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Solving industry's tough challenges – together

In a rapidly changing industry, innovation, collaboration, and openness will pave the way forward. Incorporating advances on existing infrastructure will be one of the cornerstones of success.

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The oil and gas industry has changed over the past 10 years, and it will change even more in the decade to come. Technology is moving at an ever increasing pace, making it more and more difficult to assimilate new ideas, new technology, and new ways of working.

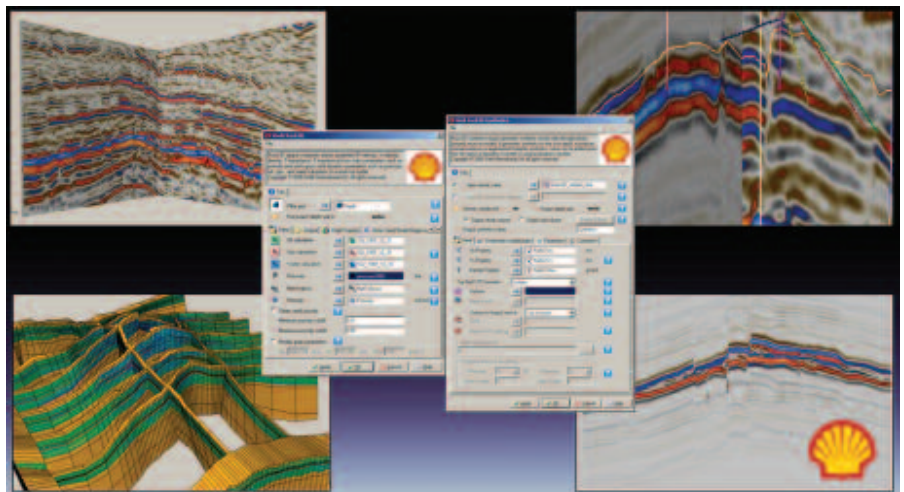
No one can afford disruptions in operations. At the same time, there is a desire to take advantage of new technologies. A lot of what has been done has worked quite well. As an industry, we need to build on that which has already been achieved.

Embrace the new, build on the past

Oil and gas companies have vast amounts of existing data, applications, and infrastructure to manage. At the same time the amount of data available continues to grow. Marine seismic has tripled over the past four years, and the data intensity from permanent downhole sensors has grown by a factor of six in that same timeframe.

It is impractical, if not impossible, to start from scratch to implement new technologies. It is important to find ways to embrace the new while building on the past.

The challenges the oil and gas industry is facing are getting much more complex



Shell has integrated Ocean framework, a 3-D rock physics application, into Schlumberger's Petrel software, allowing iterative calculations to be done to validate and continually improve the model and interpretation. Shell can deploy this on a standard baseline anywhere in the world and can make it a part of a standard workflow. (Image courtesy of Schlumberger)

from both a technical point of view and in a business sense with challenging environments such as the arctic and deep water as well as complex structural traps, fractured carbonates, unconventional hydrocarbons, and subsalt plays.

Expertise is needed to solve these problems, and the level of experience in our industry is diminishing. The number of petrotechnical professionals less than 40 years old will almost double in the next four years. How will companies organize and manage teams and manage the quality of the work being done by the new people entering the industry?

The technology choices and the amount of data available to geoscientists and engineers have are daunting and growing by the day. Operators are faced with the task of selecting the appropriate technology, managing the various systems

and databases required for the applications to work, and managing the various versions, results, and interpretations that are produced from these applications.

With modern infrastructure lowering the barriers to entry, more niche and innovative technologies will likely emerge to solve increasingly complex technical problems. While these niche technologies solve real problems, they also introduce issues for operators that need to integrate new data into earth models, deploy information across organizations, audit the results, and manage the derived datasets.

Working in the way we've always done is not an option.

An open approach

Having multiple individual applications is tough, but having only one vendor

does not get the job done. Operators are going to need two things: an open system approach and people to put together a solution and make it work anywhere in the world — 24/7.

