

The 2016 UPSTREAM OIL AND GAS DIGITAL TRENDS SURVEY

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Abstract

The annual Upstream Oil and Gas Digital Trends Survey is commissioned by Accenture and Microsoft. In its fifth year, the 2016 survey was conducted in January 2016 by Penn Energy Research in partnership with the Oil & Gas Journal. Respondents were oil and gas industry professionals including engineers, mid-level and executive management, business unit heads and staff, project managers and geoscientists from a cross-segment of the industry. Respondents to the "2016 Upstream Oil and Gas Digital Trends Survey" included international oil companies (IOCs), national oil companies (NOCs), independents and oilfield services firms.

Digital technology investment is helping oil and gas companies reduce costs and make better, faster decisions.

Despite the downturn, oil and gas companies plan to invest the same amount or more in digital technologies—including cloud-enabled mobility, Big Data-powered analytics and the Internet of Things (IoT).

Over the next three to five years, 80 percent of upstream oil and gas companies plan to spend the same, more, or significantly more (30%, 36%, and 14%, respectively) on digital technologies as they do now, according to the survey, now in its fifth edition. This continued investment in digital is due to respondents' confidence that digital technologies can continue to help them drive leaner, smarter organizations.

The survey drives its conclusions along 5 significant trends:

- Digital is creating value and could create even more
- Investment continues and is expected to increase
- Investments are focused and targeting value
- Increase in analytics capability
- Increased use of cloud to unlock the value of digital

The report develops each trend with supporting evidence from the Oil Industry itself, alongside additional insights of what is expected to come from information technology in the next years.

Introduction

The oil and gas industry is in general very conservative at the time of adopting new technologies, but according to the pace of development and the expectations from several key players from the Industry, it may seem that sentiment is steaming up. We are witnessing the dawn of the 4th industrial revolution, where IIoT (Industrial Internet of Things), Cloud and analytics among others, are no more fuzzy words and are beginning to reshape the landscape of oil & gas operations and decision-making.

The fifth Upstream Oil and Gas Digital Trends Survey commissioned by Accenture and Microsoft along with Penn Energy Research, in conjunction with the Oil and Gas Journal, reveals the investments upstream companies are making in digital technologies—why, when, and which ones.

The analysis of the data gathered and the comparison with past surveys allows the extraction of

several conclusions and the initial extrapolation of 5 important trends.

Trend 1

Digital is creating value and could create even more

According to the survey results, oil and gas companies recognize that digital technologies can help them reduce costs, which is especially important in this environment. And make better and faster decisions. Over half of those surveyed reported that digital is already adding high to significant value to their business.

Over half of the respondents believe digital technologies have added high (36%) to significant value (17%).

The biggest barriers to doing more were lack of funding and lack of clear strategies and business case.

Trend 2

Investment continues and is expected to increase

Despite the low oil price environment, 80% of oil and gas companies expect to continue to invest at least the same amount in digital technology over the several years.

80% of respondents plan to invest the same amount, more, or significantly more in digital technologies over the next 3-5 years.

Trend 3

Investments are focused and targeting value

Analytics and Internet of Things are predicted to be the leading digital investment over the next 3-5 years. Nearly three out of four respondents expect either big data / analytics or the Internet of Things to be their leading digital investment.

Trend 4

Increase in analytics capability

On big data and analytics, even though that was identified as a key capability that oil and gas companies need, only 13% felt that their company had a mature analytic capability and almost two thirds said that their company would be investing in analytics over the next three years to try and close this gap.

Trend 5

Increased use of cloud to unlock the value of digital

Cloud has shifted from being primarily an infrastructure solution, to a platform solution which enables mobility.

Development

The supporting evidence for each trend from the 2016 Upstream Oil & Gas Digital survey can be organized as follows:

Trend 1:

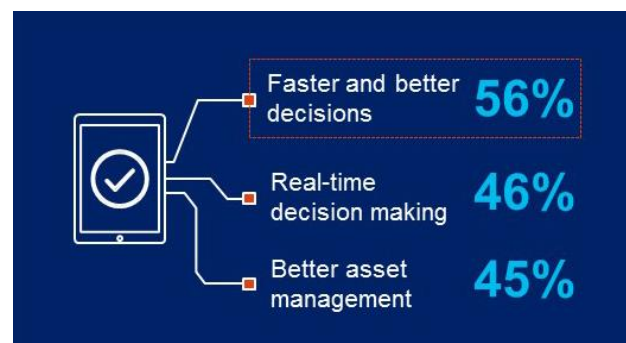
Digital technologies are adding value to upstream oil and gas companies by helping them reduce costs, make faster and better decisions and increase workforce productivity. The key barriers to achieving even more value from digital are a lack of funding, and a lack of clearly defined strategies and business cases for digital initiatives.

