

# the difference <sup>Being fast will make</sup>

With multiple applications across the A to Z of the oil and gas industry, new information technologies can improve processes and contribute towards faster results.

**T**echnology is embedded in all business sectors, and in some of them, such as the oil industry, it is fundamental to enable organizations to achieve their goals.

Today, the challenges of the oil industry are so great that technology has become vital for the success of large and small companies alike. The widespread use of new technologies to face industry challenges gives rise to a number of issues, however. Technologies may cause environmental damage, consume a lot of energy and occupy valuable space, thereby generating hidden costs, which are usually not considered when analyzing whether to exchange or implement a specific technology.

If we begin by examining the upstream segment, specifically exploration, seismic processing is often still performed by the oil companies themselves, especially in the case of national oil companies (NOCs), or by oil service companies (PGS, CGG, Western, etc). This processing began in a distributed manner at the start of the twenty first century, but these systems cover increasingly large areas and consume immense amounts of energy. It has to be asked whether they are really the most efficient solutions to analyze seismic data for oil companies. These structures and models may not be the best solutions for current challenges.

There are companies investing in research and development to create extremely powerful chips, which use up to 40 percent less electricity when compared to cluster structures, and which have already been tested in seismic applications and have performed very well in open platforms (Linux).

These solutions are very suited to seismic processing, both for oil service companies and operators themselves. They enable seismic data to be processed in a secure manner, whilst implementing business necessities to ensure good results from seismic processing.

This may not be commonly known, but integrated oil companies have already been carrying out seismic processing for more than a year using a hosting model, with highly successful results, very good performance and at an attractive cost. This has involved market outsourcing companies rather than traditional oil service companies.

Another innovation is the use of BladeCenters to analyze and interpret processed data. BladeCenters are central servers with high processing capacity, using high-resolution monitors attached to them, which can replace standalone workstations, with local processing.



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This system can help cut costs – by up to 30 percent, where there are between 100 and 150 stations. In addition, this technology does not require greater centralization, so knowledge remains the company's property. This is a major concern in the industry today.

Remote visualization solutions are starting to be used in the industry, after several years in which the concept was tested without success, due to problems of connectivity, bandwidth, and application settings. Oil companies are now experiencing success in bringing together different teams with diverse expertise to analyze problems jointly, in order to help ensure faster decision-making, without needing to incur the travel and time costs of bringing together these teams.

## Ontology

If we consider the challenges of pre-salt – which will demand a long period to process immense quantities of data, especially from long-duration tests – we have the alternative of ontology-based models, which help in understanding and sharing data generated at the wellhead.

These models optimize understanding of data, enabling reuse and sharing between groups with different levels of knowledge, which helps in collaborative analysis work and accelerates decision-making related to a specific problem.

This methodology has been applied widely in areas where the volume of data generated is extremely large, so it is very suited to the oil and gas industry.

This is just one example of the use of this methodology. There are many theories and studies in the industry focused on drilling, well tests and reservoir optimization. Unfortunately, often the results obtained through better use or better analysis of information – with increasing rates of drilling success in a field, representing a lot of money – will only come after some time.

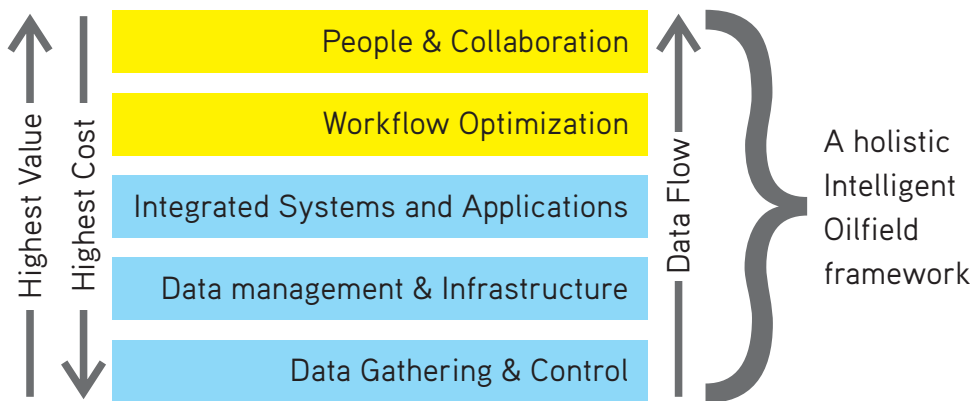
Other parts of the oil and gas production chain, including field development and production, and downstream, also face major challenges. Companies are investing heavily to understand the characteristics of the new pre-salt discoveries, to learn about reservoir features, to see if the oil is very acid, if there is a lot of CO<sub>2</sub> in the reservoir, to determine the optimal offshore logistics, and to decide what to do with all these obstacles to production.

