The digital oilfield (DOF) has evolved over the last 20 years and incorporates technology-centric solutions which increase return on investment (ROI) and maximise operational safety while driving up production. What’s more, DOF provides a competitive advantage by maximising data use to gather information, enabling key business decisions and improving overall productivity.

As the concept of the digital oilfield has matured, there are several notable success stories that incorporate specialised disciplines or point solutions. Some of the key drivers of DOF scenarios are real-time monitoring, data analysis and optimum control for field management. An excellent example is Seismic Guided Drilling (SGD) technology, which utilises both surface seismic and logging-while-drilling (LWD) data to predict pore pressure and geological hazards ahead of the bit while updating a 3D seismic earth model and quantifying associated uncertainties and discrepancies in real time. SGD can have a significant effect on drilling safety and well cost, particularly in deepwater exploration.

Streamlined connections

DOF is not simply about using new technology, it also helps streamline workflows, connects services, and integrates them to move towards faster turnarounds and efficient use of resources, in terms of both infrastructure and people. A prime example of this is Kuwait Intelligent Digital Field (KwIDF), a cross-domain project that integrates instrumentation and automated workflows via multidisciplinary collaboration.

Kuwait Oil Company (KOC) was facing a challenging environment in one of its greenfield developments* with a heterogeneous carbonate reservoir. Parts of the reservoir exhibited tight, densely connected fractures and others were more sparsely connected. The high-pressure, high-temperature (HPHT) environment and the presence of hydrogen sulphide provided further hurdles. KOC wanted a digital solution to increase production and recovery rates, while keeping costs down and maintaining safety and reliability.

The company also wanted to reduce shutdowns, better utilise data to accelerate decision making and improve multidisciplinary collaboration.

After meeting with Schlumberger it chose to use Avocet production operations software as the foundation of a DOF solution. The server-based, workflow orientated approach to production management consolidated data in one environment and helped create comprehensive workflows to automate data acquisition and conditioning, event detection, alarms and production performance management. KOC’s integrated solution gave the project team the ability to design real-time production surveillance, optimising workflows, automating...
and standardising many existing engineering processes.

**Key challenges**

So, what are the main challenges facing DOF development in the oil and gas sector?

The future of the digital oilfield is directly affected by developments in the hardware and software domains. While many industries are ahead of the oil and gas sector in leveraging the latest digital technology as a key business driver, the energy sector’s resistance to change is considered to be the biggest challenge in realising the full potential of DOF. According to a BP poll in 2012, the industry is typified by conservatism, with 60% of respondents believing that resistance to change represented the biggest obstacle to realising the full potential of DOF.

This resistance is gradually changing and is expected to make DOF grow at 4–5% by 2022. However, use of real-time big data analytics still remains a primary challenge. Typically, oil and gas operations feature a plethora of raw data but frequently face quality issues when it comes to gaining valuable insight into assets. Consequently, the industry is still missing key tools and functionalities to collect all such raw data into an analytical query database and implement needed processes for future projects.

**A window of opportunity**

Considering that an estimated 80% of data in the oil industry is either unmanaged or unstructured, or both, this creates bottlenecks that prevent fully developing big data applications. However, it also opens a window of opportunity to put procedures and guidelines in place by bringing data from different sources, such as structured data from sensors, unstructured data such as emails as well as internal and external reports under a unified format for analysis.

Schlumberger has been taking proactive measures to harness the power of data and advance computing techniques. The Schlumberger Software Technology Innovation Center (STIC) has been established in the heart of Silicon Valley, to target big data, high performance computing, cloud, analytics, Internet of Things (IoT), industrial internet, visualisation and the user experience.

Many organisations have started to fully explore the potential of big data, such as applying lessons learned for future projects. That includes mining sensory data, user reports and software metadata, which leads to faster turnaround and calculated decision-making. Some of the potential applications being analysed (but not limited to) include developing smart oil platforms through daily analysis of sensory data; data-driven earth model building and reservoir modelling; new ways of data delivery to minimise losses and retain quality, ie using fibre optics to improve well delivery performance, for example; and real-time well and field optimisation with ever increasing new data inflow.

Big data applications like these can help companies make smart decisions for drilling parameters, completion techniques and risk assessment, improving productivity and driving towards sustainable growth.

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According to an article co-authored by Schlumberger and KOC in Oilfield Technology.