Over half (53%) of the respondents believe digital technologies have added high (36%) to significant value (17%).

And 72% of the respondents believe **cost reduction** is an important (27%) or the most important (45%) challenge digital can help address.

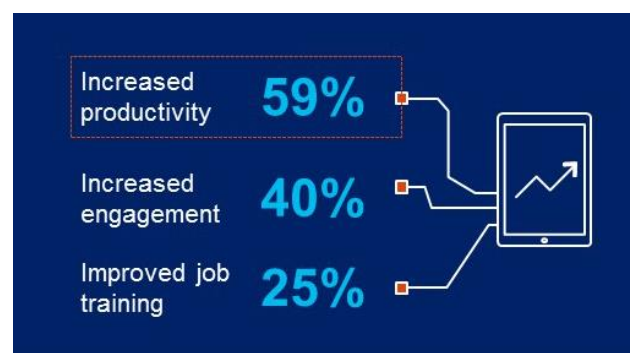
The survey identified the business benefits that Digital can help address, where Improved Decision making appears as the top area of value:

1-



Digital is also well understood for its impact on the workforce, Respondents said digital's biggest impact to date on the oil and gas workforce has been increased employee productivity.

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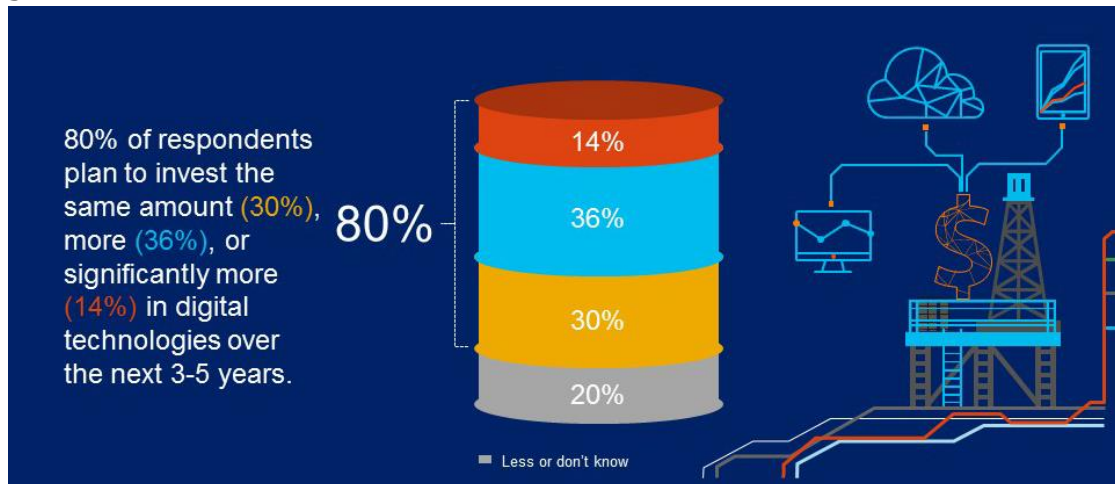
These results are not any surprise. Digital technologies have always acted as catalysts for improved efficiencies, what is changing now are the deepness, speed of change and transformational nature that can be introduced with emerging technologies.

Trend 2:

Despite the low oil price environment, the majority of oil and gas companies will continue to invest at least the same amount or more in digital technologies over the next 3-5 years.

80% of respondents plan to invest the same amount (30%), more (36%), or significantly more (14%) in digital technologies over the next 3-5 years.

3-



Trend 3:

Digital investment today is focused on mobility and the Internet of Things (IoT) — with analytics and IoT predicted to lead the way over the next 3-5 years. Nearly three out of four respondents expect either big data / analytics or the Internet of Things to be their leading digital investment.

