDC's *Digital Transformation Leadership Survey,* analytics was the top application investment initiative for exploration; 40% of oil and gas companies stated they invested in analytics for 2018 as a core part of digital transformation.

To become digitally native operations, oil and gas companies must invest in other areas in parallel with analytics. As Figure 2 shows, they are investing in analytics, infrastructure, and other transformational technologies to support DX.

> 40% of oil and gas companies stated they invested in analytics for 2018 as a core part of digital transformation.

Figure 2: *E&P Investment in DX*

Investment Level in 2018 to Support DX
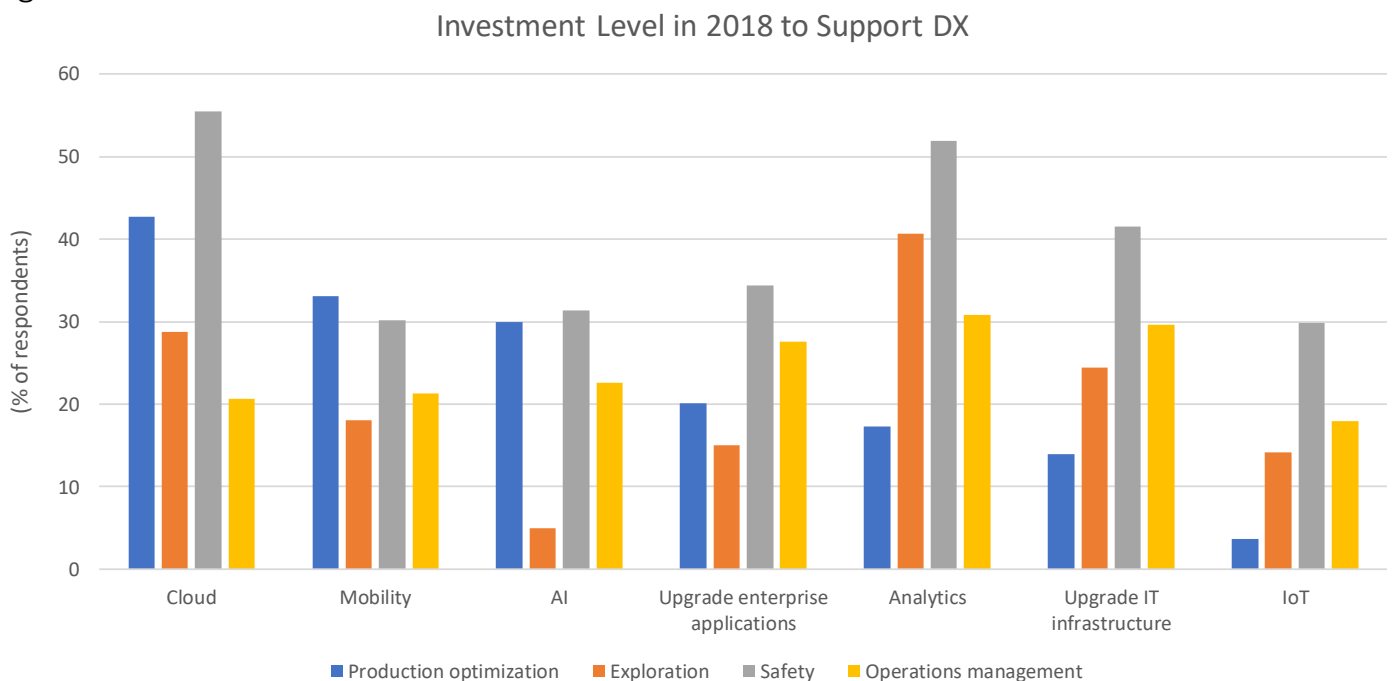
Source: IDC's Digital Transformation Leadership Survey, 2018

We can see that infrastructure investments are considered a top priority for DX. Security, a derivative of infrastructure, is not far behind; however, it was called out separately in our survey because of the recent heavy focus on security in critical infrastructure.

The interesting part is cloud. Cloud is a critical element of every transformation IDC sees in the oil and gas industry. Transformational investment priorities for the critical function areas shown in Figure 2 are as follows:

» **Production optimization.** Big investments in cloud, mobility, and artificial intelligence (AI) are about increasing the speed of decision making, regardless of location.

» **Exploration.** Analytics, cloud, and infrastructure investments are a priority. The exploration side of E&P has always been heavy in analytics, but the transformed company is making sure the data and results are not siloed to each geophysicist, as they have been historically.

» **Safety.** Analytics, cloud, and infrastructure are areas of focus for investments, with the goal of making safety information and process available throughout the organization rather than stored in silos. The interest in Internet of Things (IoT) is around connecting safety wear and validating its use.