Every company is different; every reservoir is different. It is no longer enough to choose software vendor A or software vendor B.

The open framework Schlumberger Information Solutions (SIS) is deploying is Ocean, an environment that allows operators and service providers to bring technology and innovation onto a common platform. With this framework, an organization no longer has to rely solely on monolithic releases of software. As innovation becomes available, it can be deployed and integrated across an enterprise and across the globe, enabling innovators to do what they do best without carrying the overhead and burden of maintaining an entire platform.

The Ocean/Petrel framework allows operators to define directed or guided workflows. An organization can specify which workflows to apply to a given interpretation problem and can understand how certain results were obtained. The capability to focus people on tough problems instead of computer science will dramatically increase the productivity of highly skilled resources. Collaboration will be critical to enable this open innovation and resolve industry challenges.

Businesses that flourish in the face of these challenges will be those that redefine and embrace innovation, collaboration, and openness.

Real innovation

Innovation — applied innovation, not innovation for innovation's sake — solves business problems.

Innovation can mean new technologies, or it can come from combining existing elements in a new way. It means collaborating with and using innovative concepts and technologies from other industries.

Most importantly, innovation can come from anywhere — from the field, research teams, engineering, operators,

and service companies. There will always be more innovation happening outside an individual company than inside it, and forward looking companies will find ways to take advantage of these advances.

Collaboration today

Collaboration is being able to have the conversations that matter. Problem solving requires people from different backgrounds with different talents. These people can come from oil and gas companies, different vendors, universities, and third parties for whom oil and gas is not their main business.

In the realm of digital oil fields, for example, SCADA systems, data historians, and databases already exist. These pieces do not constitute a digital oil field. All parties have to talk to collaborate to achieve a solution to a common business problem.

It is not feasible to replace every SCADA system or to repopulate every database or even to replace every software application. This does not mean giving up our competitive advantages or not protecting our intellectual property. It means that we respect our collaboration partners and that we understand one another's point of view. There is much to lose by not collaborating.

Defining openness

Openness means faster innovation without waiting for release cycles. It means the freedom to choose niche technologies that solve specific technical challenges. It is being able to create new workflows on top of existing infrastructure to realize the efficiencies that standardization can bring.

Openness is more than an open development framework. It goes to the core values of a company. While it is necessary for every company to create differentiation and to benefit from that differentiation, it is also necessary to recognize that tough problems will not be solved by one company alone.

In its pursuit of openness, SIS is enabling third parties to write to its Ocean platform. The company also funded joint research and development projects with key customers. The openness created enables real

partnerships and real innovation.

An example is one of the proprietary capabilities that Shell has integrated into Petrel with Ocean framework, a 3-D rock physics application. Once the seismic data has been interpreted, a model is generated in Petrel. Next, the model is populated with rock physics properties. Then, elastic rock properties are calculated, and synthetic seismic volume is generated. Finally, the synthetic volume is compared with the original seismic volume, and the difference is calculated. Iterations can be done to validate and continually improve the model and interpretation. The power is that Shell can deploy this on a standard baseline anywhere in the world and can make it a part of a standard workflow. Even better, Shell can keep this capability proprietary. Only Shell has access to this application as a part of the company's Petrel workflow.

Emerging technologies

In exploration, there is the need to manage large amounts of data and to extract as much information from the data as possible. Experts deal daily with uncertainty and risk, continually using more modeling and simulation to test more scenarios and better understand the possible outcomes.

On the production and operations side, the primary hurdles are unstructured data and a less standardized workflow. Tools need to be adopted from geosciences and reservoir engineering, and there must be standardization and integration to improve efficiency, reduce cost, and extract more from known reserves.

A key objective is to bridge these two worlds, bringing simulation-driven workflows to the production space, taking production information back into the model, and refining understanding of the reservoir. This is not just history matching, but performing simulations fast enough to drive operational decisions.

Openness and collaboration are critical to solving this problem. Companies that effectively bridge this gap and achieve dynamic reservoir management will prosper in the decades to come and will set the standard for those that follow in their footsteps. 