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BP Deepwater Gulf of Mexico Integrated FIELD OF THE FUTURE Case Study

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Abstract

This paper will take us through the journey of integrating BP's Gulf of Mexico Information Management and FIELD OF THE FUTURE (Reddick, 2006; Reddick, et al, 2008) Strategies to deliver a powerful, combined technological solution. Only when both of these pieces are working together, can you truly start to use IT and automation technologies to optimize the business.

The paper will start with the information management story four years ago when we had four producing assets and four major projects behaving as individual businesses. It will then describe the creation of a strategy that focused on getting the information foundation right first.

The paper will then describe the integration of the foundation data sources into a web portal and organized in the way that people do their job. The paper will contain examples of real time data systems that give our asset support teams and vendors access to performance data on their machines. The paper will also discuss new processes that allow the advanced collaborative environments to take advantage of the new kit.

Finally, the paper will discuss the optimization efforts that are possible after a robust information foundation layer exists and is tightly integrated in the way that people do their work.

The lessons learned in the Gulf of Mexico over the last four years are:

- Need merging of FIELD OF THE FUTURE and Information Management strategies
- Need new processes developed and support models defined for new tools
- Need to use common information management architecture across entire business

Benefits that we have seen for our combined strategy are that:

- Faster, more coordinated responses to severe weather events
- Reduced personnel on board thereby lowering HSE risk and lowering our operating expense
- Increased worker productivity due to much quicker access to and visual presentation of the data
- More rapid development of business tools

Introduction

In early 2004, BP's Gulf of Mexico assets included four producing offshore platforms. Two were implemented by Amoco and two were implemented by BP. As a consequence, different data historians, process control architectures, etc. existed. When these businesses were combined into one strategic performance unit in the Gulf of Mexico, it was difficult to benchmark the platforms against each other. Key performance indicator definitions were different and status updates were performed differently. However, leadership was committed to delivering a one team vision and created a new information management role to bring it all together.

At the same time, under the FIELD OF THE FUTURE effort (Reddick, 2006), new applications were being delivered by our central technology teams that were aimed at raising the technology use in our assets. The tools relied heavily on real time data and content knowledge of our business for proper configuration. In order to successfully implement FIELD OF THE FUTURE applications at scale across all of our platforms, it was realized that the effort would fail without having information that was robust and easily attainable. Thus, the concept of a merge between FIELD OF THE FUTURE implementation and information management efforts was taken.

Statement of Theory and Definitions

Vision

In order to get a handle on the situation and make progress on creating the one team culture, the first step was to develop a vision of a compelling end state that could be used to rally the business. The vision was completed by envisioning the future as if the vision was achieved. If our efforts were successful, the business would exhibit the following:

- Our work efficiency is at an all time high
- Our integrity management has driven our HSSE incidents to all time lows
- Our reserve recovery and production has exceeded our past technical limits
- Our production efficiency is recognized as best in class

Our work efficiency is at an all time high means that our organizational capabilities have been optimized. Our people employ standard business processes and integrated, automated information systems to allow our technical experts to focus on higher order tasks that address the growing complexity in exploration, drilling and production operations. In the past, engineers spent days hunting for information to use in modeling, reports and benchmarking. We can not afford such time-intensive tasks in the coming era of skilled labor shortages.

Our integrity management has driven our HSSE incidents to all time lows means that our people use online technologies for real-time remote monitoring, integrated planning and predictive maintenance. We have complete records and documentation supporting as-built design and ongoing condition on all our equipment. Unplanned losses have been eliminated, and onsite interventions and safety incidents are at all-time lows.

Our reserve recovery and production has exceeded our past technical limits means that our people consistently leverage state-of-the-art tools integrating real-time visualization, modeling, and advanced controls to allow optimal business decisions real time. Our reserve recovery is optimized and our production facilities continuously operate at their installed production capacity.

Our production efficiency is recognized as best in class means our people effectively monitor and control our assets from fully equipped remote operations centers. Our people work together using remote collaboration tools to link onshore and offshore teams and to access cross-asset or global experts instantly to optimize production, reduce lifting costs, and address issues remotely in real-time.

This vision would just be empty words if not followed up and things were not moved forward. To help drive the organization towards this goal, we developed a three layer Information Management strategy of Foundation, Integration and Optimization as shown in Figure 1.

Strategy

Foundation

The top of the pyramid was Optimization, where a lot of the excitement and potential efficiency prize is perceived to lie. However, the key part of the strategy was that the business should not jump to that level before completing the first two layers: Foundation and Integration. At the base is a strategic foundation involving a common, reliable and secure infrastructure coupled with data management that addresses the company's entire spectrum of operations, including drilling, production accounting, HS&E, and reservoir and wells. Developing this Foundation layer encompassed getting an inventory of all of the discipline software applications in use. It also involved getting a handle on the hard copy record requirements of the business. Each asset team had at least one hard copy file room. Some had two. At the same time that this effort was occurring, a restacking of the building into open concept from individual offices was planned. This did not leave room for the same amount of hard copy space in the restack world. Thus, a fundamental shift in how we did things was necessary. In the

effort to get the business aligned into the one team concept and away from silos, it became necessary to standardize on a common toolset. Along with that toolset, we needed to develop the control processes and personnel support to manage and keep the information current.

