



Digital Oil and Gas

Volume I

The Transformation Imperative

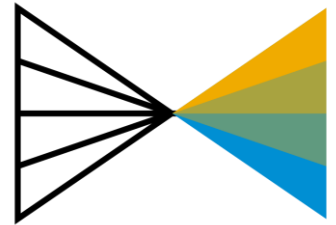


Run Simple

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Commodity prices remain low and are not expected to dramatically increase



Oil and gas organizations must sustainably reduce cost structures



The industry is facing disruption from multiple sources – regulation, alternative energy, global demographics and more

The industry has already extracted as much value as possible from three main areas of cost

1



Reducing organizational headcount

2

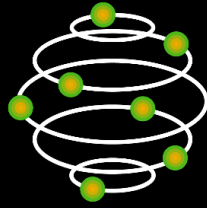


Increasing pressure on supplier pricing

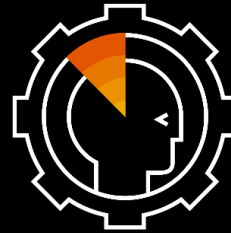
3



Redesigning processes for incremental efficiencies



Connecting things to outcomes with the industrial internet of things



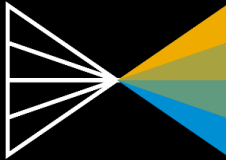
Improving – and automating – decision-making with machine learning



Enhancing efficiency and effectiveness with automation



Transforming the way transactions are performed and documented with blockchain



The next wave of innovation will not be easy - it will require the thoughtful adoption of digital technology

FORWARD CURVE OFFERS NO MATERIAL RECOVERY

The forward curve for West Texas Intermediate oil implies almost no increase in the price of oil between 2017 and 2025

Since 2014, oil prices have been suppressed by excess supply and lower-than-expected demand growth. As of Q1 2017, there's no sign that prices will improve between now and 2025 (Figure 1).

If the forward curve in the graph below is accurate, oil will actually lose value (accounting for inflation) between now and 2025. While there has been short term relief thanks to OPEC production cuts, those cuts are only in place for the first half of 2017. Right now it's unclear what will happen after that.

As prices rebounded to the low-mid \$50 range, rig counts in the US increased, with expected production to coming online in 2017. If it does, prices may drop back down. Therefore, Canadian oil and gas companies must find ways to remove cost from their operations in response to the soft outlook on prices.

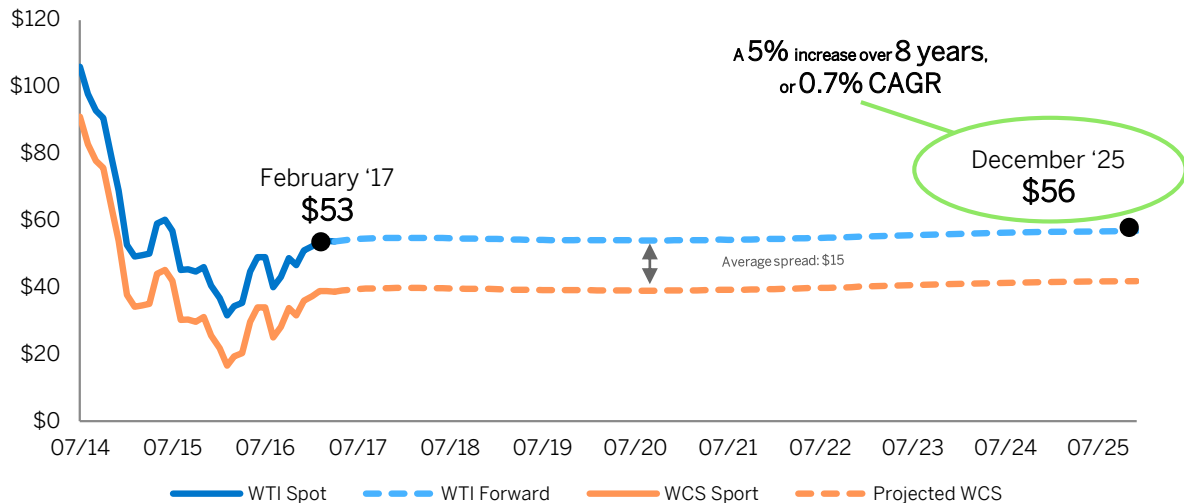


Figure 1 – WTI and WCS Prices

DISRUPTION AT OUR DOORSTEP

The top minds in business and technology are zeroing in on the energy sector

In addition to extreme price pressure, the industry's social license to operate is under scrutiny. Everyone has an opinion on where energy should come from, and perspectives on carbon-based forms of energy.