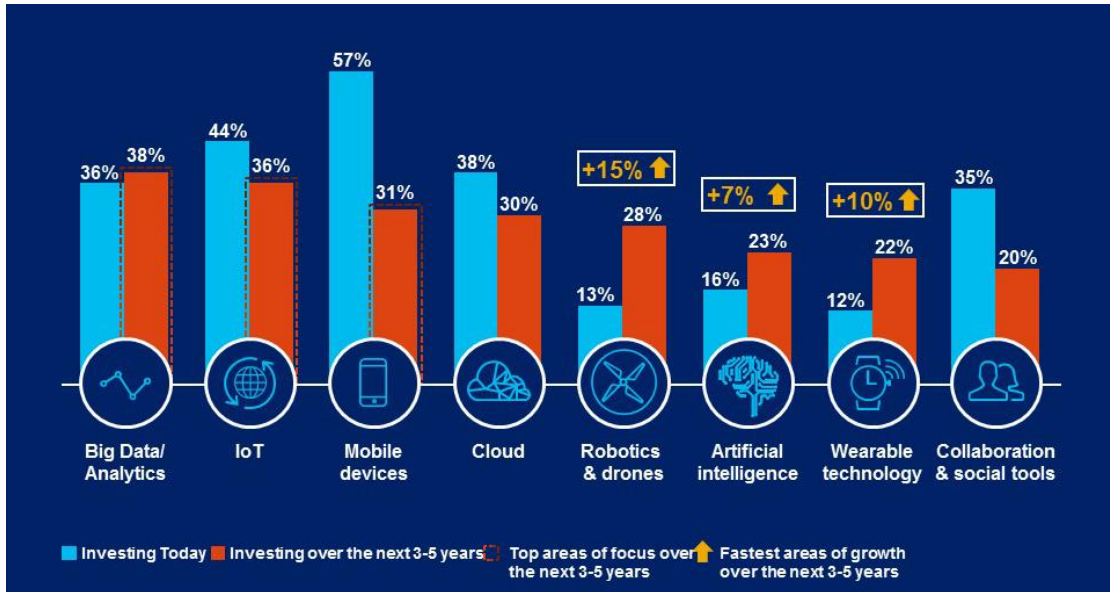
There are two new themes in this year's energy survey compared with past surveys. The first is the internet of things (IoT). Last year 25% of companies said they were investing in IoT, versus 44% this year – this is a significant yearly increase.

IoT was mentioned as having many different opportunities. Firstly it can help reduce surveillance costs. Cheaper edge devices at the well site, cheaper infrastructure such as cloud to process all the data bring collected really creates a lot of opportunities to think about digital oilfields in a new way. The other key trend was big data and analytics: using big data and analytics to take all of the data that companies are gathering and look for hidden insights. Things like taking costs out of chemical spend, or optimizing artificial lift systems. In this kind of environment, it's a relatively cheap and fast way to cut costs.

But it's key for companies to sit back and question how digital technology can help reimagine their business processes. The technology is changing so radically that it is not just by taking something from paper to mobile, or using data in a different way, but fundamentally changing the process, so that they're not just temporarily more efficient, but come out of the downturn sufficiently more efficient.

The fastest growth areas are predicted to be in artificial intelligence, robotics/drones, and wearables. The investment in mobile devices looks to be peaking.

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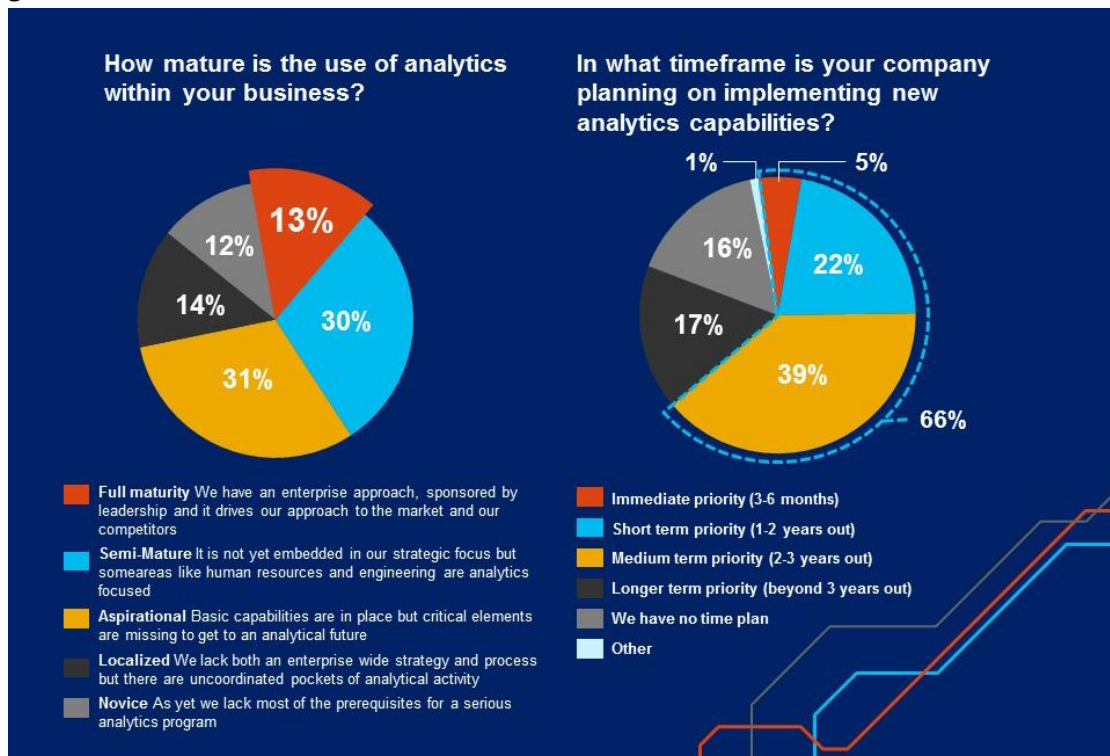
Trend 4:

To realize the maximum benefits of digital, companies will need to rapidly improve their capabilities, including maturity in analytics.

More than a third (36%) are investing in Big Data and analytics today, but only 13% feel that their company's analytics capabilities are fully mature.

Almost two-thirds (66%) have as an objective, to resolve this within three years.

5-



It is well known that data is king in oil and gas, and that is something the industry has long

recognized. For example, in its quest to accurately determine reservoir potential and maximize recoverable oil, the industry has pioneered many highly successful data-intensive applications— from wireline logging to seismic modelling. Business decision makers, however, struggle to fully use the resulting wealth of information. As E&P operations have become exponentially more complex, the volume of data that companies must deal with has soared. Worldwide, sensors now generate upwards of 1 petabyte daily from off shore rigs alone, enough to fill more than 2,000 average-sized hard drives (500 GB) every day. While, on one hand, this data powers robust reservoir engineering and production management, on the other, managerial decision makers often lack visibility on basic information such as operating costs or the daily use of logistical resources. This is because data collection is typically scattered across many systems that tend to be specialized for a single technical function, such as ERP systems for finance, drilling scheduling systems, and logistics planning systems. The lack of integration deprives cross-functional decision-makers of information that can help them gain valuable fact-based insights that could dramatically improve their operations.

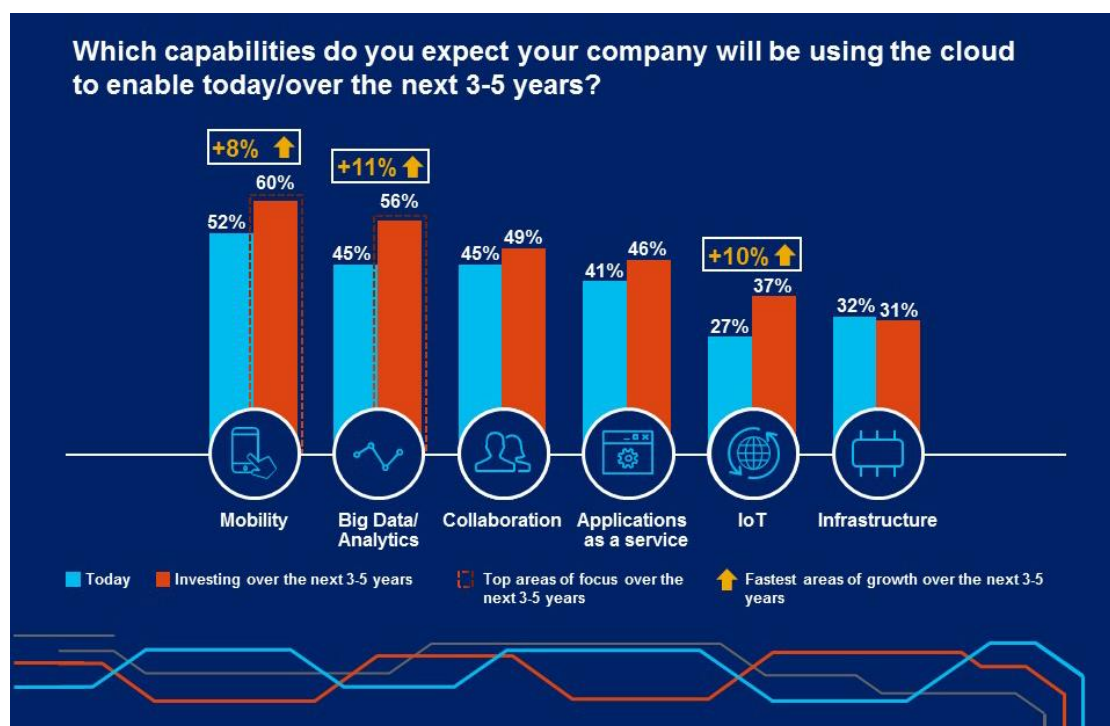
The result is an unfortunate paradox: an industry that arguably pioneered the Big Data concept for reservoir evaluation and production management now lags in the use of information for business decisions.

