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Digital Transformation in the Oil and Gas Industry - Learning from Others



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1. Executive Summary

Digital Transformation changes business and operational models through the exploitation of new trends in technology and data including automation, big data analytics, cloud infrastructure and the Internet of Things.

By harnessing such advances, digitization creates organizations that make better decisions (lower risk), are more customer-focused, more responsive, more cost efficient, and overall are higher performing.

For this reason, digitization has become critical to survive and thrive in sectors that are either highly cost-competitive (e.g. Retail), highly cost constrained (e.g. Government), volatile (Finance), or a combination of these (Commodities). Digital transformation methods and approaches have quickly matured in such environments and already best practice and success stories are emerging.

The oil and gas industry has made significant investment in digitization in key operational areas including drilling and production, as well as asset management. However, the industry lags behind other industries in terms of the implementation of widespread integrated digital technology to drive workflow automation.

With the recent downturn in the industry driven by significantly lower commodity prices, a large number of experienced personnel have left the oil and gas business and are unlikely to return. While the market and political forces that negatively impacted oil prices may abate for a period, it is clear that they will not go away and price pressures can return very quickly. Companies will need to become much more efficient in order to remain competitive in a world with lower long-term prices, reduced access to 'easy' oil, and increased pricing volatility.

In such a competitive and cost-constrained environment, Oil and Gas companies must overcome the constraints of such a legacy. Those that do survive and grow will be those that most quickly learn and apply the lessons from other sectors and realize the benefits from their own program of digitization.

This White Paper will explore the key challenges facing the oil and gas industry that have already been addressed by other sectors and how the key technologies, organizational structures, and methodologies that have been adopted in these industries create a foundation for efficiency that can benefit oil and gas companies.

2. Challenges Facing the Oil and Gas Industry

The Oil and Gas industry currently faces a number of broader challenges:

- **Resource replacement.** The ‘easy’ oil is gone. Innovation is now key to the identification of new opportunities and to be able to extract commercial hydrocarbons from existing, known reserves including unconventional.
- **Price pressure.** Companies need to look for efficiencies at all phases of the Well lifecycle to reduce costs and enhance recovery rates from reservoirs. Small percentage changes can make a big difference to the bottom line.
- **Geopolitical uncertainty.** Prices are not forecast to return to high levels of recent years for a long time, if ever. It is evident that prices can fall rapidly, and driven by events that are beyond the control of organizations and not subject to predictable economic influences.

These are compounded by further challenges in the way Oil and Gas companies manage their systems and data relating to exploration activities:

- **Exploration systems are siloed and dis-jointed.** A smooth joined-up workflow where data passes seamlessly from prospect appraisal to production, remains an aspiration for most companies, who are struggling to implement master data management.
- **Many of the processes for the exchange of data are manual.** Current data workflows are cumbersome, time-consuming and highly dependent on skilled staff. There has been a large exodus of people from the industry due to the downturn of the last 18 months, and there are yet more people preparing to leave through retirement over the next couple of years. There needs to be a push towards the automation of routine processes to accommodate fewer people, and to improve the reliability of data exchange and integration.
- **Lack of standardization across data suppliers.** Companies frequently purchase exploration data from a variety of suppliers, all supplying in different formats and to different standards. All too often, the burden of integrating and conflating this data falls to the Oil and Gas companies themselves, who are ill-equipped to respond.

3. Why has the Oil and Gas Industry not addressed these challenges in the past?

The data challenges the industry is facing are not new. While painful, they have been historically more tolerable owing to:

- A reduced focus on efficiency when oil prices were high. These have driven companies to focus on drilling more and more with less of a focus on the efficiency of those operations – Oil and Gas is an information-rich business, it needs to learn from other industries that are also information-rich how to exploit that information.
- The focus has been on driving innovation within specific groups and has not taken a more holistic view of the enterprise. Innovation, is technically challenging and,

particularly in large organizations, requires the cooperation of departments that have traditionally operated as fiefdoms with little incentive to collaborate.

- A tendency towards big bang solutions that are big on promises, take forever and then come up short on actual delivery. Numerous attempts have been made to address exploration data management in the past but the initiatives end up being huge, expensive, and unwieldy and they are often too driven by IT rather than the business. Companies then tend to run out of patience when results are not forthcoming or they reorganize.

4. What can the Oil and Gas Industry learn from other sectors?

Many of these challenges are not unique to the Oil and Gas sector. When striving for positive change to data and information management practices, there are many practical learnings the industry can adopt from other sectors.

- To start, Oil and Gas companies need to become more innovative in looking for new opportunities and taking advantage of the opportunities that they have. Key to this is encouraging staff in the business rather than IT to engage in developing solutions to the problems they face, owning those solutions, and prioritizing incremental improvements towards a longer-term vision. Oil and Gas companies also need to become more efficient from both an operational and an organizational perspective. New IT systems alone will not make you more efficient. Too often new systems have been bolted onto existing outdated and inefficient processes, resulting in little, if any, improvement. To deliver real benefit, improvements in organization, processes and systems go hand in hand.
- Outside of Oil and Gas, companies are achieving this change through programs of digitization and integration. In order to achieve this, there has been a discernible move towards digital transformation across sectors including finance, government and retail to name a few – fuelled through developments in cloud, big data and analytics.
- In particular, this has been seen over the last 5 years within the UK, as well as Australia. Both countries are pushing forward with the Digital Transformation agenda, and realizing the benefits. Comparatively, outside the tech industry, the US lags somewhat behind. There are also some early signs of digital transformation within the Oil and Gas industry, as a small number of organizations begin to digitize their work and look at new ways to gain advantage with better data management and analytics, but generally the Oil and Gas industry has been slow to appreciate and capitalize on the benefits.

