

WITSML IS THE KEY DATA SOURCE FOR AUTOMATED DAILY DRILLING REPORTS

Independent Data Services uses “lean automated reporting” powered by WITSML™ data to improve the speed and accuracy of reports and free up 1–2 hours per day for the costliest people on a rig.

THE CHALLENGE

INCONSISTENCY, ERRORS, TIME AND COST TO PREPARE THE DDR

Drilling systems automation. Well manufacturing. Rig automation. These are all terms that describe the industry's efforts to use computer technology to automate tasks and activities for improved performance and safety, and reduced costs in drilling operations. While most of the industry is focusing on the crucial first step — automating the physical actions—one company is focused on another key aspect: automating the related reporting, which is also an important part of drilling operations.

The daily drilling report (DDR) provides vital information about the last 24 hours of drilling activities, which includes information about the operations performed, progress made, materials used, problems encountered, and more. The DDR is required by operators, partners, and regulators to track progress, performance, safety, and costs.

Data from the DDR is also used to optimize the current operation and as offset data to optimize future operations. If the data accuracy is poor, the analysis based on this data will also be poor. The only option is for engineers to spend valuable time on quality control (QC), verifying and correcting data.

A typical offshore DDR has grown from 1–2 pages to between 4 and 6 pages, with the activities section (the detailed listing by depth of work and tasks performed, which delivers the operational narrative) often taking about 20–25% of the report “real estate” and more than 50% of the data entry effort. This increased content volume reflects operators' increased expectation for more detailed and more accurate data.

Sensors, wired pipe, and other digital oilfield technologies now automatically capture much of the required data. However, much of the required report data is still entered manually—and typically by the company man or the rig manager, some of the highest paid people on the rig.

While hand-written logs were long ago replaced by computerized data entry, even with the most sophisticated systems, completing the DDR can still take as much as 1 to 3 hours each day and this by highly paid personnel, who have many other responsibilities. However dedicated these technical professionals may be, they are still human, which means reports are subject to inconsistencies and errors. These errors can be further compounded if the data is used for future optimization.

THE SOLUTION

LEAN AUTOMATED REPORTING POWERED BY WITSML DATA

One company combines key new reporting technologies and use of WITSML™ data to automate production of the DDR, which dramatically improves the report's accuracy and consistency while freeing up personnel time for other important responsibilities.

Independent Data Services (IDS) has been delivering operational reporting solutions for upstream oil and gas for 20 years. The company has applied principles of lean automation to reporting and analytics for what they have termed Lean Automated Reporting (LAR).

IDS's LAR-powered reporting solutions access data from a WITSML data store; capture relevant contextual, numeric, and identifying data; analyze the WITSML and IDS data to determine operational states (operational state detection (OSD)); and use fixed text remarks (FTR) (which are structured text objects) to populate activities with consistent language and data. When a user opens the IDS DDR application, DrillNet, all data that can be automatically captured and computed is auto-populated in the report, including much of the daily activities section—which is the most important data and most time-consuming to enter.

SOLUTION DETAILS

LAR. With readily available real-time sensor data from multiple sources and the emergence of data sharing standards, particularly the WITSML protocol, IDS is automating access and processing of that data using LAR. “Lean” means maximizing value while minimizing waste—in short, more for less, with a goal of achieving a value-creation process with zero waste. For DDRs, LAR means optimizing the data flow from the point of acquisition to the delivery of analytics and knowledge extraction, and removing, where possible, manual data entry and processing.

WITSML Data. Data used to produce DDRs is accessed from WITSML data servers. WITSML is the industry-defined, vendor-neutral, data exchange standard for specifying and exchanging data for wells and well-related operations and objects, such as drilling, logging and mud logging. Drilling operations typically include solutions to gather and store data on WITSML servers, where data from sensors and other operations technology are aggregated. Client applications can connect to WITSML servers and use data as it is gathered and stored during drilling operations.

Most people know that WITSML includes log data along with related geological data (such as wellbore geology and formation markers) and survey data (such as trajectories). But WITSML also includes key operations and well construction data. For example:

- The Tubulars data object can be used to define any string of pipe, including drill strings, coiled tubing, and casing. Some example workflows using the Tubular object include: BHA component tracking, hydraulic calculations, displacement calculations, bit properties and statistics, and many others.
- The BHA Run data object is used to capture information about one run of a tubular string into and out of the hole.
- Several data objects are actually pairs of related objects so that data can be captured during planning and execution of a job, and post-job reports; these include: Wellbore Geology/ Mud Log Report, Stimulation Job object & report, and Cement Job object & report.
- WITSML also includes several key report data objects such as: Drilling, Fluids, and Operations.