The answer to these and other questions must come from collaborative work by national and international oil companies, oil service companies, and leading-edge technology companies, to develop technologies that may well have applications outside the oil industry. These companies, whether or not they are directly related to the oil industry, must possess resources to invest and extremely talented teams.

## Practical example

This collaborative work is already bearing fruit in the North Sea, where IBM, ABB, Aker Kverner and SKF joined Statoil to create a project called Tail IO, which enables real-time management of

Figure 1



IT to understand the needs and parameters of the solution, without imposing standards that are not applicable or that become complicated to implement.

At the end of the process, the solution should address the different business objectives, for example increasing productivity and en-

platforms, reducing unscheduled downtime for maintenance. This has reduced operating costs by around 30%, and increased field production by 3%.

Various IT concepts were applied in this project, generating significant cost reductions and increased profitability. Similar projects are under way, involving some companies that are best known for their technology portfolio, and others better known for their expertise in the oil industry.

It is important to have all partners engaged in the success of these projects. Oil companies in particular need to view these projects as important, and give them the support needed within their organizational structures. Otherwise, results may be weak and all the investment may go to waste.

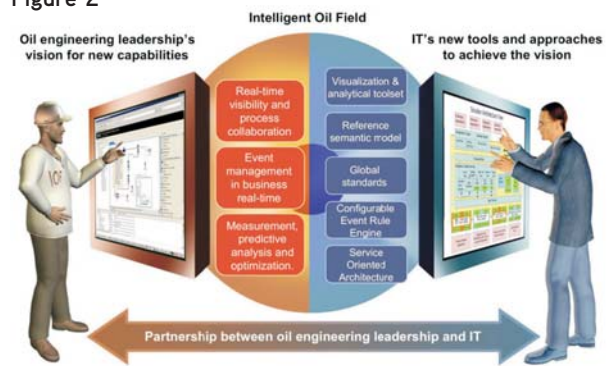
The Statoil project is a successful case of the implementation of a concept much discussed in the oil industry today, called IOF (Intelligent Oilfield) or DOFF (Digital Oilfield of the Future), among other names used by the industry. The main goal of this concept is to use techniques and the latest technology to increase the recovery rate of declining fields, or increase automation levels to manage new wells and oil fields more efficiently.

The concept brings together IT and business visions, which work together to make maximum use of very high flows of information generated in the field, providing for integration with wellheads, compressors, pumps and other field equipment. These solutions are developed based on templates that combine consulting and technology, as shown in the **Figure 1**.

Because data management and information gathering are very important components for the implementation of this solution, the partnership between IT and business is crucial to the success of implementation. However, it is very important for

enabling real-time management of an oil field. IT's role is to provide the technologies required to implement the solution, as shown on **Figure 2**.

Figure 2



### Refining in focus

If one looks at the downstream segment, Brazil has many old refineries that need to be modernized in order to produce high-quality products for local and international markets. The USA, in particular, has strict requirements. For example, maximum sulfur content is 30ppm in the States, compared to the 2000ppm contained in the gasoline Brazil currently produces. Brazil also uses benzene, which is highly pollutant and is not accepted in the American market.

In other words, heavy investment in refining processes and business models will be needed to enable surplus Brazilian products to be sold in different consumer markets, following significant planned increases in the country's refining capacity.

Furthermore, there are challenges related to reducing CO<sub>2</sub> emissions, waste production and fuel consumption in the industry. Studies have been

carried out by the COPPE research center in Rio de Janeiro and other institutions on the use of biomass and the construction of gasification plants to capture CO<sub>2</sub>. These studies may point the way for refineries of the future.

