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OIL & GAS

Empowering the data consumer with data excellence

The five steps to scale data operations to deliver operational ROI from AI.



A clear direction

For the oil and gas industry (O&G), it's becoming increasingly difficult to predict the future, even in the short term. Prices are volatile and trading relationships are uncertain, but fossil fuels continue to <u>dominate</u> <u>energy demand</u> despite the drive toward a low-carbon sustainable future.

However, there is one prediction that we can confidently make: Digital technologies, just as they have in other industries, will transform all aspects of the O&G supply chain – disrupting business models, opening up new opportunities, and delivering efficiencies.

The idea that heavy-asset industries are too complex and risky for digital no longer holds. Instead the number of firms actively considering digital technologies such as artificial intelligence (AI), robotics, and analytics is growing, as business and IT leaders formulate strategies to counter uncertainty and boost their competitiveness. Leading research indicates how much this transformation is already gathering pace. In PwC's 22nd Annual Global CEO Survey, nearly 80% of O&G executives said they "agree or strongly agree" that AI will significantly change the way their companies do business in the next five years.

And more than 50% plan to implement or have already implemented some aspects of AI in their operations – just as the timeframe for realizing the benefits shortens. <u>McKinsey research</u> shows that up to 50% of work performed today can already be automated with currently available technology, with efficiency gains of 20-40% delivering positive ROI in 12-18 months.

PwC's 22nd Annual Global CEO Survey



80% of O&G executives agree or strongly agree AI will change how they do business in the next 5 years <u>50%</u>+ of O&G executives plan to implement or have already implemented aspects of AI in operations

<u>Up to **50%**</u> of today's work can be automated using existing technology

The value of streamlining project management, operations, and the supply chain will be enormous. In fact, the promise of digital technologies is an <u>estimated</u> <u>\$1 trillion</u> in capital and operating expenditures savings over the next seven years.

O&G companies cannot afford to be complacent about digital. Business leaders are already recognizing that those who establish a lead over their competitors will have a significant advantage, and they are actively seeking to disrupt their sector rather than waiting to be disrupted.

KPMG's 2019 annual CEO survey

revealed that 63% were on the disruptive front foot, versus 54% in 2018.

Despite the clear benefits of digitalization, many O&G companies are struggling to bring their transformation efforts to fruition. The main obstacle is their inability to scale. It's a common experience for firms to find themselves stuck at the pilot phase with no means to develop further as a large-scale operationalized project.

This limits digitalization to oneoff solutions designed to tackle isolated obstacles without improving end-to-end processes. Each project, and its data, is stuck in its own silo, making scaling impossible.

To break free from this constraint, O&G companies will need to rethink their approach to digitalization, starting from its most basic foundation: the fundamental level of data. Data is the lifeblood of digital, and it is the quality and availability of data that will underpin successful digital transformation at scale.

Digital excellence depends on data excellence – the ability to turn raw data into meaningful insights across the organization.

Yet many O&G companies lack the ability to manage and process data at the level of scale and complexity to achieve data excellence. In this guide, we show you what steps you need to take to achieve maturity in this foundational capability, so that your organization can move forward toward unlocking the benefits of digitalization.

What is data excellence?

Data excellence represents the highest level of data maturity. It is the foundational capability of digital transformation – without data maturity, it is not possible to achieve digital maturity and the operational efficiencies it promises.

What does data excellence mean in the context of O&G operations? Most firms don't suffer from a lack of data – they have an abundance of it. The problem is that it's just raw data stuck in silos, which means it can't be easily accessed, made use of, or understood by the people who need it and the digital processes that rely on it.

Data excellence means making this data understandable and actionable – by getting the right data in front of the right person at the right time and in the right context. Data excellence is about connectivity, accessibility, and contextualization. All the disparate data sources within an organization's IT stack – including data lakes and data warehouses – need to be connected. This liberates data from its silos and makes it securely available to authorized users across the organization.

For this raw data to become useful, it needs to be put into context – to be made meaningful. This is how data becomes information, from which data consumers can develop actionable insights that enable intelligent decision-making.