Additionally, IDS leverages the WITSML data to accumulate and compute data for workflows not traditionally associated with WITSML data, such as well planning and logistics forecasting. The table below shows a subset of the data included in IDS DDRs and the corresponding WITSML data objects used. With a full set of WITSML objects available, more than 80% of the manual data-entry effort can be eliminated and more than 80% of the DDR content can be automatically populated.

IDS DDR Capabilities & Corresponding WITSML Data	
IDS DDR (subset)	WITSML Data Object
Activities	Log
BHA	BHA Run & Tubular
Bit	BHA Run & Tubular
Casing and Cementing	Wellbore Geometry
Drilling Parameters	Log
Formation Tops	Formation Marker
Fluid Volumes	Fluids Report
Rig Pumps	Ops Report: Mud Volumes
Surveys	Trajectory
Weather and Environment	Ops Report*
HSE	Ops Report
Bulk Stock	Ops Report
Personnel on Board	Ops Report

*In many cases IDS becomes the producer of the Ops Report and related objects because they are traditionally compiled as part of the daily drilling report workflow.



Most people know WITSML includes log, survey, and geological data, but it also covers key operations and well construction data.



OSD. Operational state detection uses multiple parameters from rig state, WITSML feed(s), and metadata contexts to process them concurrently to determine the current operational state. For example, if rig state is “Pull out of hole” (POOH), and bit depth is smaller than the last casing shoe depth, the operational state is “POOH” in cased hole. IDS has its own rig state detection (RSD) engine or can connect directly with WITSML-enabled third-party RSD suppliers.

Auto-Populating the DDR—including Activities. By automatically determining the operational state from the OSD engine and using that state to trigger the appropriate activity code, it is now possible to “build” the activity entries for the day directly from the OSD.

When certain activity codes are selected, the system uses fixed text remarks (FTRs), which are structured text objects, to construct correct and consistently structured activities for the report. For example, if the “Drilling Ahead” code is selected, the system presents the option shown in the figure below, so the user need only plug in the values (not type the related text).

Furthermore, by reprocessing the same incoming WITSML data for each discrete activity, it is possible to populate the FTR associated with that code with the correct absolute or average values for the duration of that state. For time intervals during which the operational state cannot be determined, the LAR service uses a visual cue to alert the user to a break in the sequence of activities in the daily matrix.

Drilling ahead from ft to ft with rpm

& gpm , psi SPP On Bottom, psi Off Bottom, klbs

WOB, in OD hole, klbs Up Weight, klbs Down Weight, klbs

Free Rot Weight, ft-lbs On Bottom TQ, ft-lbs Off Bottom TQ .

In IDS DataNet, users input values only, and fixed text remarks in the system automatically construct the activity description on the DDR.

Fixed Text Remark



Drilling ahead from 555 ft to 666 ft with 3 rpm & 4 gpm , 5 psi SPP On Bottom, 6.00 psi Off Bottom, 7.00 klbs WOB, 8.000 in OD hole, 7.00 klbs Up Weight, 6.00 klbs Down Weight, 111.00 klbs Free Rot Weight, 222.00 ft-lbs On Bottom TQ, 333.00 ft-lbs Off Bottom TQ .

THE BENEFITS

The IDS solution delivers step-change improvement in personnel utilization and system data quality by replacing time-consuming, manual processes with automated, data-driven processes. Specifically, this solution:

- **Improves accuracy of data, results, and ultimately operational performance.** Gathering and using data from measured sources (e.g., sensors, etc.) significantly reduces data-entry errors and eliminates double entry of data. More accurate DDR report data leads to more accurate analysis, for current operations and as offsets in future operations, which has the potential to significantly impact overall operational efficiency.

IDS is paying particular attention to improving the quality of well construction data and how it may be used to optimize well planning and logistics.

- **Saves time and money.** The ability to gather data and auto-populate fields in the DDR frees up operations personnel—often high-cost, high-responsibility people like the company man or rig manager—from manual data entry. These operations people can instead focus on other, higher-value tasks, for example, helping to troubleshoot and resolve operation problems. Engineering personnel who use the data for optimization can have greater confidence in the data, and reduce or eliminate QC efforts typically required for DDRs with manual data entry.
- **Improves efficiency and availability of software developer resources.** A WITSML data source provides a single, vendor-neutral connection to data; no need to maintain multiple connections to multiple proprietary data stores.

THE COMPANY

Independent Data Services (IDS) has been delivering operational reporting solutions to the upstream oil and gas industry for 20 years. In that time, the company has helped more than 200+ companies across the globe to capture, analyze, and report on their operational data, reporting on more than 100,000 operations on nearly 500 rigs. IDS solutions are completely Web-based and fully customized to meet the unique requirements of each company's operating environment. For more information, see <http://www.idsdatanet.com>.



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