It is not very consistent the fact that companies agree that there is value in unlocking analytics capabilities, and at the same time very few believe they have already the right analytics approach in place, but surprisingly it is not an immediate priority to solve. This reinforces the idea of a more strategic approach to the new technologies is needed across the board.

Trend 5:

Oil and gas companies are increasingly leveraging cloud technologies to more rapidly unlock the value of other digital technologies - especially analytics, IoT and mobility.

6-



During last year we are witnessing a surge in the use of cloud. The concept of delivering information technology functionality “as a service” over the Cloud is overcoming all the

obstacles and becoming more and more a cost effective option. Mobility services and utilization of analytics/bid Data through out the web have had an important increase since last year.

The use of the cloud, respondents said, has shifted from being used primarily for infrastructure to an enabler of mobile tools. This trend, including the growth of hybrid cloud models, is expected to increase in the next three to five years, as companies keep using the cloud to get faster and more value from other digital technologies.

IoT utilization also starts to ramp up supported by cloud.

Conclusions

Most oil companies have already taken dramatic cost cutting measures to help manage through these turbulent times. Even with these actions, however, many are struggling to effectively operate with their current organizational structure and legacy technology footprint. And cost cutting alone is not enough to position upstream companies to be successful in the future. That is where digital technologies can help.

Over the next three to five years respondents expect the focus to shift to areas that deliver greater long-term value, such as helping them make better and faster decisions. Digital can help upstream companies re-wire themselves to thrive in the new volatile market that we live in today.

For short-term cost reduction, oil companies are implementing digital across a variety of areas. For example, many are moving to "as-a-service" cloud models to reduce IT infrastructure costs; many are adding more mobility in field operations to increase worker productivity and reduces costs; and many are implementing cognitive computing robots in back-office operations to reduce costs and increase efficiency. In addition, some are deploying low-cost Internet of Things (IoT) technologies with analytics in field assets to optimize asset operations and reduce costs.

And for the longer term taking lessons from lean start-ups and from digital native companies, upstream companies have the opportunity to redesign their operating models to be radically lower cost and significantly more agile. Current upstream operating models have served them well over the past few decades, but today there are more efficient models available. If upstream companies can move to this next generation of operation models, they will be able to manage through current challenging times and create the agility and new capabilities to better thrive in the industries future challenging times.

Surviving the new era of low prices requires oil and gas companies to view data analytics as one of their most powerful allies. Fortunately, a new suite of technologies promises to help oil and gas companies gain insights into previously invisible aspects of their operations. By tapping into the huge potential of already available data, companies can identify and capitalize on unexpected opportunities to recover their margins.

Looking forward, companies can unlock even greater value. The more general data analytics trend that is quickly penetrating not only oil and gas, but the broader industrial society. For example, estimates show that productivity gains from the Industrial Internet of Things could increase the rate of productivity growth from approximately 1.5 percent per year in the 2005-2011 period to over 3 percent per year over a span of 15 to 20 years. In fact, the Industrial Internet of Things phenomenon is expected to drive efficiency gains comparable to the Internet itself, and it holds massive potential for the oil and gas sector.

The upstream industry must overcome the paradox of having a wealth of data but failing to exploit it to its fullest. By doing so, not only will the industry ensure its immediate survival, but it will also accelerate its adoption of the Fourth Industrial Revolution.

Today, digital provides the opportunity for upstream companies to redesign their traditional operating models and re-position themselves for future growth and new opportunities. With the current challenges and the pace of change moving faster than ever, now is the time to act. But merely deploying technology does not automatically create economic value. More specifically, using analytics and visualization tools without the proper business context will not produce insights that optimize decision-making. The reality is that successfully implementing a new approach to data value creation requires a cultural shift, a new mindset.

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