GLOBAL EXPLORATION & PRODUCTION NEWS • TECHNOLOGY UPDATES • ANALYSIS

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WATER management

LWD/MWD
Drill bits get better guidance

Subsea
Gathering Systems
Information fills pipes fuller

Exploration Software
Planning optimizes search process

Human Resources
Find and keep new people

SPECIAL BONUS:
BP plans region of the future
The exploration and production (E&P) industry has never been short of innovation, be it in lean times or in periods of intense activity such as we have been experiencing for the past few years. Software development in E&P has continuously delivered new concepts, new science and new methods, which coupled with escalating computing power at an affordable price and increased data integration has created substantial value for their user communities. These innovations directly reduce both investment risk (by increasing the probability that expenditure on assets is allocated to successful projects) and operational risk (through a better understanding of gas-fluid and geomechanical risks associated with drilling, completing and producing an asset).

Deploying innovative solutions
Experiences vary widely from company to company, and sometimes from business unit to business unit within a company, often in situations where identical processes were used to assess, validate and promote the deployment of an innovation. There can be many reasons to this difference in uptake, mostly boiling down to organizational and human factors. A common explanation is a lack of time or expertise to evaluate alternatives or enhancements to current workflows and proven products that are already in use. There is also a natural reluctance to try something new while working on a deadline-critical project for which there is confidence that current solutions will deliver a reliable, albeit not state-of-the-art, outcome. Regardless of the resources an organization applies to drive the uptake and continued usage of a new solution, success usually correlates with the existence of one or more champions within the organization. These are the people who are not only thrilled at the possibilities that have become available but also feel an urge to share their success stories with their colleagues and to act as mentors and promoters to see their company benefit from new technologies.

Large-scale innovation
This process is both productive and economical as long as it applies to innovations that add or substitute small elements within the broad and sophisticated workflows that apply to most E&P activities. Adding some new seismic attributes to an established suite, automating a specific sequence of tasks.
to increase efficiency or productivity, providing a higher level of analysis, or corroboration of an existing set of data (e.g., through new visualization or cross-plotting tools) — in all these cases there is nothing fundamentally disruptive about the change, and activities ahead of the new component or using its results are not challenged in their routine operations.

Accommodating a new scientific breakthrough or taking on a new approach to a broad multidisciplinary set of tasks that constitutes a significant fraction of a large workflow requires a completely different business model. It becomes a disruptive change to the work practices of many people. It even challenges, in some cases, the distribution of responsibilities or the ownership of data among different departments. The requirement is no longer for one busy person to take time out to evaluate and implement a change to their activity; the implication is that a large number of people are required to buy into the value proposition, find the time to appraise its validity and then proceed with a change process that involves many other parties. With spare time at a premium, it will take determination to see such a process through.

Can the organization get in the way of innovation?
The flow of activities in large E&P organizations, the distribution of specific tasks to dedicated entities or their grouping within project or asset teams have largely shaped the way specific technologies are deployed and concatenated within geoscience or engineering application suites. Over time, there is convergence of the two, and it is not always clear whether organizational boundaries evolve to reflect the interface of major software packages or whether the software footprint gradually changes to adapt to the segmentation patterns of the organizations in which it is used.

It can be observed in recent times that the rare instances of rapid growth of a new, broad-footprint product suite has been attributed to the fact that the new product mimicked the footprint of one or more products it aimed at replacing while avoiding the need to reconfigure any organizational structures set in place for the legacy system. The value proposition is centered on new efficiencies while performing established workflows. Such substitutions generate value in terms of coping with workloads and with resource constraints, but they do not foster the introduction of radically innovative science and technology, nor do they challenge the validity of workflows conceived many years ago.

For the sake of illustrating a point, let us envisage that a new proposition is made to integrate a revolutionary solid modeling process. This new process will use detailed petrophysical information to automatically build a velocity field that will drive a next-generation seismic depth imaging process. This radically new system will directly generate a comprehensive full-wave inversion of all relevant data (thus skipping the interpretation phase as it is classically known). Let us then look at an organization that has a group of specialists handling petrophysics for all the business units. Elsewhere, a department provides seismic imaging services with specific high-performance computing resources, the assets teams focus on interpretation and solid modeling is in the realm of the reservoir engineering department. This organization will have to change considerably to properly leverage the new workflow that this hypothetical breakthrough would propose. How could one go about assessing the proposition, who would take the lead and would all parties be able to objectively look at such a change and feel comfortable about the implications of adapting to it?

A complex proposition
The full cycle to succeed in getting adoption of a complex solution starts with the construction of the value statement. This is followed by the orchestration of a proof of concept project using customer data (if not a full-scale validation) and finally the push to obtain buy-in at an appropriately high level in the customer’s organization such that one can make abstraction of departmental issues. The burden of conducting this activity is mostly carried by the vendor proposing the new game-changing technologies and the associated workflows. This takes considerable time, demands the commitment to the venture of highly skilled technical staff and is built on a series of elaborate customer interaction events necessary to ensure that continued engagement and support is obtained at the appropriate decision levels.

Few vendors have the resources and the ability to risk engaging in such an expensive and long business development cycle to succeed in selling a broad and complex technology innovation. A substantial proportion of the risk is not associated with the ability of the innovation to deliver value but with the reality of dealing with large organizations and a scarcity of time and resources to investigate radical change opportunities.

Organizing for change
Other industries have been confronted with this issue, with notable examples in aerospace (the Skunk Works at Lockheed Martin, which built the first prototype American jet plane in 143 days) or in the computer industry (IBM’s radical approach to Emerging Business Opportunities, initiated in 2000, which yielded 22 successful ventures for only three failures in the ensuing 5 years).

In both these examples, the large organizations realized that their mainstream processes were geared to sustain and improve their current business, not to foster radical change. The success of both these examples is attributed to carving out an independent environment dedicated to innovation and devising its own rules to achieve its goals. It should be noted that in both cases, although these operations were introducing a form of counter-culture by design, their operation was every bit as rigorous as the parent company. The differences came from shifting emphasis towards performance and delivery-cycle metrics and through the dynamics of small teams operating outside of complex organizational structures. Project management was shown to
be an essential component of a successful operation in such circumstances.

**Performing innovation-rich change**
Having identified a process, the challenge remains to find the resources and the innovative science and technology to populate it. It appears difficult for many energy companies to build such an activity with internal resources in the current business climate. The shortage of experienced staff makes it difficult to take out of current operations a half-dozen or more highly skilled employees for a protracted period of time. Also, the greatest diversity of investments in new science and technology for E&P has shifted to small and medium-sized vendor companies or academic institutions. Only a handful of vendors are in a position to construct broad innovation-rich workflow solutions with a corresponding investment in process and data integration.

**Return on investment**
Such a laboratory would not be trivial in terms of costs. However, as a strategic initiative with an impact on large-ticket items such as drilling budgets and strategic goals such as technology differentiators that help secure operator status in new acreage, the expenditure can be set against the high value that will be derived from its pioneering work.

**Conclusion**
In a period of intense activity and constrained human resources, innovation is the only factor that can enable energy companies to do more and do it better. Novel ways of appraising and deploying game-changing science and technology offer a possibility to differentiate operators and accelerate the uptake of high-value solutions.

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