COGNITE

Data excellence puts the data consumer at the heart of data management.

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NODE 04

NODE 05

BLOCK 01

NODE 02

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Who is the data consumer?

Data excellence expands the scope of data management beyond databases and their administration to include modern data consumers and their diverse use cases.

The main bottleneck to digitalization efforts in O&G has been the failure to push beyond the standard cloud data lake. These vast amounts of expensively extracted and stored data are rendered unusable to anyone outside the data lake project team itself (and too often remain useful in only a very limited way to that team, as well).

However, data is only valuable if it's accessible, readable, and open for connections to other relevant data.



It has to be meaningful to the people who will rely on it to make strategic business decisions, whether technical, operational, or financial. These are the data consumers.

Data consumers need to use data more objectively and at scale to make better decisions. A use case example could for example be how to increase accuracy when deciding where to open up new wells.

This process involves high-risk, high-reward decisionmaking, where most choices result in drilling a dry well. A small increase in accuracy, even of just 1%, delivers a huge gain. There is a lot of data available to inform this process – drilling measurements, seismic surveys, chemical surveys, electromagnetic surveys, and so on. But it needs to be integrated between the various disciplines and readily accessible to domain experts, so that they can combine it in new ways to reveal new insights.

These data consumers need to be able to easily import and export the same data between tools to arrive at the answers they seek.

Only data excellence will enable them to do this.

The five key steps to data excellence

Developing data maturity involves addressing these five critical issues:



Data consolidation



Data management



Data quality



Data modeling



Data contextualization

1. Data consolidation

This first step in the process involves eliminating data silos by integrating data from across the organization so previously isolated departments and functions can connect to it and connect to one another.

This means getting full visibility of all your data – not just what the organization generates itself, but from what it harvests from other sources as well. Data from your assets and equipment, your people, your processes, your locations, your partners and suppliers – all connected, all up-to-date, all readily available to those authorized to access it.

When data is consolidated, data consumers can access and share the same real-time and historical data to compare and contrast ongoing performance. Liberating data from silos also liberates data consumers from the constraints of limited data access. Consolidation empowers data consumers to analyze data, interrogate it, and turn it into actionable insights – and most importantly, it enables them to scale benefits to other parts of the organization where there are overlapping needs, such as between operations and commercial operations, for example.



2. Data management

Data excellence reimagines data management so that it's no longer only about administrative processes related to acquiring, validating, storing, protecting, and processing data; or about IT products such as data warehouses, master data management solutions, and identity and access management tools.

It moves data management beyond databases into every conceivable platform for storing, accessing, processing, and integrating data. It includes metadata requirements and operating system compatibility.

This change has occurred with the shift in focus toward empowering the data consumer. With the demand for accessibility and connectivity across a complex, vast, dispersed data landscape, data management now needs to include:

- **Operational systems data**
- Unstructured data
- Visual data

In this way it can cater to a new group of data consumers – business application developers – who focus on production optimization rather than financial modeling.

Data excellence means opening up data management to wider groups of "citizen" data consumers, such as citizen data scientists and citizen developers.



This democratizes data management by enabling everyone to perform some data management tasks. To that end, facilitating access to underlying data stores will become a thing of the past, replaced by metadata of API-defined citizens and professional resources in all data consumer languages.

Furthermore, data management also needs to involve figuring out how artificial and human intelligence can complement each other. New challenges will arise, such as supporting microservices architectures and designing for machine learning and deep learning workflows, including write-back of synthetic data from directly hosted or orchestrated models.

3. Data quality

High-quality data is a prerequisite for data excellence. Data needs to be understandable to humans and machines, and available in the right form when it's needed. And it has to be trustworthy, especially for surveillance and optimization purposes.

This means that there must be good syntactic data quality with the correct metadata field names and mappings as well as a proactive approach to maintaining data quality – with alerts sent to the relevant user when the quality deviates from predefined parameters. Again, there will be a change in focus to data consumers and how their use cases shape data quality perspectives. Data quality will be organized around data kit management, process optimization, and building and managing data pipelines.