» **Operations management.** With a heavy focus on asset management, operations management is focused on making sure the right asset-focused applications are operating and available. Analytics plays a big role in asset performance management.

The fact that safety is a significant opportunity for transformation should surprise no one in the oil and gas industry. Safety concerns arise in all aspects of drilling and production. Many safety considerations have been outside the abilities of companies to monitor and maintain, except through training. Now, simple safety measures, such as wearable safety equipment, can be monitored through connected IoT developments. This drives investments in cloud, analytics, and infrastructure capabilities. The infrastructure aspect is around having security, storage, and governance in place to manage the workflows and data.

Investments in infrastructure, cloud, mobility, analytics, and AI are driving overall investment in DX from a technology standpoint. But a continued investment in transforming the organization, especially the relationship between operations and IT, is money well spent.

Putting It All Together for Innovation

Now that we have seen where oil and gas companies are investing their money when it comes to DX, we need to look at how they are taking a holistic approach to get an agile and resilient framework for supporting innovation, which is the ultimate goal. The CIO of an independent operator stated that he received the following mandate from the CEO: "You will not use IT to block innovation or stifle the creativity of our engineers. I need an IT organization that can take that innovation and get value out of my IT investment."

Can any company do it alone? The answer is almost always no. Some smaller and newer companies that don't have the issues of scale or a debt of legacy technology on the books can transform on their own. But any oil and gas company that has more than 1,000 people will need help. That help comes from partners that understand all the DX use cases and know how the technology combines with the business process to create a transformed business.

Another important aspect is choosing a platform that supports the ultimate goals of resilience, scale, and decision support. The right platform removes the need to manage a multitude of enterprise applications within a complex system of integrations and custom middleware. This platform should have some fundamental capabilities:

» A unified and agile development environment based on a microservices architecture model

» An ecosystem capability that supports internal and external partners in application development and deployment

» A unified data management capability with common semantics

» A common cybersecurity structure

The most important benefit of such a platform is the ability to provide some basic structure to innovators without restricting and dulling the innovation in the company.

The DX Journey and Where You Are

To provide some context for where oil and gas companies are on their DX journey, Figure 3 offers a comparison of how organizations are leveraging digital technology relative to their peers. Most of the companies consider themselves on par with their peers. About 25% of the companies consider themselves ahead of their peers, and a little more than 10% consider themselves the "best in the world."

It's a journey — one on which many companies have already embarked. It touches every part of an E&P company's operations and business. It's a journey that IT and CIOs must prepare for because transformation is required faster than expected. IDC's research shows that the mean is rapidly shifting, and IT organizations are at risk of being boxed out and marginalized by the rapid innovation of their businesses.

Figure 3: *Industry Peer Comparison for Leveraging Digital Technology*

Q *Where does your organization stand in comparison to other worldwide peers when it comes to leveraging digital technology to transform your business?*
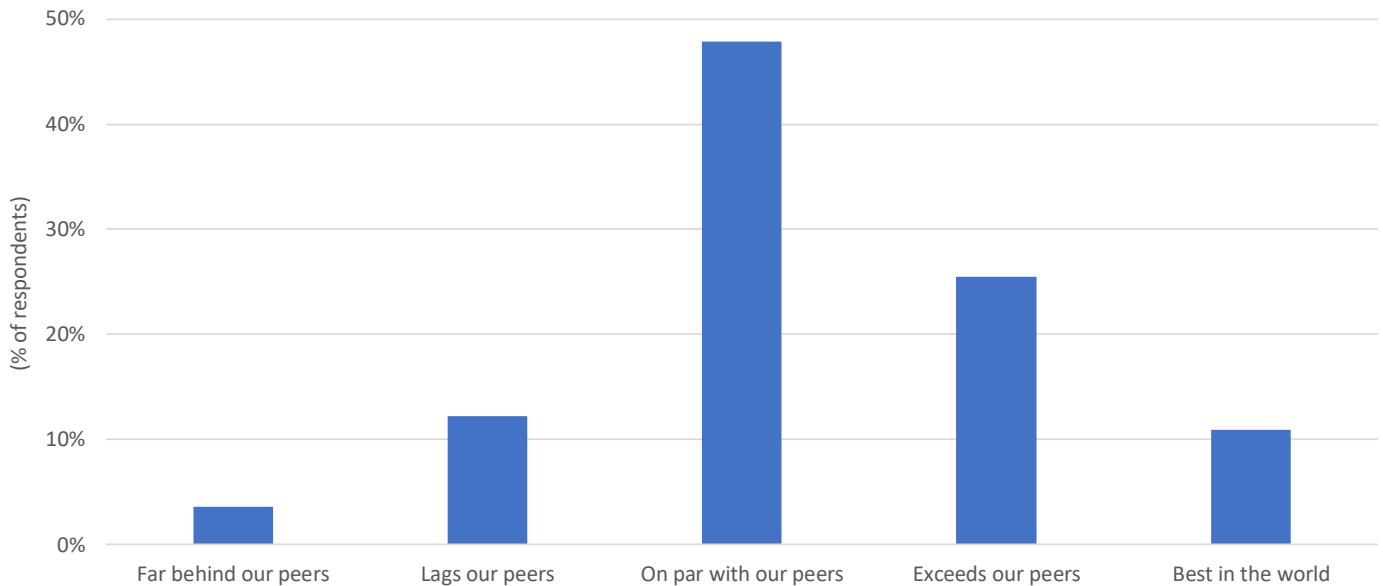
Source: IDC's Digital Transformation Leadership Survey, 2018

