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Implementing Drilling Centres in a High Pressure Environment

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Abstract

As part of BG Group's global iValue programme, BG has installed drilling focused real-time collaboration facilities (Drilling Integrated Collaborative Environment) for their current North Sea HPHT drilling schedule. The Drilling ICE (dICE) concept is one of the central elements of BG Group's global iValue programme

The focus of the dICE is to change the way the well engineering teams based onshore and offshore work together, to enable to the collective wealth of their experience to be used for the benefit of the drilling program. The primary focus of the facilities is to improve the operating uptime and drilling efficiency through the identification and resolution of potential issues before they have the chance to become an actual operating problem.

BG Group's pragmatic approach brought together both internal and external domain experts to design and implement the facilities using off-the-shelf components. This group also examined and planned for the evolutionary changes to the drilling decision processes and workflows within the organisation.

The technology implementation to facilitate real-time data flows and decision processes for the dICE required collaboration between multiple vendor organizations. In addition, significant change management was necessary to enable the transition from old to new job roles and the decision processes within the facilities

A benefits realization framework has been implemented to track improvements in efficiency and operating uptime.
This paper is focused upon the BG Group approach to this project from a people, process and technology perspective and the benefits realised to date.

Introduction

BG Group's installation of a Drilling Centre in Aberdeen (figure 1) is a critical element in its iValue program and will provide the hub for an HPHT Centre of Excellence. A fast follower approach of proven capabilities and technologies has been adopted which has streamlined the pilot evaluation programs.

Figure 1 Computer image of drilling Centre in Aberdeen office

Business Context

The recent increase in drilling activities has led to a scarcity of resources and in addition there has been a decrease in the level of experience of offshore crews. When this is combined with increasing drilling environment complexity and well plans, and the heightened focus on performance metric reporting and analysis, it results in non-productive time being scrutinised more closely than ever. Add to this the current rig rates and the focus on managing non-productive time is more intense than ever before!

This is a similar situation to the drilling Industry position in the late 70's which resulted in a measurable decrease in drilling performance (figure 2) (1).

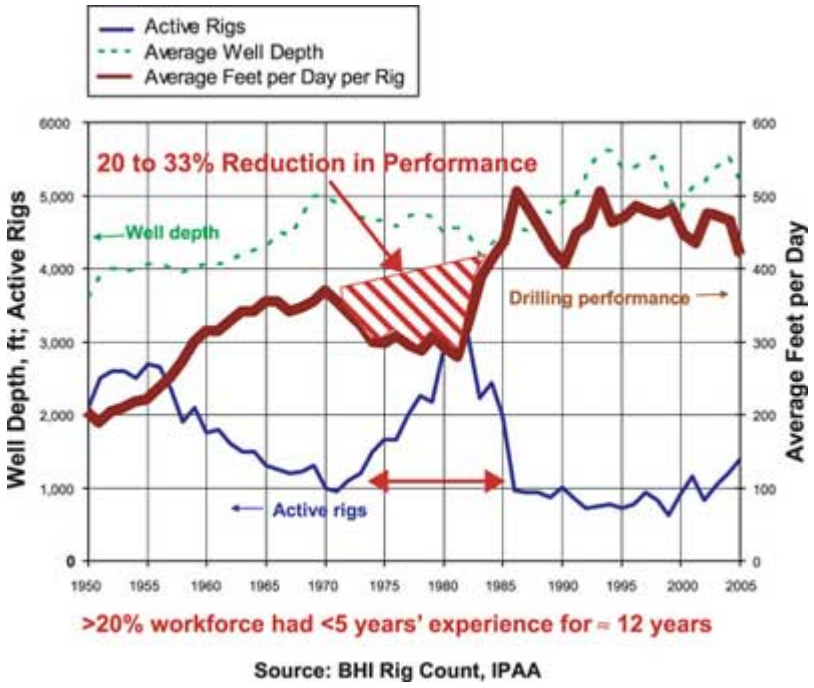

Figure 2 Impact of competency gap on drilling performance. (Brett, 2007)

Approach to project

BG's approach has been to provide facilities that will result in a significant increase in the level of support for offshore in order to improve performance. The primary focus of the dICE is to improve operating up-time and drilling efficiency (with a corresponding reduction in Non Productive Time (NPT). This project is NOT a de-manning initiative. The onshore team now has the capability to provide greater support and utilise their expertise proactively in support of their offshore colleagues, rather than only being available for post-event analysis.

The period between final acceptance of the business case and well spud was only 3-4 months. A fast track project was initiated that pulled in external expertise, to work alongside internal experts. These resources were used primarily to provide domain expertise, such as an experience of layout designs, understanding of the technology suppliers, and the change management issues the project was likely to face.

People

The importance of getting the behavioural change in the team right, has been identified in other drilling centre projects (2) & (3). If the team are not fully engaged with the new behaviours the project will fail. The full team was therefore involved early in the project process in order that they could plan for the change the new environment would make to their roles. This process involved classical "team building" activities as well as site visits to other centres. These visits were then supported by a visioning workshop to get alignment in the team as to what the purpose of the facilities are, what will be the benefits, what will be the issues, how they wanted to use it, what will they need to do differently.

A number of key issues were brought to the fore that then allowed the teams to enter the new facility with an open mind and with the intention to address these challenges as they emerged:

- Intrusiveness of cameras for video-conferencing and viewing rig operations;
- Value of monitoring real-time data both offshore and onshore and the increased transparency of operating decisions;
- Increased involvement of onshore in operating decisions resulting in the Dilution of the Company Man's authority; and
- Increased pressure to reduce NPT due to these facilities that may shift focus from other key operating measures.

