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Drilling advances

The human touch

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Check out the results of any inquest into a deepwater well control incident, and odds are that “human error” will appear prominently among the identified root causes. What typically goes unreported, however, are the underlying factors that led to said human error.

Dr. Mark St. John, director of cognitive systems at Pacific Science & Engineering Group, Inc., of San Diego, Calif., hopes to fill that gap later this year with the so-called Trident assessment tool. It considers human factors alongside the BOP and other physical well control barriers in the planning of a deepwater well. Working in conjunction with drilling consultants **HTK International**, St. John said the tool essentially translates into questions that the common links extrapolated from a specially built database of well control incidents.

The Trident project was initiated in August 2013, as part of the ultra-deepwater program at public-private Research Partnership to Secure Energy for America (RPSEA), with St. John as the principal investigator. The intended aim of the initiative, now in its final phase, was the development of “a human factors database and decision aid to help industry practitioners understand, and mitigate, those aspects of deepwater drilling in which human and organizational performance limitations can result in the failure to meet safety, environmental, productivity and other system goals.”

St. John said much of the project’s first two phases were devoted to building a database that now includes some 60 well control incidents, which were evaluated with the goal of identifying common, human-related links. While data were collected “here, there and everywhere,” owing to the level of detail included in post-incident reports by the U.S. Bureau of Safety and Environmental Enforcement (BSEE), the data sets largely are confined to the Gulf of Mexico, he said. “We looked, for

example, at the (DNV) Worldwide Offshore Accident Database, but it only included short, primarily demographic descriptions, such as the water depth and region. It, and the others we investigated, did not give us any of the human factors information we were looking for. BSEE was the only real source for the level of detail we wanted. What we really liked were those in-depth BSEE panel and district reports."

Common links. The role that human factors play in safe well delivery has gained steam in recent years. In a December 2012 study of "Human-related root causes behind oil well drilling accidents," the Norwegian University of Science and Technology in Trondheim analyzed a blowout on Norway's Snorre A platform, and a well control incident on the Gullfaks C platform. The study identified training and competence as the primary human factors contributing to both events. St. John said that after plumbing through the Trident database, delay and lack of wariness appeared as common links.

"The general theme [in the database assessment] was delay," he said. "There might be a delay in even detecting there was an issue, and then there was a delay in doing anything about it; to stop and check for flow or do any kind of other investigation. And ultimately, there was a delay in shutting in the well. Sometimes that would get the best of them."
"Another thing we saw was kind of a lack of wariness. Not that the rig crews were being cavalier in any way, but I think rather they were performing their duties in the regular way and unaware of the true nature of the situation. Some barrier, perhaps, was not as perfect as it should be, and they didn't know that. In some ways, they were perhaps overconfident with respect to the true situation."

Meshing disciplines. St. John said the combination of drilling and human factors expertise provided a sound foundation for the project. "As drilling consultants, **HTK** certainly gets into the complexities of the drilling process and the physical barriers, but they didn't come with any human factors background, so I brought that to the table. But, I didn't have any drilling background; they brought that to the table. So, it's been a really good collaboration."
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he coupling of disciplines allowed the collection of human factor barriers culled from the database to be modified into assessment questions that can be taken to a rig to identify and rectify underlying issues. "We translated all the human factors barriers into assessment questions, so

we can really dig into the human factors in general and, specifically, in areas such as pore pressure monitoring, hydrostatic pressure maintenance, pit management and kick detection itself," he said. "A number of questions are things an assessor would ask, such as, is this an effective display of information? Are the alarms effective from a human factors point-of-view? Then, there are a number of questions we ask the crew: 'Do you have such-and-such training? When was the last time you did a certain type of drill?' And, of course, we definitely ask about fatigue and the company's policy in that regard."

In an initial deepwater Gulf of Mexico pilot test, St. John said data from the drill-well-on-paper (DWOP) exercise and crew interviews raised an issue that had not been identified in the database evaluation. "In addition to looking at the barriers to see whether they were effectively implemented, the other thing we discovered were inconsistencies of knowledge among the crew members. One example, the driller thinks the mud loggers know how to calculate pore pressure, and then the mud loggers tell me, 'No, we don't calculate pore pressure.' So, then I have an inconsistency that could get us into trouble."

St. John said Trident is nearing the point of becoming an integral part of a deepwater well plan. "I think we want to do a couple more pilot tests to really nail down the procedure and refine the questions. But, I would say by this fall we'll be ready to begin commercializing it. That's the plan."

THE AUTHOR

Jim Redden is a Houston-based consultant and a journalism graduate of Marshall University, has more than 38 years of experience as a writer, editor and corporate communicator, primarily on the upstream oil and gas industry.