In the past, it was easier to dismiss alternative forms of energy as being uneconomical or initiated by those who don't understand business. Neither of these things are now true.

Solar power economics continue to improve¹. Some of the world's top business and tech minds are wading into the energy space:

- Example 1: ***Breakthrough Energy***, trust founded by Bill Gates with \$1B to invest in clean tech (see box on right)
- Example 2: ***Elon Musk's investments*** towards electric vehicles and battery technology

Even a small success in the renewable energy space could send shockwaves across the industry. In the end, the tangible impact might not actually be as important in driving change as social sentiment, which alone could cause major shifts in the availability of capital.

Example 1: Breakthrough Energy

Big Players Investing in a Carbonless Future

- Breakthrough Energy is a venture fund with \$1B in capital to invest in partnerships with 20 national governments
- The coalition is using technology to solve energy issues, feed the world and produce goods without emitting greenhouse gases, driving partnerships between governments, researchers and investors
- Members include Bill Gates, Marc Benioff, Jeff Bezos, Michael Bloomberg, Richard Branson, Reid Hoffman, Jack Ma, Hasso Plattner, Neil Shen, Masayoshi Son, Meg Whitman and Mark Zuckerberg
- Coalition members have a collective net worth of roughly half a trillion US dollars, a clear demonstration of their ability to build successful, sustainable industries

Many factors could cause dramatic disruption to the energy landscape. What would happen to your company if prices never reach \$60 again? What if they decreased 25%?

FORECASTS IGNORE DISRUPTION

Conservative forecasts predict flat growth, but small changes could disrupt that and drive a further impact on supply or demand

Price forecasts are based on reasonable estimates of supply and demand. The energy market uses safe assumptions and incremental changes to predict the future, but, by its nature does not include disruptive events.

Forecasts, like any estimate, are subject to sensitivity: a small change in supply or demand could have a large impact on prices.

Supply Factors

Predicting oil supply relies on two factors: what OPEC produces, and what non-OPEC countries produce to contribute to the global oil supply. Current forecasts for both OPEC and non-OPEC

production are fairly modest. OPEC forecasts a 0.5% per year increase over the next 20 years, while non-OPEC production is forecasted to increase by 1.2% in the same timeframe². This could be disrupted in a number of ways, including the demand factors below.

Demand Factors

It is consistently assumed that demand will continuously increase. Predictions of renewable energy, electric cars and alternative fuels are dismissed as immaterial. Current demand forecasts show some decrease in demand from OECD countries, which is fully made up by an increase in non-OECD countries.

What would happen if the standard forecasts were disrupted?

Supply Factor	Standard Forecast	Disrupted Case	Impact on Supply
OPEC growth ²	0.5% annual	0.6% annual	0.6%
Non-OPEC growth ²	1.2% annual, declining at 2027	1.2% annual, no decline to 2040	1.2%
Demand Factor	Standard Forecast	Disrupted Case	Impact on Demand
GDP Growth	3.4%	3%	-0.1%
Fuel Demand	2Mbbls/day reduction	2.3Mbbls/day reduction	-1.36%
Population Growth	0.87% CAGR	0.67% CAGR	-0.2%
Personal Consumption	1.5%	Keep flat instead of growing	-1.5%

If all of these variables were disrupted, it could result in a **4.3M bbls/day oversupply by 2040**

That's **200,000 bbls/day of new oversupply each year**

Figure 2 – Predicting Oil Supply and Demand with Disruption

PREDICTING THE UNPREDICTABLE

Disruptive scenarios might seem far-fetched, but run with the idea that sustainable low cost structures will be key to future success

To give some context, 2014 saw an approximate oversupply of 2 million bbls/day, which resulted in a price drop from over \$100/bbl to \$28/bbl.

