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The Great Data Transformation: How the Industry Is Capitalising on Digitalisation

Part 2 : Real-Life Examples from Shell, Transocean, and SBM Offshore

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In the first part of this paper, we explored how TransCanada, Petronas, and ADNOC Onshore have successfully embarked on a digital transformation with real-time operational data. Now, we'd like to share the success stories from such leading industry players as **Shell**, **Transocean** and **SBM Offshore** who are achieving similar transformational gains from real-time data using the OSIsoft's PI System.

Shell's Journey Towards Advanced Analytics

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For many years, Shell has been an innovator and leader in the application of digital technology for improving oil and gas operations. Two decades ago, Shell installed OSIsoft's PI System to collect sensor-based data from its assets. By 2009, the PI System was at the very heart of Shell's digital oilfield solution known as "smart fields," enabling asset modeling, hydrocarbon accounting and real-time collaboration. Four years later, the Anglo-Dutch super-major signed an Enterprise Agreement with OSIsoft to accelerate the benefits from the PI System across the entire company.

Today, the PI System plays a critical role in managing Shell's huge repositories of operational data as part of its 'Smart Foundation' platform. So reliant is Shell on this technology – with over 7.5 million connected devices and reporting a significant amount in cost benefits – that in 2017 the company extended its existing Enterprise Agreement with OSIsoft to encompass even more areas within its operations.

Shell is increasingly recognising the huge value that can be realised by applying advanced and predictive analytics to its operational data. The oil and gas giant now has a team of 80 data scientists who are focused on solving complex operational problems.

Shell's data scientists work very closely with PI System experts at the company's PI Centre of Excellence (CoE), managed by Peter van den Heuvel, throughout the process. The PI CoE team relies on OSIsoft's Asset Framework (AF) to take raw operational data from the field and apply meaningful structure and context

to the data streams coming from millions of pieces of equipment. With Asset Framework, data is presented in terms of a uniform, easy-to-build hierarchy of assets, rather than as constantly measured strings of sensor readings, which can be hard to understand and use.

Once the data is contextualized through Asset Framework, it is delivered to the data science team for advanced analytics and machine learning. The results of advanced analytics are then deployed back into Shell's Smart Foundation platform, allowing other applications and users to leverage the advanced algorithms and valuable information on which they can act.

Rather than leaving the pursuit of advanced analytics entirely to data scientists, PI System experts and engineers are also bought into the process. "Magic happens in the blends of discipline," said Dan Jeavons, the General Manager for Advanced Analytics at Shell, who spoke at the OSIsoft Users Conference in London.

Recently, Shell's Advanced Analytics team and its PI CoE successfully collaborated on several projects. One of the example projects Peter presented is the project

for a carbon capture and storage system in Canada. The system is designed to store injected CO_2 underground in depleted wells to minimize carbon emissions into the atmosphere. A laser sensor monitors CO_2 levels rising to the surface while accounting for changing weather conditions, such as wind, rain or snow. The team deployed Asset Framework to structure the sensor data, which is now fed to Shell's data analytics tools to calculate real-time emission levels at the surface. Advanced mathematical models are running behind the scenes, but the operations manager in Canada views a simple dashboard showing the critical information required to ensure Shell's compliance with Canada's regulations.

Today, Shell runs several interesting projects to prove the commercial potential of advanced analytics. It's a cooperative effort on which the oil major relies to gain continuous insights that can be deployed back into the workflow for better business decisions. The PI System lies at the heart of this ongoing, highly creative forum.

To learn more about Shell and the PI System, watch the full presentation here.

Transocean

Transocean Pursues the 'Gold Standard' Well

When you've got up to 250 people on a drilling rig, as does Transocean, their productivity becomes a burning priority. In early 2017, Transocean embarked on a company-wide strategy called "Performance Through Data." The ultimate goal was the pursuit of what the group called 'Deepwater 4.0' or the gold standard well. To reach its new standard, Transocean turned to the PI System.

In a remarkably short time, Transocean has seen impressive gains with real-time data, such as a 40% reduction in non-productive time during drilling, even in the most challenging ultra-deepwater locations.

Transocean's impressive results are the result of enhanced visibility into tens of thousands of sensors across its fleet. All operational drilling data is now

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Transocean's results include:

- **Enhanced sensor visibility**
- **Centralized operational drilling data**
- **Real-time data readings**
- **Easier performance measurements and shift analysis**

centralised in the PI System, and Transocean crews have a consistent way of getting the data they need. Technical staff can pore over downtime readings from any of the group's wells and quickly identify the root cause. It's easy to see the depth of the bit position at any time, and engineers can measure the relative performance of drill crews using events tables that identify how different shifts are working.

As José Gutierrez, Director of Technology and Innovation at Transocean points out, such analysis can now be done onshore far away from the dangerous drilling environment and allows the company to put less people out to sea.

For Transocean, the Deepwater 4.0 journey is just the beginning. Realising that information for its own sake does not necessarily result in better decisions, the company now puts all its operational data through several stages of refinement. First, the raw data is cleaned and normalised. Then it's structured and contextualized using OSIsoft's Asset Framework (AF), which make the data more meaningful to the crews. Finally, the data is interpreted and converted into the kind of knowledge that goes straight to the bottom line.