Data quality needs to be monitored at every stage of the data pipeline – from ingestion to:

- Management
- Contextualization
- Data maintenance

4. Data modeling



Efficiency gains in heavy-asset industries like O&G will only be realized through greater automation, with the ultimate goal of autonomously operated assets.

However, very few O&G assets have been built to run autonomously, which means that many existing assets will have to increase their digital maturity often from a very low base – manual, paper-based processes are still common place. The process they will need to follow involves scaling up and interconnecting successful automation use cases.

The core capability that enables this shift is data modeling – where both machines and humans read and apply highquality data to develop models of components, processes, and assets to test hypotheses and discover process and performance gains.

Opportunities to scale are unlocked by the ability to manage the interconnected nature and complex versioning of these models.

In this way organizations can develop an overarching view across their functional and process silos – an important step on the path to full automation. By interconnecting more and more sophisticated models, companies will follow the process that eventually results in an operational digital twin – a key competency that further allows the organization to innovate and optimize its assets.

5. Data contextualization

Contextualization is the final stage for achieving data excellence. It involves adding human- and machine-readable meaning to data through linkages – structuring data alongside other relevant data in the form of process diagrams, 3D models, and events data, to name but a few. Contextualization delivers an operational digital twin of an asset or system.

Contextualization of data, and governance of data kits supporting digital applications, are key contributors to enterprise scalability of application portfolios. It is imperative to reduce the time, effort, and resources required to find relevant data, deploy additional models, and configure monitoring, as applications are scaled from one asset (pump, well, or other) to many.

Data excellence and the resulting operational digital twin provide organizations with real-time insights and business intelligence on which to base their decisions. They enable faster responses to adverse events, improvements in worker safety, predictive maintenance, and production optimization. Deloitte estimates productivity and efficiency gains worth \$40 billion across the industry as more organizations achieve digital maturity.

The use of digital twins is a major disruptive trend, where <u>half</u> <u>of large industrial</u> <u>companies</u> will have adopted them by 2021, according to Gartner. "As an exact digital replica of something in the physical world, digital twins are made possible thanks to Internet of Things (IoT) sensors that gather data from the physical world and send it to machines to reconstruct. While the concept of a digital twin has been around since 2002 when Michael Grieves at the University of Michigan first used the terminology, it was IoT technology that made it affordable and accessible to many more businesses.

By creating a digital twin, insights about how to improve operations, increase efficiency or discover an issue are all possible before it happens to whatever it's duplicating in the real world. The lessons learned from the digital twin can then be applied to the original system with much less risk and a lot more return on investment."

Forbes

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Conclusion

Contextualized, meaningful data is often described as the last frontier of data management. To the many data scientists who spend up to 80% of their working time stitching together data from various components, that idyll of data excellence must seem a long way off.

However, there is a solution that some progressive O&G firms have already adopted to chart a path towards data excellence – Cognite Data Fusion (CDF). This unique collection of microservices provides Contextualized Data-as-a-Service – the key to achieving data excellence and unlocking the benefits of industrial AI.

Cognite Data Fusion can aggregate and contextualize any O&G data, from any system. It liberates data from its silos and makes it securely accessible to those who need it in real time, even if they are working across different systems, and with different tools. All data across the organization can be controlled from CDF and its intuitive user interface.



Contextualized, meaningful data in Cognite Data Fusion opens up opportunities for deeper analytics and improved visualizations to widen the scope for automation and optimization, and empowers data consumers to make more intelligent decisions with data that they can easily search and understand.

It also enables these consumers to develop applications, expand their use of AI, and scale their solutions faster.

For heavy-asset industries like O&G, Cognite Data Fusion is the key to achieving data excellence, enabling organizations to scale up digital transformation initiatives and deliver consistent, costeffective operational excellence.





How close is your O&G organization to data excellence? Get ahead of the competition with Cognite Data Fusion. See for yourself how advanced insights and integration can scale up your digital transformation now.

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