Benefits

Digital transformation provides the foundation for oil and gas companies to:

> » Use existing data and the new interconnected data stream to support a faster decision-making process
>
> » Improve internal business process efficiency and reduce operations costs
>
> » Develop a more resilient infrastructure that can scale with the business and support innovation at all levels

That last benefit is key for companies. The infrastructure must support innovation, not limit it. In oil and gas, CEOs want their CIOs to foster innovation, not cage it in IT-mandated processes.

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Considering Wipro

Wipro delivers comprehensive digital transformation capabilities to the oil and gas industry. These capabilities combine corporate digital strength with deep domain, consulting, and process context. They include a strategic partner ecosystem and apply solutions across the upstream, midstream, and downstream sectors. The company offers a full-service portfolio of expertise with systems integrations and application services as core capabilities.

Robust agile development and design thinking make up the core of Wipro Digital, providing rapid development through "Digital Pods" in 20 locations across the globe. A dedicated digital practice in oil and gas works alongside Wipro Digital to offer a distinctive strategy for DX to the industry. Wipro's oil and gas practice has grown to over 70 active clients, including 7 of the largest companies in the industry.

In 2019, Wipro has become active within The Open Group Open Subsurface Data Universe Forum. Digital practitioners have extensive skills in cloud adoption and architectures that enable upstream businesses.

Key acquisitions are digital differentiators for Wipro, such as Designit (a European acquisition), a global strategic design firm that applies design thinking and innovation to companies' challenges. Wipro also recently acquired the United States–based Cooper and Australia-based Syfte design firms. Wipro's acquisition of Appirio expanded delivery capability in Salesforce and Workday scalable SaaS offerings. This acquisition included Topcoder, the world's largest crowdsourcing organization for coding and data science expertise, which helps companies rapidly address talent shortfalls and short-term innovation needs.

Wipro reinforces these capabilities with a $100 million venture fund for strategic technology investment.

Wipro Contextualizes

Wipro's oil and gas practice understands that DX should not simply cloud enable or automate existing capabilities. Senior domain and technology specialists identify where a client company can realize the most business value, contextualize ways to transform, and reimagine that work and unlock value by applying disruptive technologies to the biggest challenges.

A proof of concept or pilot helps a company visualize its business scenarios in the digital world. Contextualized examples include the following:

» Wipro worked with an oilfield services (OFS) company to design a wastewater marketplace concept for unconventional production, focusing on the haulers that perform pickup and drop-off to water treatment facilities and injection wells. The solution concept includes blockchain, IoT-enabled wastewater tanks, smart contracts, incentives, and a mobile map–based application. It helped enable quick turnaround time for the truck drivers, reduce invoice reconciliation time, and streamline existing services.

» Wipro worked with a global oil company on an upstream pilot project for handling operational safety audits of its assets. Wipro helped the company design and enable the digitization of existing manual procedural and collaboration workflows leveraging hardhat-mounted hands-free tablets. This enables users to conduct and document safety auditing in the field, increasing the productivity and connectivity of assurance personnel. Wipro has conducted more than 8 successful field trials at multiple locations around the world for the customer, thus helping transform field assurance activities and delivering improved efficiency and quality.

Wipro Operationalizes

DX is a complex journey for oil and gas, and Wipro has developed methodologies, approaches, and services to operationalize digital delivery. These methods build on a deep knowledge of the industry and apply digital disruption to the challenges.

In production, Wipro provides extensive domain expertise in helping companies plan and deliver their digital oilfield transformations. These programs emphasize high-value initiatives and a process-driven theme of collaboration across asset teams and integrated operations centers to eliminate silos. Wipro worked with an oil and gas major to implement more than 100 collaboration and integrated operations centers worldwide, resulting in a production gain of $75 million per year. This helped with improved management of the wells, reservoirs, and facilities, contributing to a fieldwide arrest of the production decline achieved over several years and a 3% increase in one year.