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SBM Offshore and Veolia's Creative Partnership Allows for Increased Water Injection

Two years ago, SBM Offshore, the world's largest lease operator of 14 large floating production vessels (FPSOs), began thinking about new ways of deploying digital technology across its fleet. Consequently they approached key partners and service providers to discuss how to achieve its goals for operational optimization. There was a lot at stake for the Amsterdam-based group whose fleet of vessels process over a million barrels of oil per day.

One area for improvement was the water treatment and injection facilities critical for deep water production, a process in which, as the industry saying goes, "water in equals oil out."

Working with its partner Veolia Water Technologies (VWS Westgarth) to improve water treatment and injection, SBM concluded that both parties needed a much more accurate, real-time oversight of the highly complex and expensive process where problems can result in costly downtime with hefty contractual penalties.

Harnessing Real-Time Data

SBM Offshore had already experienced losses due to fleet-wide issues with water treatment systems. Expensive nano-filtration membrane systems were underperforming due to a lack of insight into their actual operational condition offshore. At a time of lower oil prices, reservoir management is particularly important for deepwater operators and as such, production contractor SBM made the move to deliver improved performance.

SBM's partner Veolia had previously been reporting performance with data packets from offshore, which provided little value due to its historic nature, on submission. Because of the complex, time-consuming procedures required to gather, interpret and publish such data, it could take up to eight weeks before information about equipment conditions reached the offshore operations team and the asset integrity team. The slow, frustrating process was ripe for improvement.

One System, One Source of Truth

Veolia and SBM Offshore, who are both well-established users of the PI system, engaged OSIsoft to see if it could offer a solution. "We wanted one system with one version of the truth across our regional teams," explained David Lothian, Head of Upstream Services at Veolia, during the 2017 OSIsoft EMEA Users Conference in London.

SBM had all the data for the water treatment equipment offshore in their PI System and Veolia needed the data in its own PI System at the onshore headquarters. The answer was simple: deploy OSIsoft's PI Cloud Connect service to link the two companies together and facilitate safe and secure sharing of real-time operational data.

The creative partnership has led to a flow of rich data, enabling both companies to move from reactive to predictive analytics for managing water treatment. The result? Increased water injection uptime and reduced opex for SBM, which can now leverage Veolia's expertise remotely. It is a clear win-win for everyone involved.

PI Vision enabled engineers to put everything up on screen in real-time to quantify the effectiveness of water injections and define improvements.

Condition-Based Maintenance with Asset Framework and PI Vision

With data flowing between SBM Offshore and Veolia, the next step was to build the Condition Based Maintenance system in Veolia's own PI System using Osisoft's Asset Framework (AF) as the foundation for analysis and workflow automation.

Once Asset Framework was in place to structure the data into a standard hierarchy of assets, PI Notifications could provide real-time updates on issues arising with the water treatment equipment. Using Event Frames on and offshore, crews were able to see the data as meaningful operational activities while receiving insights into critical processes. In one case, an offline system had not been properly flushed, creating a high risk of membrane scaling. This abnormal event was automatically detected and an automated notification was issued to both SBM Offshore and Veolia teams, allowing them to collaborate on detailing the best course of action to prevent further risks. With the issue

identified as an event, the crew was able to take pre-emptive action almost immediately.

Additionally, PI Vision enabled engineers to put everything up on screen in real-time to easily quantify the effectiveness of each water injection cleaning operation and define improvements, such as the use of alternative chemicals or cleaning procedures.

As data became available across both organisations, each one saw efficiency gains across a host of departments, from setting injection targets by the technical teams to the ordering of materials by purchasing personnel. The commonality of the data across the FPSO fleet is now leading to shared insights and enabling measurable improvements. In the near future, data from the collaboration will be mined to improve the design of mission-critical membranes for the next generation of SBM's vessels.

Conclusion

Different though they are, these large and innovative companies have achieved substantial benefits in a remarkably short period of time from their ability to collect and process real-time data in ways that improve operational performance. Instead of being swamped by waves of seemingly unconnected information, oil and gas operators are learning how to harness the power of data for their own ends to realise significant benefits for their entire operational lifecycle.

Over the years, the industry's needs for data have constantly grown and evolved. Real-time data must be accessible on any device, be predictive, and organised so to facilitate collaboration, instead of being buried in silos. It is this knowledge that underpins the PI System's universality. That is why the PI System has been deployed at over 20,821 sites around the world.

ABOUT OSIsoft.

OSIsoft, a global leader in operational intelligence, delivers an open enterprise infrastructure to connect sensor-based data, operations, and people to enable real-time and actionable insights. As the maker of the PI System, OSIsoft empowers companies across a range of industries in activities such as exploration, extraction, production, generation, process and discrete manufacturing, distribution, and services to leverage streaming data to optimise and enrich their businesses. For over thirty years, OSIsoft customers have embraced the PI System to deliver process, quality, energy, regulatory compliance, safety, security, and asset health improvements across their operations. Founded in 1980, OSIsoft is a privately-held company, headquartered in San Leandro, California, U.S.A., with offices around the world.

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