It was known from experience elsewhere that limited value can be derived from simulating ways of working unless the technology is well known to the team already. Only when the facilities are up and running and the team are working on an active project can the changes in the ways of working be assessed and subsequently challenged on how far these working methods might change.

Environment

The room environment incorporates lesson learned from others such as:

- The importance of location relative to other part-time members of the drilling team to allow easy access for collaboration;
- Provision of short term "hot desk" facilities for on demand use within the workspace;
- High level of visibility of the team and the real-time data to promote ad-hoc collaboration from passers-by and increased desire for cross-discipline learning; and
- Provision of high quality ergonomically designed furniture systems that facilitate both individual and group based workflows.

Rather than a fixed forward facing layout commonly seen in Operations Centres supporting platforms, BG chose a combination of joint/private workspaces to allow easy switching between different types of working patterns in drill programs and use as a Centre of Excellence.

It was recognised that as part of the change management process, that the team had to be comfortable in the environment. It was afterall the team's working area that is changing; it was therefore important that they were involved in the design of the rooms and had the final say on the layout of the facilities. This has resulted in facilities that the team feels they "own" and are excited to use, rather than a room designed primarily to increase collaboration which the team would have been uncomfortable with.

Technology

The users had a number of needs that the technology solution should provide:

- Room visualisation and data display functionality to be in a push button/ plug and play state of readiness at all times;
- Real-time data displayed in the same manner on and offshore;
- Real-time data management backbone providing data conduit for all real time data types independent of supplier and data sampling rates and volumes;
- Complete tie-in with well engineering(e.g. EDM) and geo-modelling (e.g. Petrel) software so that real-time trend analysis can be performed; and
- Ability to recall historical and analogous well data and manipulate it.

More broadly BG defined by purpose of room with an eye on proving solutions ready for other drilling centres and the potential for a global drilling support centre. This resulted in these additional requirements as part of the technology solution:

- Real-time data technology that enabled BG to replay the real-time events in one standard BG designed data display format, both onshore and offshore, irrespective of the service company on the rig;
- A video-conferencing (VC) system that was software-based to allow flexibility to balance picture quality with how much bandwidth was consumed across a satellite link; and
- VC that allows multi-point locations for input and output – drilling centre, adjacent meeting room(s), laptop from remote locations, in the Company Man's office on the rig with the most appropriate set-up at each.

More broadly the approach was to look for solutions that could scale across other centres. This resulted in a number of

primary requirements:

- Service-company neutrality in the provision of real-time data acquisition to allow common re-useable formats;
- Standardisation of the real-time data display formats for current and future drilling operations, regardless of service company or geographic location;
- Transferability of data acquisition rig hardware from one drilling rig to another;
- A VC solution that can be used across satellite, microwave and fibre connections.

Process Change

The processes for the delivery of a drilling program were well established amongst the team selected for this well. However there was no experience of how these processes would differ given the new capabilities that a collaborative environment provides. BG is therefore evaluating the change in processes as the centre develops.

The approach will be to document the way the new work-flows operate so that they can be referred to on subsequent wells. These will include:

- Simple process maps - new/revised steps including who now involved, frequency, type of interactions and changes in organisation, accountability and authority as result (RACI);
- Protocols used for communication;
- What types and sources of data needed to be available;
- Any new analysis that was carried out;
- Any additional physical environment requirements; and
- Ongoing and on-demand technology and scenario based training to enable the new real-time workflows.

Where the processes did not exist previously such as the use of real-time data fed into drilling applications, BG has brought in part-time expertise to facilitate the development of new work flows.

For those processes related to engagement between the team, BG has used a change manager both onshore & offshore to assess and coach on how communication and room use is going.

Benefits Capture

The project has implemented 3 methods of benefits capture to log the effectiveness of the room to improve performance and to highlights lessons on how to improve either the people, process, technology aspects of the room.

1. An Event Log to capture an event that resulted in increased NPT where the Drilling Centre did or might have contributed to improved performance. This includes information such as:
   - Did the Drilling Centre help avoid/ reduce impact of event? and
   - Recommendation - Any improvements in People, Process or technology that could help avoid/ reduce impact of recurrence.

   With more data, comparison of productive versus non-productive time could be analysed within the real-time data management systems allowing a quantitative measurement of changes in behaviours and resulting NPT.

2. A series of observations made on a regular basis by an engagement coach who is noting the changes in attitudes and behaviours as the Drilling Centre develops. Social Network Analysis is also being used to identify how interactions between the team has improved.

3. A satisfaction survey issued to the users of the capability to assess their confidence in the facility and their recognition that it the facility has changed the way the team are working.

Early results

The team has within the first month of operations already noticed an increased level of situational awareness from the use of the dICE environment and associated tools.

Lessons Learned

The implementation has allowed us to capture a number of lessons that we will be applying for the other BG locations:

- Layouts – pick the right one for the type of work patterns;
- Train staff on the full capability of the technology so they can get the most from it – have ongoing technical support and user visits planned;
- Do not assume using a standard *e.g.* WITSML 1.2 (4) means immediate compatibility with other software that is labelled as compliant; and
- Reliability of technology and communications is the key to building team confidence in capability.

Way forward

Our fast follower approach has allowed BG to start planning centres in 4 other locations using a similar approach.

References

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(4) Witsml.org, 2007, viewed 04 |November 2007, <http://www.witsml.org/schemas/120/WITSML_Schema_docu.htm>