The company reduced the average time for the restart of wells that had quit production from six days to less than three days; enhanced surveillance capabilities, resulting in a 0.2% reduction in deferment from trips and failures of the sea water injection pumps; improved cooperation between the asset teams, instilling a high level of trust; contributed to reliability of over 97%, overall availability of 93%, and a near-zero maintenance backlog; reduced travel to the field by 15% or more; reduced safety (HSSE) exposure; and improved equipment availability to over 90%.

Wipro has defined a business-driven approach for transforming exploration and production workloads and data into the cloud. This includes a perspective for maintaining the integrity of workflows by placing users, as well as their experiences and data, at the center of cloud transformations.

Wipro's Data Wrangling service supports companies with large volumes of aging paper and electronic media. It develops a detailed understanding of a company's business, fields or plants, and metadata and applies a tailored, repeatable AI-based service for transforming and unlocking the value of data assets. Wipro is using this solution to digitize more than a million documents for various locations across the world for an oil and gas major.

Wipro helped a major oil and gas company significantly improve exploration and subsurface geoscience productivity through the implementation of an integrated subsurface platform and reengineered workflows, consolidating 80% of its petrotechnical application portfolio and transforming underlying subsurface data and the management of that data. The transformation included platform and data migration, performance measurement, and benefits realization.

Wipro's Cognitive Search solution has democratized information in upstream processes for 1,000-plus users within a major oil company by giving structure to unstructured data. The custom-built, experience-led user interface has broken data silos. The interface now enables information digitization and AI-powered, natural language processing (NLP)–based information search on multiple end-user devices and channels. It has significantly improved the ability to intelligently search for subsurface documents even if those documents didn't have user-provided metadata for classification. The solution has helped provide results with better relevancy and contextual search. It also has allowed users to save the search and documents and collaborate on the results.

Wipro is partnering with OFS companies to accelerate high-performance software engineering and application modernization through digital acceleration cells. This co-innovation and co-modernization model is helping improve the go-to-market positioning and customer experience of Wipro's various products. Wipro applies a structured approach for leveraging crowdsourcing by using its Topcoder platform. The company worked with a United States–based independent producer to apply crowdsourcing to upstream use cases, including mud log image evaluations. This has accelerated evaluations from days to seconds.

Other examples include:

- » An automation road map to deploy AI-based use cases

- » A framework for analytics to make the best use of available data

- » A concept-to-implementation road map for blockchain use cases

- » A cybersecurity methodology to tackle the complete array of cyberrisks through a unified approach

- » A methodology for agile and DevOps work for oil and gas packaged implementations

Challenges

Oil and gas companies that are moving down the path of DX know they can't do it themselves. They will partner with multiple technology vendors and service companies not only to implement technology but also to manage the significant changes needed to digitize their organizations. Some of the challenges that systems integration and consulting companies such as Wipro face in helping oil and gas companies through their DX and digitization journey are as follows:

» Companies must ride the wave of commodity markets as budgets potentially shrink and recover in parallel to the price of oil.

» Just like its customers, Wipro must retain and recruit talent that aligns with the transforming technology and energy markets, especially for oil and gas experts.

» Systems integration and consulting companies are sometimes challenged to balance getting oil and gas companies to understand the level of commitment needed for DX without scaring them into inaction.

» One of the most critical challenges for systems integration companies is selecting the right platform as the digital foundation. That partnership can set the tone for success or failure.

While these challenges are significant, most oil and gas companies already understand them and the commitment needed for DX in the industry. Companies need help choosing the right technology and prioritizing where to apply the right resources. This is where partnerships with systems integration and consulting companies pay off.

Conclusion

Oil and gas companies can no longer afford to support a technology strategy that fails during large swings in the market. The technology strategy must support innovation that drives digital transformation. The following points are a good way to evaluate your maturity in the DX journey:

» Work with partners to develop an innovation-centric data governance model. Work with business leaders, especially in operations, to support engineers and others in innovation-centered projects that will rely on IT expertise.

» Use security as a linchpin to engage businesses in innovation. Oil and gas companies know it's critical but typically don't know how to do it. It's something IT is very good at and is a great starting point.

» Get the right partners into your ecosystem to provide guidance and support. Look for partners with deep experience in oil and gas and transformation use cases. They should have a road map that goes from initial DX governance to ongoing support of platforms and cloud.

» Use a platform that can set the data management, governance, security, and development environment for your organization and its ecosystem.

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Kevin Prouty is responsible for managing a group of analysts that provide research-based advisory and consulting services that will enable energy executives in oil and gas and utilities to maximize the business value of their technology investments and minimize technology risk through accurate planning. Kevin's research specialties are Utilities, Manufacturing, Enterprise Applications, and Product Innovation research.

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