

DATA: A MISSION CRITICAL ASSET

In June 2014, oil was averaging US\$120/bbl. Over the last two years, until very recently, it has not been above US\$60/bbl.


There is what you can control, and there is what you cannot. Wisdom, as the saying goes, is knowing the difference, and in the world of midstream oil and gas, wisdom is making and breaking companies.

'Wise' midstream oil companies have recognised that, in the digital era, operational data has become a mission critical asset. When collected and made available in context, this data can reduce their 'controllable margins', guarantee their social license to operate and ensure their survival amid a wave of mergers and acquisitions.

Midstream oil and gas under pressure

The cost per barrel is down and shale oil production rose by almost 10% in 2017. This increase in realised production is forcing midstream companies to operate on razor thin margins. On any given day, the difference between operating profitably and running at a loss is operational efficiency.

The good news: midstream companies can, and have, successfully reduced their controllable margin in logistics by 1 - 5% year-over-year through aggregating, normalising and adding context to their operational data and applying 'layers of analytics' that reduce operational and maintenance (O&M), energy and compliance reporting costs.

A hand holding a pen is positioned over a digital data visualization background. The background features a grid with numerical values and a line graph. The overall color scheme is a mix of blue and red, with a glowing effect. The text is positioned in the upper left quadrant.

Craig Harclerode, OSIsoft, USA, focuses on the role of data infrastructure as an asset to midstream companies looking to survive the current economic pressures and maintain a social license to operate.

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TransCanada, for example, transports roughly one fifth of US demand on a network of 31 000 miles of pipeline. Along its network, it manages 800 compression units across 36 states. The compressor fleet is as varied as it is large – they operate three different types of compressors: some dating back to the 1950s, others state-of-the-art recent models.

These diverse compression units dotting the TransCanada network are essential to operations. They compress natural gas to a specified pressure so it can flow on. The best-case scenario if a compressor breaks: TransCanada’s ability to move and deliver natural gas is compromised resulting in disruptions in supply. The worst case scenario: a rupture, explosion or fire due to the compressor failure.

The critical nature of compression units led TransCanada to implement a programme of Enterprise Analytics, which the company describes as “a real time monitoring system that detects and prevents functional failures on large rotating equipment.” Run by just three

people, Enterprise Analytics handles over 16 000 streams of data and provides an executive level dashboard for critical anomalies, as well as email and text notifications of operations deviating from the norm. This system saved TransCanada an estimated US\$10.6 million through the first three quarters of 2017, based only on reduced parts and repair costs (Figure 2).

These savings result largely from early detection and cost avoidant intervention. In one instance, Enterprise Analytics alerted TransCanada to a discharge temperature in a ‘Tier 1’ compressor – which represent the most commercially valuable components of operations – that was rising above its set parameter. With the alert, TransCanada was able to schedule maintenance on the valve before a catastrophic failure and costly unplanned downtime. In another case, Enterprise Analytics notified operators of a rising temperature that turned out to be a cracked main shaft bearing. They intervened early and replaced the bearing, sparing them a larger US\$4 - 5 million expenditure had the crack gone undetected.

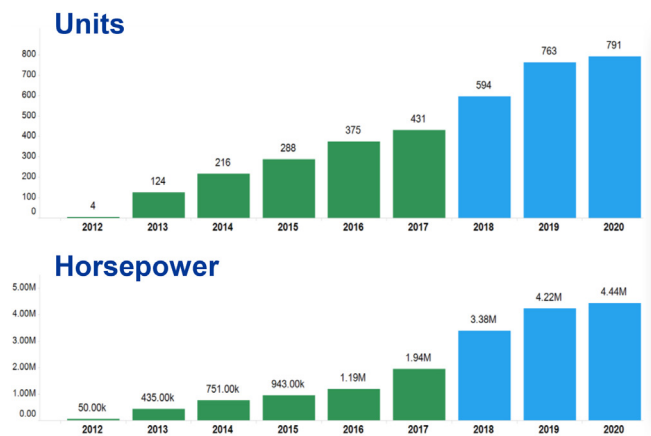


Figure 1. TransCanada continues to rapidly expand its capacity.

Social license to operate

The benefits of a digital infrastructure go beyond cost reduction. The rise of unconventional drilling, especially shale production, has increased the supply of oil and gas flowing through North America’s midstream infrastructure. The pressure for more capacity to flow through the same pipeline has increased the risk of oil and gas spills and increased public concern around the environmental impact of midstream pipelines.