However, there are more basic technology aspects that are also important and which cannot remain outside this discussion. Refining business managers are also very concerned about visibility across the supply chain, management of the refinery in real time, health, safety and the environment (HSE), and increasing efficiency by optimizing the production process.

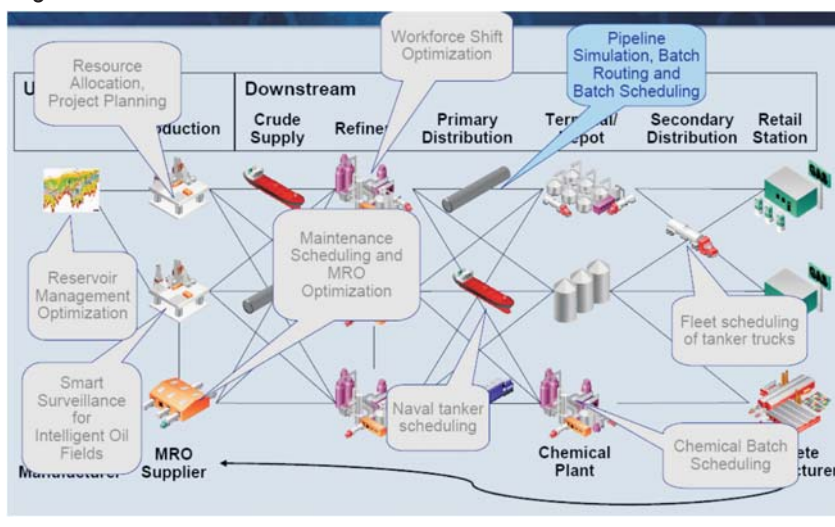
Oil majors around the world have been increasing their investments in downstream in recent years, and the concept of an intelligent refinery has gained ground. This concept is very similar to what has already been taking place in upstream.

A very complex series of optimizing systems organizes the process of transporting oil to refineries by pipeline. After this stage, other optimizers take charge of organizing the production process and control secondary distribution from the refinery to the next stage. For this, they use operational research concepts and a great deal of applied mathematics, which is not always a specialty of oil and gas companies. Rather, this work is performed in the laboratories of technology companies around the world, such as IBM, or even in medical research labs that apply this kind of solution to the problems of medicine, and which can cooperate with the oil industry.

Some optimization opportunities in the oil chain are shown in **Figure 3**.

Intelligent refinery solutions require a technology architecture that can integrate automation and management systems. They must also help to reduce operating costs, improve maintenance processes, reduce HSE-associated risks through the use of rules and policies, and increase the productivity and efficiency of plants by reducing unscheduled downtime. Another point, which is especially important in times of belt-tightening, is that, depending on the level and quality of automation, it may often be possible to keep old systems. This can provide effective solutions for a small investment.

Figure 3



### Change management

Allied to all this, we cannot forget that the industry constantly needs to review its business processes, translating and deploying them using change management tools, which help people to understand the new way of operating. These tools should be used whenever a new technology is implemented.

External consultancies can play a valuable role in change management. They have methodologies, knowledge and deep experience in this kind of work, which can be used to help companies succeed in their challenges. In particular, they can help companies avoid designing processes and attempting to deploy change management for years and years without obtaining the desired results.

Success in implementing these new technologies will depend on a number of factors, especially the adaptability of companies to the market. Technology comes in waves. Equipment that is no longer used can be modified, and new components can be added to it, enabling it to have ideal specifications for a given problem. Seismic processing used to take place in large computers, and this is now occurring again. Everything passes through cycles. The main point is that companies must become more adaptable to these cycles.

Oil at US\$140 a barrel was a cycle: now oil is at US\$44, which represents another cycle, with completely different characteristics for costs and investments. The truth is that oil companies – international and national, small and medium – must continue exploring for oil, raising their reserves-to-production ratios and increasing the value of their assets. To get an edge in doing so, they will have to swiftly apply the best solutions in the market. Being fast will make the difference. ■