Using that as a guide, these supply and demand disruptions imply a price decrease of about 13% a year, from a potential oversupply of 2 million bbls/day by 2040 (Figure 3). While that scenario may be extreme, even if they are only 25% correct there is still downside price risk of about 3.25% a year.

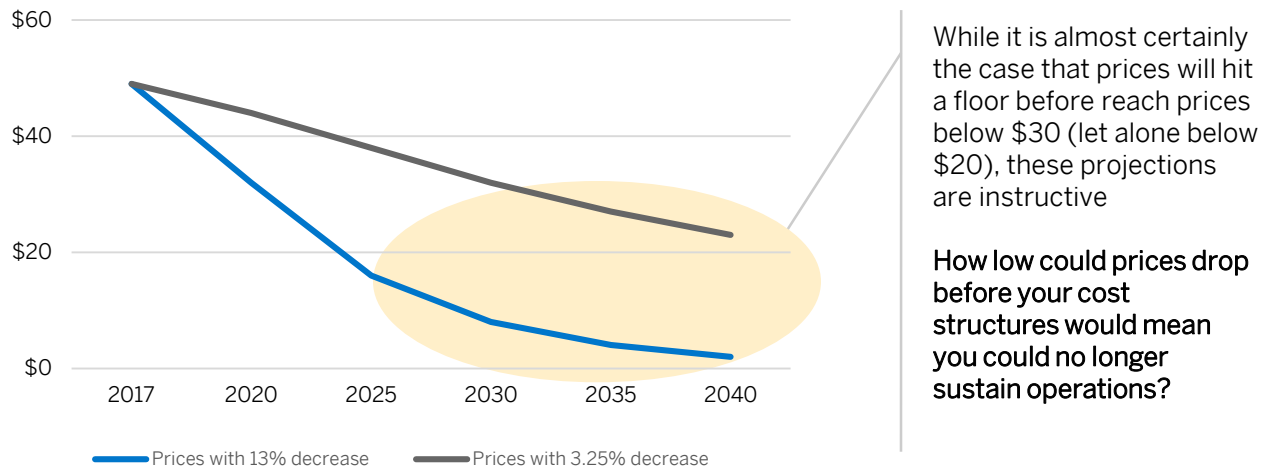


Figure 3 – Potential WTI price projects, based on disrupted supply and demand

RESPONDING TO A LOW-COST FUTURE

Oil and gas organizations have exhausted the traditional methods of reducing cost. The next frontier is improving process efficiency using digital technology

To best respond to a sustained low price environment, oil and gas companies must find ways to reduce costs permanently, not simply in ways that can be unwound as soon as prices increase.

There are three primary cost reduction drivers:

- 1. Headcount reduction:** Since 2014, oil and gas organizations have reduced headcount to baseline levels. The scope of future reductions in this area is limited at best.
- 2. Supplier cost reduction:** When prices fell in 2014, energy companies were quick to put immense pressure on suppliers. Prices fell but are unlikely to yield much more value.
- 3. Process efficiency improvement:** Incremental changes have been made to improve business processes, but full process transformation holds the key to significant cost reduction.

To consider how digital technology can reduce costs and deliver value, organizations should consider three areas of impact:

- 1. Vision:** How does technology enhance, augment, or change corporate or business unit strategy?
- 2. Process:** How does technology impact the organization's ability to automate or innovate its processes?
- 3. Use Case:** What specific technology-driven use cases exist that will deliver value?

Vision

At the strategic level, executive teams must decide how technology can influence their strategies. To many oil and gas companies, this is a question of how technology enables and matures operational excellence agendas across the enterprise. The first step is to establish executive sponsorship, before defining strategic priorities and identifying which processes will best support them.

Process

When deciding which processes technology can improve, two questions must be answered: What is technology's ability to impact a given process? and, should we start our design with process or technology? The answers will provide a framework on which to prioritize process redesign and improvement efforts.

RESPONDING TO A LOW-COST FUTURE

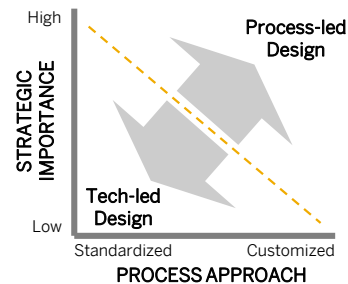
Technological innovation is helping organizations across the globe transform and join a new digital economy

By understanding technology's potential impact on a process, along with the appropriate design approach, processes can be prioritized based on complexity, cost to redesign, and time to value.

