Innovative Digital Geological Interpretation Framework for Wellsite Real-Time Operations

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Abstract

Digitalization is rapidly transforming oil and gas industry, particularly in real-time drilling operations. Many years back, manually-drawn wellsite striplogs were mostly used to assist drilling operations. The legacy technique encountered major challenges such as data accessibility, preservation of paper-based interpretation and delays in decision-making process. The technologies introduced in this abstract offer significant improvements to overcome the challenges by providing an innovative digitalized solution for wellsite geologists to monitor drilling operations on 24/7 basis.

The implemented solution transformed manual wellsite processes to a customized framework based on an in-depth analysis of exploration workflows. It empowers geologists with interactive interpretation features for casing points identification, lithology interpretation and well correlation utilizing visually-rich log templates. The framework provides a smart data entry functionality to validate data based on a set of predefined guidelines. Furthermore, a full integration with corporate repositories and map services is established to facilitate access to multi-disciplinary data. Due to the criticality of drilling operations, computing services are configured using distributed redundant architecture to ensure high availability, despite the rig-site network bandwidth limitations.

The introduced state-of-the-art solution provides a fit for purpose geological interpretation platform to enhance drilling decision-making process. The implementation significantly minimizes manual data entry of active wells, which enhances data quality in an efficient manner. The integration with corporate databases and key vendor applications provides a centralized hub for all wellsite geological operations and improves correlation accuracy. Wireline logs of offset wells are seamlessly accessed from remote rig-sites for optimal interpretation outcomes. The utilization of the interactive GIS maps improves well location identification, spatial measurements with offset wells and reports on relevant log data availability; to streamline correlation charts creation. The system enhances the overall performance by providing an efficient access to a cutting-edge set of geological interpretation tools from rig-site utilizing satellite communication. This technology enabled the digitization of more than 5000 legacy wells with standardized business rules to build a consolidated database for wellsite daily operations. As a result of the successful deployment of this holistic digital framework with unlimited licenses for wellsite operations, the solution has been endorsed for use in other disciplines, such as groundwater hydrology and core analysis.

The introduced single hub enables access to multi-disciplinary data which allows geologists to generate customized drilling reports and hydrocarbon exploration results to executive management. Advanced data analytics features and dashboards are implemented to reveal unseen patterns of current and historical data. The comprehensive framework offers additional digital transformation opportunities such as formation tops prediction and drilling cutting images classification. Furthermore, mobility features will be introduced to provide reliable access to facilitate accelerated decision-making processes.