The rise in risk and public visibility is pressuring midstream companies to verify well and pipeline integrity if they want to maintain their social license to operate. This social license to operate is conditional on public trust and government permission, both of which depend on asset integrity and protection of the public and the environment. In short, the social license to operate mandates operational excellence, and a reliable data

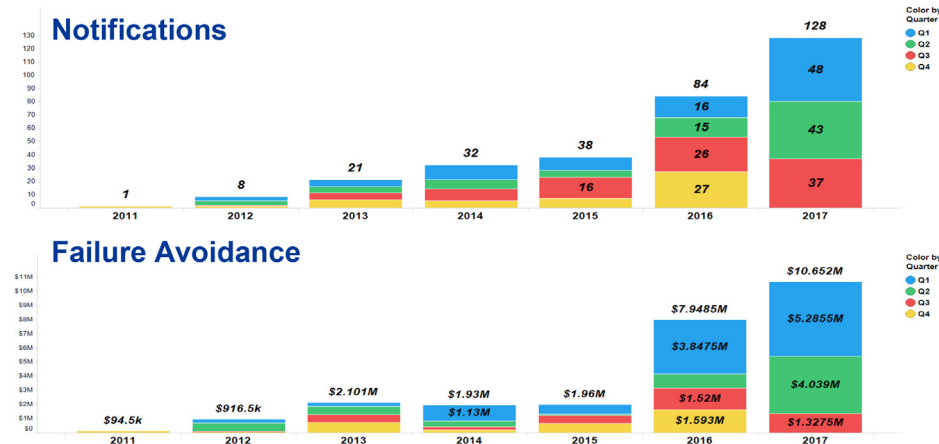


Figure 2. Failure avoidance costs for TransCanada’s Enterprise Analytics anomaly detection. Estimates were calculated conservatively on the basis of a commercial impact of 30% the current parts and labour.

infrastructure provides the visibility and transparency necessary to maintain public trust and regulatory compliance.

With thousands of miles of pipeline traversing remote landscapes, Columbia Pipeline Group (now part of TransCanada) faced an operational challenge in November 2014 when the Polar Vortex dropped temperatures to below 40°F in the northeastern US. These temperatures were some of the lowest on record since 1976. The cold weather also spiked demand for natural gas in affected states. Throughout the Polar Vortex, Columbia Pipeline Group kept gas flowing without a single service disruption by

utilising real time information to understand the state of the network and make operational decisions.

Survival of the fittest

The rise in unconventional oil and gas exploration upstream has fuelled mergers and acquisitions across the North American midstream industry. Operational data plays a key role in these mergers in two ways. First, companies who treat operational data as an asset lower their total cost of ownership, giving them a healthier balance sheet and enough cash flow to want to go shopping.

In addition, a sound operational data infrastructure makes it easier and less expensive to absorb another entity. When it comes to the data used for operational decisions, mergers and acquisitions can be extra messy.

For example, Kinder Morgan is currently the largest publicly traded midstream company. The company, which started 20 years ago with an initial value of US\$325 million, has grown to manage 69 000 miles of pipeline primarily through acquisition. In 2005, the company acquired Terasen for US\$5.6 billion; in 2012, El Paso Cooperation for US\$38 billion; in 2013, Copano for US\$5 billion. Each of these acquisitions came with its own data solutions and software, as well as a taxonomy and lexicon for assets.

The digital value chain

What does the future look like for midstream oil and gas? The industry is likely to see a surge of capital lite business models as more smart equipment comes to market. Rather than buying assets, midstream companies will lease from equipment vendors who will own and monitor the assets, leaving midstream companies to focus on logistics with less overhead.



Figure 3. Hydrogen production plants: corrosion occurred because hydrogen bonded with carbon in the steel. Through fault detection analysis, MOL was able to get uptime back to 97%.

Data from midstream assets will also become increasingly valuable to the entire digital value chain from downstream to upstream. In one recent example, a US midstream company is working with two upstream companies to set up data and analytics sharing. These companies are forming a complete digital value chain, opening the possibility for a data and analytics strategy that can track oil and gas supply from initial exploration to market consumption.

Digital transformation – where to start?

MOL Downstream, one of central Europe's largest downstream companies, operates across 13 countries. Over the past five years, the company has realised an estimated US\$1 billion in increased earnings before EBITDA through data initiatives. Its approach provides important lessons for successfully embarking on digital transformation within large oil and gas enterprises.

MOL's story begins in 2012 when the business recognised that it would need to transform its operations if it were to survive in the competitive European market. MOL worked to establish a digital twin of its operations, and treated data as an asset that could catalyse smarter and more predictable operations. The company focused on concrete initiatives, such as predicting corrosion to reduce high temperature hydrogen attacks. As the first initiatives delivered concrete return on investment, MOL moved from predictive operations to management by exception, using data to automate decision making. Currently, MOL generates 80 billion data points per year. The company has also had its first successes with Big Data and machine learning on Microsoft Azure to predict the impact of sulfur levels in various desulfurisation units and increase its DCU yields by 2%.

MOL's success provides important principles to launching a data initiative:

- Build out a digital infrastructure that mirrors the physical infrastructure.
- Treat operational data as an asset.
- Start with concrete initiatives that address business problems with clear value and return on investments.
- Learn from each initiative, iterate and extend the infrastructure to more advanced analytics, including the edge and cloud.

Conclusion

Data is an asset few are using, but it holds the key for threading the many competing interests and succeeding in the future. How well a company controls their 'controllable margin' comes down to how well they manage their data.

For midstream oil and gas, and many other traditional industries, if you want to control your destiny in the digital age then you have to control your data. 