Industry headwinds mandate technology collaborations

Current E&P technology needs a significant pivot in the way applications are developed and delivered.

The oil and gas (O&G) industry is at a significant inflection point where the force of market headwinds, cost pressures, environmental challenges, knowledge attrition and geopolitical uncertainty have converged. Fortunately, the confluence of potentially disruptive technology has landed on the industry at the same time. Collectively branded as "digital transformation technology," cloud computing, edge technology, machine learning (ML), artificial intelligence (AI), workflow automation, and Internet of Things (IoT) and data analytics are now part of every O&G company's mindset, roadmap or even current portfolio. The timing seems perfect. So what is the problem?

Many of the commonly used commercial E&P software applications developed by technology providers for the O&G industry were developed in the 1980s and 1990s. These applications progressively evolved into huge monolithic systems, rich in functionality but equally rich in complexity. While these applications have undergone many upgrades and refreshes in their long histories, they lack many of the characteristics and requirements of an agile digital transformation ecosystem and a new way of working that is more conducive to a rapidly changing O&G industry.

Native cloud applications, complemented with a rich set of web and cloud services, provide agility in development, delivery and adoption. However, disaggregation of the application monoliths into more granular components that can exploit a new ecosystem and new economic delivery models takes considerable time. In the meantime, these monolithic applications have been made available to cloud users through a much simpler but less flexible "lift and shift" model.

Data sizes, data diversity and a plethora of proprietary data formats pose another huge challenge to practicing geoscientists and engineers. This challenge is not new; however, it has been exacerbated by the requirements of the industry for more and better digital data (e.g., new surface and subsurface geological and geophysical data). It also has been exacerbated by the sheer volume of proprietary data that have created data management issues, data integrity issues and workflow issues not readily solved by cloud providers alone.

Additionally, rapid decision-making requires continuous streams of real-time data and information from sensors to monitor results, maintain equipment, drive production decisions and manage field operations. These data must be directed to monitoring platforms, analyzed with diagnostic web-based dashboards and integrated with other data (IoT).

E&P data are not only large and diverse, they are complex, often multidimensional, structured and unstructured, and irregularly sampled across data types. Although analysis of these data appears to be highly suitable for ML and AI methods, off-the-shelf or open source AI and ML algorithms require effort to adapt them to E&P data to solve classification, prediction or analysis problems. Data cleaning, preparation and the lack of sufficient data to train a neural network can deter application. Integration with physics-based models also might be required to achieve desired speed to decision and quality outcomes.

This short summary of the state of current E&P technology, data and ecosystems provides a backdrop for the need for a significant pivot in the way software applications are developed and delivered and the way data are aggregated and consumed. These are not the only issues facing the O&G industry. There are many others, including the use and adoption of open systems and open data that favor democratization of technology over siloed technology development and delivery. Open standards and open ecosystems, however, require high levels of cooperation between all O&G stakeholders to allow the industry to do more with less.

Collaborations between O&G companies and technology providers have always provided a business model and pathway for solving problems. Historically, however, these collaborations have been limited to solving highly focused issues involving proprietary technology and business problems. More point-to-point collaborations of this type will not make a dent in the challenges described above.

The collaborations that are being formed today by O&G companies and technology providers aim to address industry headwinds and hyper-cost efficiencies. These collaborations are occurring between cloud providers, technology specialists (AI/ML), E&P software application providers, alternative energy providers, data storage providers, high-performance computing suppliers and O&G companies. Common themes critical to these collaborations are openness, sustainability, scalability and efficiency.

On their own, these collaborations are not sufficient to overcome the technology challenges faced by the O&G industry. A common understanding and sharing of macro and micro requirements from domain experts as well as a joint understanding of the respective business models of collaborating companies are necessary for a successful outcome. The encouraging news is that these collaborations are forming and proceeding with force. ✚

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