

Collaboration between geoscientist and drilling engineer enhances E&P efficiencies

To maximize return on investment while ensuring safe and efficient drilling and optimal geosteering, a successful geosciences-to-drilling collaboration provides significant advantages. In fact, when reviewing the overall E&P spending of an oil company and the significant portion that goes into drilling, reducing drilling-related risks and costs might be one of the most important contributions that the petroleum geosciences professional can offer to the E&P industry.

Through their extensive knowledge of the subsurface, petroleum geoscientists can provide valuable information in the well planning process, such as an increased understanding of the overburden pressure regime, accurate real-time reservoir modeling updates, and geosteering. Equipped with a deeper comprehension of the drilling process, the geoscientist can offer better drilling target selections, alternative targets, and optimal drilling paths. It is clear that whether working with drilling engineers or reservoir engineers, offshore or in unconventional fields, the petroleum geoscientist is increasingly exposed to real-time field operations, in addition to traditional work in the back office.

Judging from industry experience in integrating disciplines, such as geophysics and geology, or geology and petrophysics, one can understand the difficulty inherent in these tasks. In particular, there is a need for cross-training and the creation of common workflows associated with these new capabilities, together with the development of a common data platform and common data models that can serve different disciplines separated by their requirements, nomenclature, and culture.

Drilling engineers and geoscientists are not only separated through their different working methods and choice of computing environment (Linux and Windows 64 for geoscientists, drilling engineers almost exclusively use Windows), but also by the distance between working locations. The geoscientist usually works in corporate headquarters, while the drilling engineer is likely to be found at the drilling site.

An enabler to the integration between geosciences and drilling is the creation of software platforms that can handle multi-disciplinary data and workflows, provide remote data access, and support heterogeneous operating systems. Such platforms offer new efficiencies and enhance personal productivity through the cross-fertilization of ideas, workflows, and algorithms.

To achieve smooth integration, two important aspects of modern geosciences systems should be considered. The first is an advanced

distributed data management infrastructure that can provide local and remote access to distributed data repositories, create a seamless link between the drilling rigs and corporate headquarters, and support both Linux and Windows in a heterogeneous environment. The second is the availability of a shared, multi-resolution visualization canvas, which will provide the drilling engineer at the drilling site and the geoscientist at corporate headquarters with the same view of the subsurface image and reservoir model.

Access to all available information is essential for a successful project. All data pertaining to the reservoir, well track, and production data must be integrated, updated in real time, and presented in a consistent manner that is easy for every member of the team to understand and use efficiently. Information is displayed at the seismic scale using 3D depth and pore pressure volumes, at the reservoir scale using geological and simulation models, and at the log scale using multiple logs for each well.

The embedding of powerful well planning tools into comprehensive interpretation and visualization systems allows geoscientists to quickly select drilling targets and to produce well designs. These can then be visualized and verified in a fully 3D environment, together with all the geosciences and engineering information, for more accurate and dynamic target selection and monitoring of drilling progress using real-time data feeds.

The task of integrating drilling engineering and reservoir engineering data and working methods into the geosciences workflow is challenging. It is necessary to create the requisite processes within the oil companies, to cross-train the geoscientist and the drilling engineer to best leverage the knowledge in each discipline, and to create an enabling software platform that supports such integration. But the payback for the oil companies can be huge – the creation of safer and more efficient drilling programs, and more effective real-time monitoring and decision-making during drilling.

It is clear that due to the increased complexity and environmental sensitivity of today's deepwater frontiers, and the growth in exploitation of unconventional resources, the industry will see further demand for tighter and smoother integration between geosciences and drilling. The enabling technology is already in place to do so now.

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