

Leveraging knowledge with technology

In today's oilfield environment, knowledge is the most effective weapon against risk and uncertainty.

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In any challenging environment, the more one knows about a project or activity the better one is prepared to achieve its goals on time and on budget. While this observation may seem like a no-brainer, acquiring, collating, and accessing requisite knowledge to manage complex activities efficiently is easier said than done.

The drilling dilemma

A brief list of current practices defines current concerns expressed by members of the drilling community:

- Drillers use offset well mud weight vs. depth, offset days vs. depth, and 1-in./100-ft (30.5-m) correlation logs for well planning and drilling surveillance.
- Sometimes they get lucky and find bit records and mud recaps to provide more detail.
- Very large number of diverse data sets collected at rig sites from multiple vendors sometimes makes getting necessary data in a timely fashion a nightmare.
- Forcing engineers and managers to use text based morning reports to monitor well progress and other important information is time-consuming.
- As much as 60% of rig planning time is spent searching for relevant data.
- Up to 35% of project intervals are still consumed by non-productive time.
- Companies using e-mail and telephone to collaborate on drilling

projects have no systematic way to predict problems before they occur.

The acquisition of knowledge is a two-edged sword. Gathering the requisite knowledge to complete a project often takes an inordinate amount of time. However, to proceed without sufficient knowledge presents unacceptable risk. It has been postulated that every adverse event is predictable, but effort must be made to acquire the right foreknowledge to determine events with reasonable certainty. For any project, one end of the knowledge spectrum could be named "too risky" while if carried to the extreme, the other end could be labeled "too late." The challenge is to adopt practices that efficiently provide enough relevant and timely knowledge to enable activities to proceed with acceptable risk.

Root cause analysis

Interestingly, when a piece of equipment fails, the incident is often examined in exhaustive detail to ascertain the cause of the failure. The sum of a company's experience and engineering knowledge is focused on determining the underlying conditions that immediately preceded the failure with the

objective of developing practices that will prevent recurrence.

Why then, is it so hard to apply knowledge management principles to attack the root cause of drilling inefficiencies? One answer is that acquiring, collating, and organizing all the myriad data from widely diverse sources is an almost overwhelming task. The near impossibility of the challenge is appreciated when one considers the time limitations. Even when drilling a straight, vertical hole at traditional rates, if an unplanned event occurs there is little time to react to it, let alone gather all the relevant information and analyze it to determine the root cause.

What if?

An ideal solution would be to have a way to systematically monitor rig and drilling parameters in real time to observe hole conditions. What if rigs could be equipped with a new and improved time-based data resource like a new electronic Geolograph? What if drillers could use a single viewer to analyze any vendor's data stream from anywhere in the world, and quickly view the same data channels for every bottomhole assembly run in critical wells

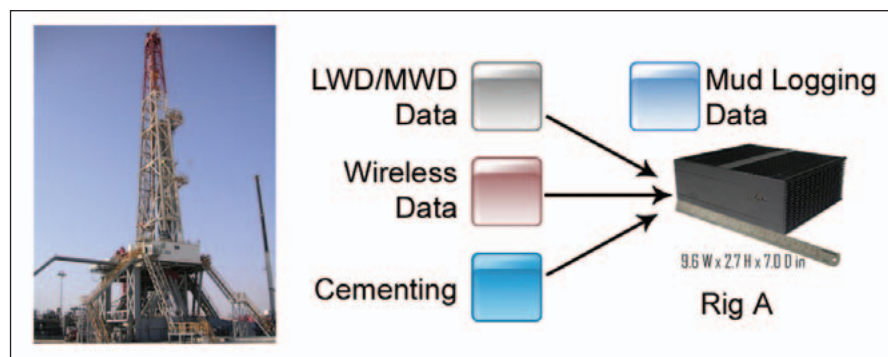


Figure 1. Information from any source can be accessed, stored and transmitted via secure Internet to any operator's facility, home, or remote location. (Images courtesy of Mobilize Inc.)

compared with the same data from previous wells instantly? What if all rig data were continuously translated into a common language that could be accessed and read using any specialized interpretation software package preferred by company experts? Such capability is available today through the use of Wellsite Information Transfer Standard Markup Language (WITSML).

WITSML is a “universal language” that allows data from any source like Excel spreadsheets, text files, WITS (Well-site Information Transfer Specification), LAS (Log Ascii standard), and others to be aggregated, stored, transmitted, and managed for the convenience of the user. By making all data accessible in a single language/format instantly, programs (specialized interpretation software applications) can be written to access any relevant knowledge needed to address any problem. It makes no difference whether the data comes from rig sensors, well logs, cementing or stimulation pumping units, or the mud logger’s cabin. Even the daily drilling report can be easily converted to WITSML, then transmitted into the system where any item can be accessed as needed.

Security is not a problem because WITSML data can be encrypted just like any other data. In fact, encryption can take place before or after conversion to WITSML. Client users can log on from their offices, from their homes, or from field locations 24/7 to access the information they need to do their assigned tasks or to react intelligently to unplanned events.

According to some early adopters, companies appreciate the ability to control data and archive it on invested databases. They like the ability of rig and office engineers to work off the same data sets, and they like having all

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data transferred by a single service provider. Already, companies are envisaging improvements, such as automated morning reports, that they can implement in the future to bring added efficiency to their operations and management teams.

The system does not have to be permanent, unless it makes sense to make it so. Portable WITSML aggregators have a small form factor. They can be transported to field locations in a briefcase, hooked up to pull custom data from any vendor instantly and begin transmitting coded data over the Internet. Leading service providers like Smith International, Schlumberger, Baker Hughes, and Halliburton offer their data in WITSML format already, as do several data providers, like Mobilize, Pason, and Kongsberg. Leading software applications providers do as well. Even if a service company does not routinely provide its data in WITSML, on-the-spot conversion is easy to implement.

History

The objective of building XML-defined standards for transmission of wellsite data in a consistent form was initially sponsored by major operators and suppliers within the data commu-

nity and was supported by the Petrotechnical Open Software Consortium (POSC). POSC, now known as Energetics, has provided independent hosting of the WITSML standards since early 2003. Most energy companies have implemented WITSML solution technology into their real-time and historical wellsite data transmission. The number of WITSML-compliant products has grown rapidly spurred by the uptake of real-time operation support centers that must be able to deal seamlessly with anyone’s data.

In the early 1990s, the concept of knowledge management was floated. At that time, knowledge management was elegantly defined as “the sum of a company’s knowledge coupled with global connectivity.” This powerful definition has stood the test of time. WITSML enables knowledge management by making data easily found in a convenient, usable format.

WITSML can enable the oil industry’s many niche providers to seamlessly integrate valuable products and services into the current knowledge-base. Similarly, innovative software applications programs can be easily linked with large operating systems if they follow standard protocols. Data gathering to facilitate development of new solutions is no problem if standards have been employed.

The operations war-rooms set up by most oil companies are characterized by large 3-D visualization media allowing rapid collaboration between multi-disciplined members of the asset team. With WITSML, any relevant piece of information from any source can be integrated into the visualization model and displayed in context to reduce risk for any decision.

WITSML can add the advantage of making supplier data useful in the current time-frame, when its value is highest. **E&P**