Real Time Monitoring for Offshore Operations

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Does your company use real-time monitoring for its offshore operations? If not, why?

- BHP Billiton utilizes real time data monitoring capabilities. The real time data is accessible to the drilling and completions team, including third party vendors, as needed. BHPB does not utilize a staffed 24/7 real time data center.

- A room is setup in the Houston office for discussing real time data, as a team, if needed.

- Real time data is available on mobile devices for the team members to support and understand ongoing operations.

- Real time data is monitored by several parties onboard the Drill Ship. Data is monitored onsite by mudloggers, Transocean and BHPB personnel 24/7. Well control parameters (volumes/flow/etc) are monitored continuously by the BHPB, TOI personnel and 3rd party vendor onsite.

- Remote tools and monitoring could cause offshore personnel's responsibilities to be diluted, attention diverted from things they should be diligently monitoring onsite, and potentially makes the chain of command less clear.
If your company does use real-time monitoring, what are the critical operations and specific parameters that your company monitors?

- BHP Billiton has the capability to remotely monitor operational parameters, volumes, formation evaluation logs.
  - Gas, ECD, LWD, WOB, Block Height, Torque, ROP, Volumes / Flow.
  - Particular operations that are monitored from well to well are: TD selection, Cement Jobs, Frac Jobs, and anytime there are questions or concerns from the rig or office.
Do you believe there are specific types of wells or operations and parameters (for drilling, completions or workovers, or production operations) that always should be monitored with real-time monitoring?

• For all wells, the data related to well control should be monitored and double checked **on board the rig**, at all times. Having a 3rd party mudlogger and BHP Billiton personnel onboard allows for continuous monitoring of the data, over and above the continuous monitoring done by the drilling contractor – who is responsible to monitor and understand all parameters related to well control.

• We believe that personnel in town should have access to real time data, as needed to support the personnel onboard the rig. Casing point selection and confirmation of cement job execution are always checked by personnel in the office.
Are there specific criteria or risk thresholds that your company uses to prompt real-time monitoring requirements (e.g. factors such as well or water depth, frontier area, HP/HT wells, or well complexity)?

- There are requirements for what must be monitored by BHP Billiton, 3rd party and TOI personnel onboard the rig. We do not have requirements for remote real time monitoring.

- Remote Real time data is actually used daily, during drilling / completion operations by Superintendents, Engineers, 3rd party vendors and management.
Does your company rely on any automation and predictive software in real-time monitoring?

• Alarms are used on the rig to bring attention to data that needs to be viewed. No predictive or automated software is used for the drilling operations.

• Predictive software is used in the planning of the well to give a road map of what should be expected during operations for such things as:
  – Torque and Drag
  – Required pump pressure at different pump rates
  – Required mud weight / frac gradient using offset information and models

• A deviation from the planned parameters, at times may give a warning of problems in the well. This is monitored onsite by the drilling contractor, fluids engineer, geologist, BHPB engineers and supervisors.
What role could automation and predictive software tools play in real-time monitoring?

• If automated or predictive tools were designed, they would be best situated onsite – not run remotely.
  - Communication interruptions may occur during bad weather
  - Most likely, tools would need to be used as indicators or alarms, to allow a comprehensive understanding of everything that could affect the predictive / automated tools.
    › Crane movements, sea conditions, workstring size, fluid transfers, material being removed from the fluid system, hole conditions, ballooning formations, etc.
What role could condition-based monitoring play in real-time monitoring? Describe how operating equipment using condition-based monitoring could be tailored and/or used for real-time monitoring

- BOPs and critical rig systems can be logged into for troubleshooting and remote support.
How could BSEE leverage such technologies? Which activities could real-time monitoring supplement or replace?

- In most areas that RTM is available (drilling / completion operational parameters) it could be difficult for BSEE decipher the information without a full understanding of everything going on the rig.

- Potential use of archived data to understand issues, to verify information on IADC reports, or for investigations.

- Real time monitoring could not replace onsite inspections, but could potentially be used for BOP test pressure monitoring. There could still be issues with communication systems, that might not allow it to be ‘real-time’.
What opportunities do you see for BSEE to use real-time monitoring to provide timely, functional, and value added inspections?

- RTM could not replace onsite inspections, except in an area like viewing pressure test charts remotely. The RTM could not replace understanding of the condition of the operation that is received by talking with individuals and looking at the condition of many parts of the ship.
What would you recommend that BSEE do in the real-time monitoring area?

• Recommend that BSEE have a requirement to use RTM for supporting well construction decisions and troubleshooting. But should not dilute or remove the accountability of the onsite personnel to make well safety decisions.