1 What is technology's ability to impact a given process?



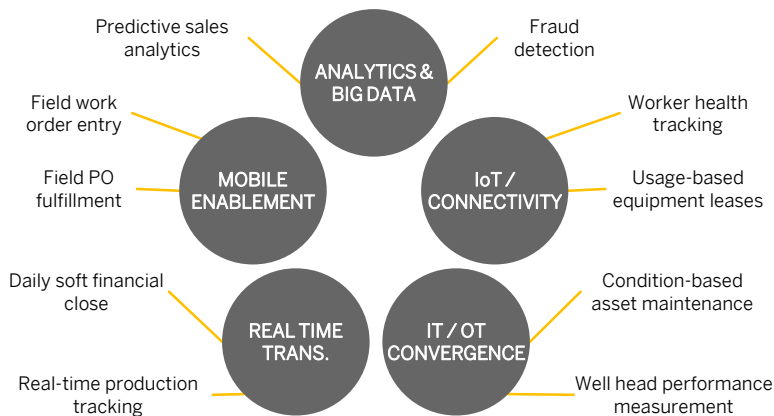
2 Should we start our design with process or technology?



Use Case

Use cases are an excellent way of identifying potential business value of specific technologies in real-world scenarios. One well-executed pilot can pave the way for widespread adoption in all relevant areas.

DIGITAL TECHNOLOGIES ENABLING TRANSFORMATION TODAY



DIGITAL TECHNOLOGIES ENABLING TRANSFORMATION TOMORROW



DIGITAL TRANSFORMATION IN OIL AND GAS

Technology innovations can help oil and gas organization deliver step-change improvements in efficiency, but require a solid technology foundation to begin

While most people are drawn towards the flashy, exciting technologies and use cases, the first step is typically to get a solid foundation of platforms established to build the innovation upon.

Once the digital foundation is in place, it is much easier for businesses to explore cutting-edge digital technologies. There are four emerging technologies in particular that have the potential to greatly improve oil and gas operations (Figure 4) that are new and worth further exploration.