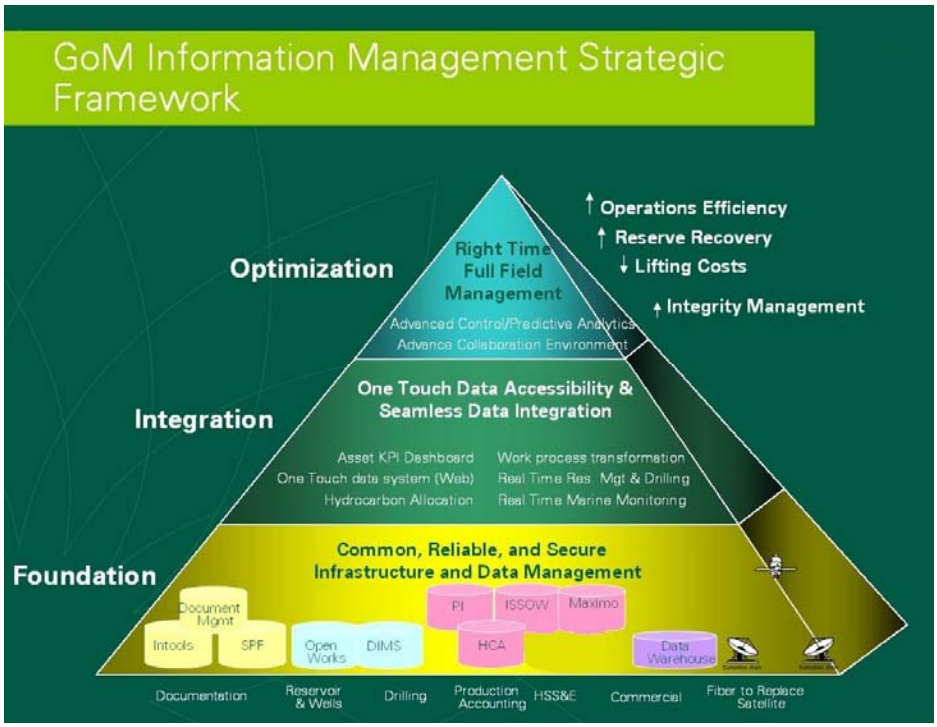

Figure 1 Gulf of Mexico Information Strategy

The other Foundation focus was to provide real time data to our business. As mentioned previously, this capability was a requirement of the FIELD OF THE FUTURE tools, which included the Integrated Surveillance Information System (ISIS) on some of our wells in the initial offering. As Figure 2 shows, this information flows from the offshore platforms over 300 miles in the Gulf of Mexico to our offices in Houston over satellite. As seen in Figure 2, there are other discipline tools relying on real time data, including real time drilling, advanced subsea warning tools (Gudimetla et al, 2006) and our general visualization tools.

The satellite links provide a view into our operations. This helps to support and enhance our one team concept. As can be seen in Figure 2, we provide monitoring data from all of our offshore control systems to our Houston Advanced Collaborative Environment (ACE) (Castro et al, 2007) where the identical distributed control systems screens can be seen by the onshore teams.

In addition, after the real time data flow was created, we extended the data flow to our equipment vendors all over the globe. This allowed a pathway for vendors to support their equipment over our secure and segregated networks. The onshore asset teams are able to share the same context as the offshore teams. For instance, if a process upset occurs, both teams usually find out at the same time. We know that latency over the satellite links is in the seconds range. We are installing fiber that will reduce that latency even further.

New business processes were required in order to take advantage of the new capability in the ACEs. In addition to implementing the FIELD OF THE FUTURE toolkit, a common upset response process was developed so that the assets could learn from each other's experiences. Also, the common supporting groups would be able to quickly disseminate learning's from one asset into another. In addition, since we had several new assets coming on-line, we developed a first oil process that helped them fully utilize the ACE toolkit in support of that effort.

Integration

Once the data sources were standardized and understood and real time data was flowing, the next step was to integrate them into a more powerful and collaborative form. This form provided one-touch accessibility and seamless data integration for

immediate use by knowledge specialists or management. In implementing these improvements, success depended on some basic tenants: data must be easily available and documentation must be up to date and locatable.

In integrating the data, we exposed underlying gaps in discipline application use. They were configured to accomplish a specific immediate task without considering the longer term impact. For instance, our drilling information tool was routinely configured using the alphanumeric instead of numeric fields. Once this application was integrated and we started presenting the data back to the users, they saw the issues with this practice. If data had been stored in numeric fields, then automatic generation of well profiles would be possible within the tool. Once presented with the issue, the business realized they needed to own the quality of the data. All during this process, we interviewed the discipline teams to understand how they used their tools so that we produced an integrated application that worked the way that they did.