5. What do we mean by Digital Transformation (DT)?

Digital transformation has acquired a broad meaning, but the following attributes are characteristic:

- DT is the broader transformation of business activities, processes, competencies and models to fully leverage the changes and opportunities of digital technologies to deliver a better and more efficient organization.
- DT is not just about the technology, and you must always put the user need and business outcome first. In fact, user need is crucial to the whole process – what are you trying to transform, for what purpose, and for whom? A key lesson for Oil and Gas companies here is that unless staff are genuinely engaged in designing new digital systems and services, the impact and benefit won't be felt across the business.
- DT is also about changing business process to take account of efficiencies of digital systems – it's not about adding new systems to inefficient processes. Organizations don't improve on performance by just adding a new system into an existing process that isn't optimized for digital working. This is why the business (and not IT) must design, own and lead the change.

A key lesson in successful DT that can be taken from the experience of other sectors is the need for commitment of the organization at the highest levels (not typical in Oil and Gas):

- DT needs boards and VPs from the business to be fully on board and understand the importance of technology within their business, and understand that it's their responsibility, not just that of the IT department. A culture change is required.
- DT needs Business Champions, driving and owning change, and delivering lasting improvements. While IT teams can facilitate delivery of technical systems, only the business can drive and implement improvements (too often historically, IT has been tasked with pushing improvements onto the business – this simply does not work).
- DT also needs clear governances and leadership, delivery planning, a way to measure results as transformation progresses, and use those measurements to test hypothesis and continually learn and improve. To facilitate this, DT typically uses Agile methods that are more suited to continual learning and improvement, and dedicated roles such as Product Owners to champion user needs. DT also adopts DevOps models for systems support, ensuring that systems are kept aligned with changing business needs.

6. What are the benefits of Digital Transformation?

There are many benefits of getting Digital Transformation right. These include:

- Greater operational efficiency – put simply, achieving more with less through the marriage of efficient operations, processes and systems.
- Faster and more responsive business operations – having the right information for decision making available at the right time.

- Making better use of data and information holdings – for example, applying data analytics techniques to better understand exploration prospects and production efficiency.
- Having better cross-department communications and collaboration – digital services can help an organization become less siloed, share data, information and services and improve collaboration.
- Improved staff satisfaction, retention and attracting the best talent – people want to be part of an organization that is high performing, successful and an industry leader.
- Automation of more routine tasks – freeing staff to concentrate on higher value activities for the organization.
- Improved standards and consistency across the organization – providing better frameworks for staff to collaborate.

7. Example – Applying Digital Transformation to Well Lifecycle Data Management

One area that remains a significant challenge, yet offers tremendous opportunity to realize benefits through digitization, is integrated planning and operations. The business workflows are well understood and have been developed over the course of many years. However, these workflows involve many different departments, disciplines, processes, and (critically) applications.

- Well lifecycle management has traditionally been a harder area to manage. It presents a good example of how the Oil and Gas sector could benefit through Digital Transformation
- There is a well-defined and understood Well lifecycle involving the activities of many different disciplines and departments. Each of these has its own responsibilities and processes for making decisions that feed into the next group and the next phase of the lifecycle. However, currently, each group uses its own preferred application software and maintains information within those applications. They need to feed information to the next group, and the next phase of the lifecycle. This is typically where problems occur as standards have not been established for the governance of the data and the management of that data. Mistakes are made during the transfer and the transfer tends to be very manual and time consuming.
- Digital Transformation can join up all parts of the Well lifecycle with one system mastering and managing the data which different groups of specialists then use and interact with, including specialist systems where appropriate.
- We believe significant competitive advantage and cost efficiency opportunities remain untapped across the Well lifecycle, where large volumes of complex data are held in siloed, legacy infrastructure, connected, at best, through customized solutions that attempt to integrate specialist systems and operated within labor intensive

organizational and governance models and processes that were designed for another age.

8. Summary and Conclusions

In summary:

- Digital Transformation offers real potential for efficiency and performance improvements in Oil and Gas companies.
- The Oil and Gas industry must look outward and learn from others – continued low commodity prices demand greater efficiencies, as do investors, well aware of the benefits gained in other sectors.
- Digital Transformation demands a different approach to the way the Oil and Gas industry has traditionally approached IT – it needs better leadership, governance and user engagement from the business, a focus on benefits measurement and continual improvement, and also delivery methods better suited to continual learning and improvement – for example Agile and DevOps practices. Above all, it needs a holistic approach that considers organization, operations, processes and systems as intrinsically linked.
- There are many practical areas where Oil and Gas organizations can apply digital transformation techniques to make a real difference – Well Lifecycle Management is one of many, but a good example of where digital transformation techniques can deliver lasting change and value.

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