

An integrated multi-vendor solution for acquisition and interpretation of real-time WITSML data to optimize wellbore placement and increase production

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The WITSML data standard sponsored by Energistics has matured to the point where multi-vendor solutions are a reality, allowing operators to select best-in-class technology for the various aspects of their real-time data acquisition, aggregation, surveillance, analysis and optimization processes.

This abstract documents one sample interoperability case that includes Data Acquisition (PetroDAQ), Management (Perfomix), and Geosteering (Paradigm) in relation to a Barnett Shale drilling operation.

Well Design and Geosteering Model

The 3D structural model is loaded to the well planning and engineering application to allow comprehensive well design within the context of a detailed structural representation of the subsurface. At this point, it is possible to send modeled engineering results in WITSML format to the drilling data hub for use as reference logs when surveillance operations begin. Typical engineering reference parameters include hook load, surface torque and equivalent circulating density.

The 3D structural model and the final proposed well path are shared with the geosteering application. By combining the structural framework along the well path with representative log signatures obtained from one or more offset wells, it is possible to perform forward modeling in the true stratigraphic thickness domain. This produces a detailed pre-drill model of predicted log responses for the planned well and provides a backdrop against which actual trajectory and log data is displayed as it is automatically gained via real time WITSML feed during the drilling operation.

Data Acquisition and Aggregation

As drilling progresses, data relating to rig instrumentation and downhole measurements from different contractors are aggregated on the well site Rig Aggregator, which performs data processing and streams data to the PetroSocial drilling data hub using minimal bandwidth. The drilling data hub is a web-based real-time operations management gateway and collaboration portal that provides a single, global window to E&P information and pre-built applications for remote surveillance, drilling activity monitoring, alerting, reporting, real-time collaboration and knowledge management. 3rd party tools for engineering, visualization, geo-steering or drilling optimization can load and consume data from the Gateway in a plug-n-play environment with the use of industry standard WITSML and web services.

Geosteering

As real-time data is automatically streamed from the drilling data hub to the geosteering application, differences between the predicted and actual logs signal changes in geology and indicate that the model needs to be updated. Updates are achieved through interactive editing of the structure so that modeled logs are correlated with the actual logs. This allows the geosteering user to determine the stratigraphic position of the wellbore within the reservoir and to gain understanding of the likely structural trend ahead of the bit.

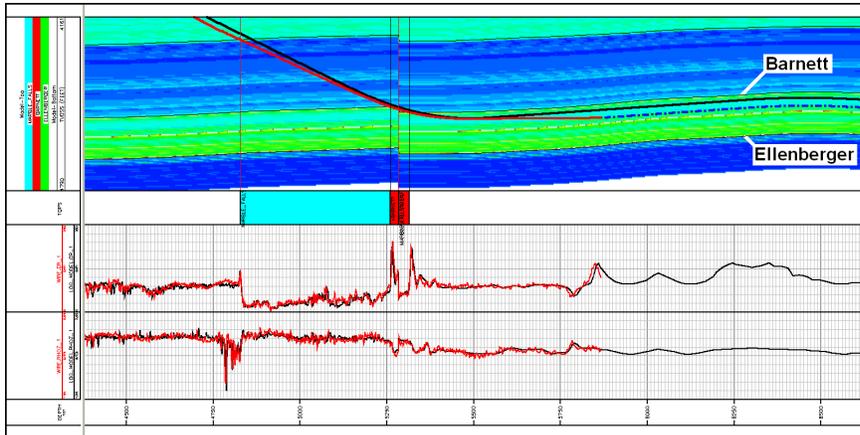


Fig 1: A repeat sequence in the actual log response allows identification of a sub-seismic fault.

Re-Planning While Drilling

In cases where geosteering model updates result in significant TVD adjustments, the updated 3D structure can be used by the well planning and engineering application to re-plan the well ahead of the bit. Once validated from an engineering perspective, the re-plan becomes the new reference plan within the geosteering application and correlation continues as drilling proceeds.

Summary

Using the WITSML standard as the basis for interoperability, this combination of multi-vendor technology provides a comprehensive solution for real-time data acquisition, management and analysis to reduce drilling risk and improve wellbore placement, with the ultimate goal of increasing production.

Come by the Energistics Booth #624 to learn more about WITSML.