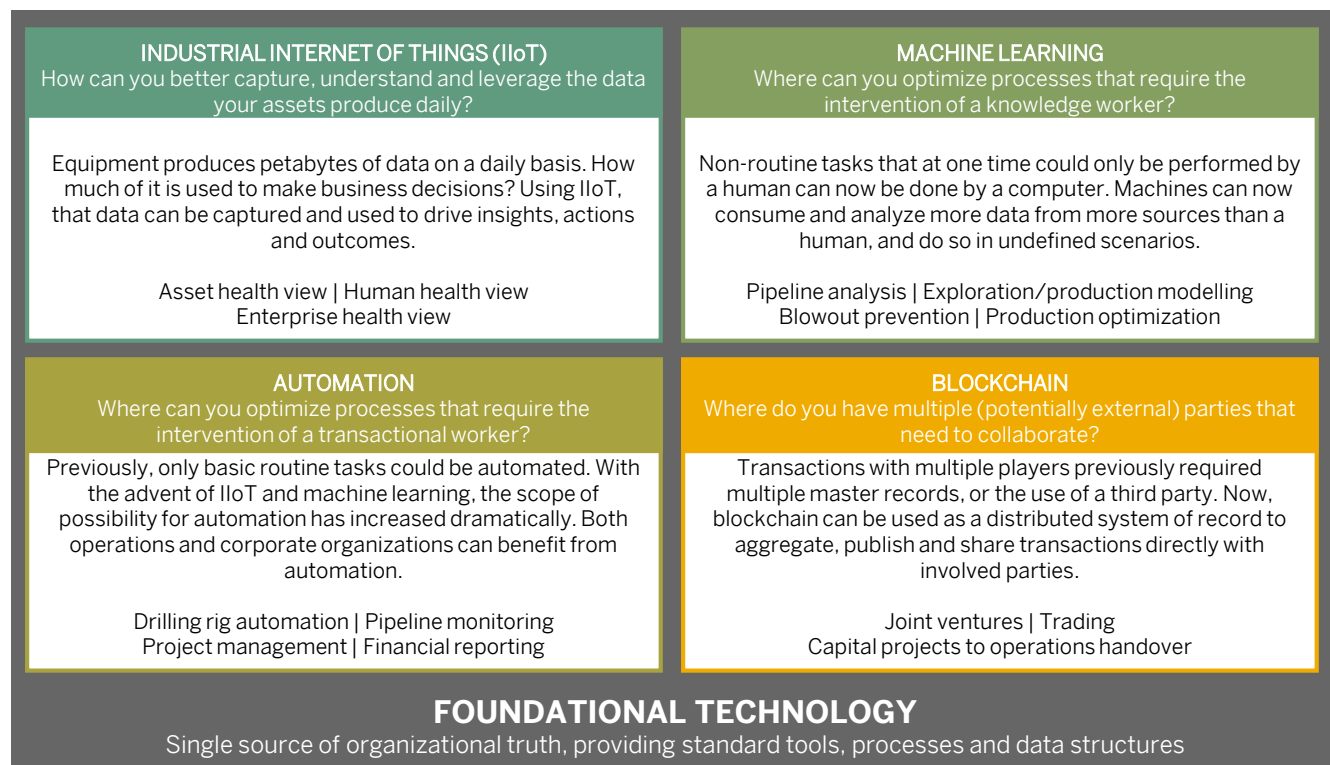


Figure 4 – Components of Digital Oil and Gas

CONCLUSION

There is significant pressure on oil and gas companies – but also significant opportunity

Oil and gas companies need to set themselves up to thrive in a lower cost environment. Pressures from price forecasts, social trends, and new sources of competition are mounting. The good news is that these factors can be predicted. When combined with a healthy respect for unpredictable disruption, there is no question that the most successful oil and gas organizations will be the low cost providers.

An emphasis on low cost is not new, and commodity companies are accustomed to volatility, but the sustained nature of this position is unique. Low cost structures will enable long-term profitability in lower price conditions – and maximize additional value in the upswing. Oil and gas organizations have maximized cost savings in the current paradigm, and now need to embrace digital for the next wave of sustainable, repeatable efficiencies.

Digital transformation in oil and gas means first establishing the foundational single platform required for innovation, then exploring the practical applications of digital trends: industrial internet of things, machine learning, automation and blockchain.

Such an investment in technology may appear on the surface to be impossible in the current market. With lower forecasted oil prices, how can the industry afford to invest? That view is short-sighted. Oil and gas has survived a difficult downturn, and while there are challenges still to come, there is also substantial opportunity for those willing to explore, invest and adopt the next wave of digital technologies to thrive in a new era.

The Transformation Imperative

The Energy Industry has more to invest in Research & Development

- Over the last decade, energy and chemical companies spent less than 2% of their annual revenue on research and development
- This is significantly behind the leading industries such as software and internet (16%-14%)⁴, as one might expect given the source of competitive advantage in those industries
- Even highly cost conscious industries such as industrials and automotive still invest a greater percentage of revenue in R&D (3%-4%)
- What could the energy industry achieve if R&D spending was increased as a percent of revenue by 1%?

REFERENCES

1. D. Frankel, K. Ostrowski, D. Pinner (2014, April). **The disruptive potential of solar power [Online]**. Available: <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/the-disruptive-potential-of-solar-power>
2. Organization of the Petroleum Exporting Countries (2017). **Oil supply and demand outlook to 2040 [Online]**. Available: <http://www.opec.org/index.php/oil-supply-and-demand-outlook-2040/data-download/>
3. A. Evans-Pritchard (2015, November 19). **Goldman eyes \$20 oil as glut overwhelms storage sites [Online]**. Available: <http://www.telegraph.co.uk/finance/oilprices/12006554/Goldman-eyes-20-oil-as-glut-overwhelms-storage-sites.html>
4. PwC (2015). **Comparison of R&D Spending by Regions and Industries [Online]**. Available: <https://www.strategyand.pwc.com/global/home/what-we-think/innovation1000/rd-intensity-vs-spend-2015>

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