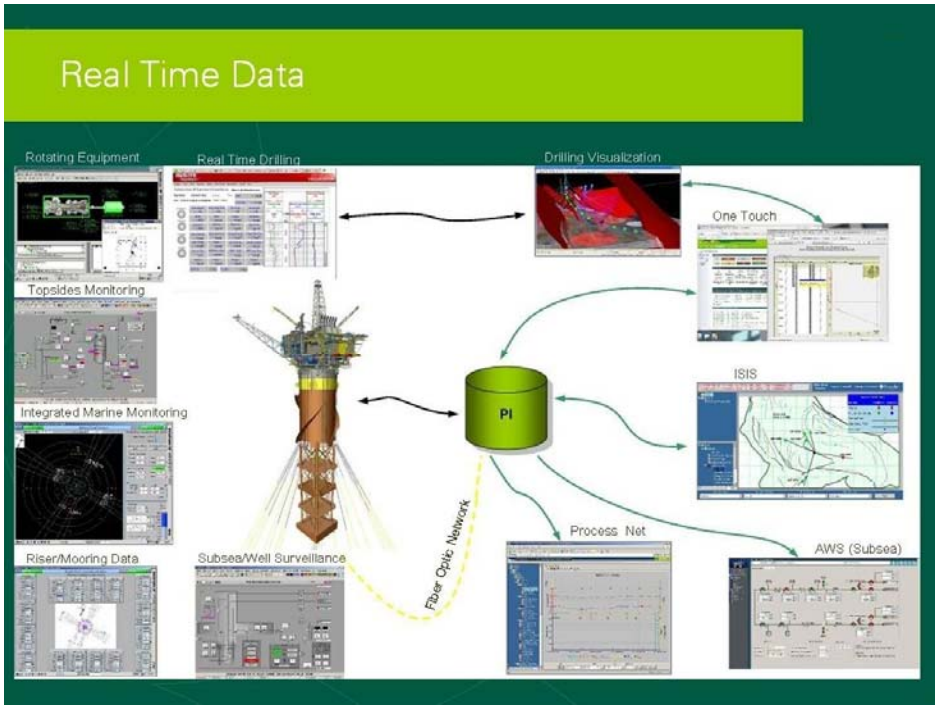

Figure 2 Real Time Data

Description and Application of Equipment and Process

Our Information Management strategy included keeping our applications as off the shelf as possible. For the integration layer, we deployed standard products from outside the industry to create a basic architecture to deliver solutions quickly. This architecture assembles a number of components within an online Web browser using dashboards to provide personnel immediate visual status of ongoing operations. From the dashboards, personnel can drill down to in depth documentation and performance data by clicking a mouse button.

More specifically, our business portal is based on Microsoft Office Share point Services 2007. We have added web parts for integrating our document management system, our equipment tag database and real time data historian. Because our architecture is mostly off the shelf and scalable, we are able to rapidly add solutions to serve the business need. While the solution may appear custom, it is based on architecture that has components that can be switched out without the end user being impacted. This allows us to enhance capabilities as applications become more and more robust.

Also, as we added more and more communities to our portal environment, demand on upgrades to the existing communities grew. For example, the wells community that had seen an improvement from six weeks to two minutes was now saying that even that was too slow. They also wanted to see real time data from the wells added to their portal. We realized that we needed a robust support model to handle both the new communities and the existing ones. This caused us to transition the portal support from the project team to our central IT group to ensure long term survivability of the portal.

Presentation of Data and Results

As mentioned in (Castro et al, 2007), the secure and segregated networks set up as part of this effort allowed automation engineers previously based offshore to be moved onshore and reduce personnel-on-board limitations on the platforms. This also lowered our operating expense as dual shifts were no longer required. More importantly, the employees could go home at night and on weekends.

One early successful example of improving worker productivity through the Integration layer involved transforming a well review data gathering exercise from six weeks into two minutes. The portal facilitated discussion because all of the relevant data was visualized in one place with tools that were truly interactive. This early win demonstrated that integrating discipline tools into a web portal that was set up to support the way that people work delivered high value. Other groups in the business started asking for a similar integration of their tools and data.

With the award winning (Computerworld 2007) hurricane management system, we are able to visually combine weather feeds with operating and human resource data. With faster access to information we could take better decisions during the strike of a natural event, such as a hurricane and have safer and more efficient offshore operations. We could also deliver humanitarian aid to our employees and contractors in the event of severe weather or other catastrophe. In this system, we have tools that allow us to visualize where they are located. We have processes developed that inform employees to check in after the immediate threat has passed. Using GIS-enabled views of the impacted region and knowing where our employees are located, we can better coordinate where to deliver food, generators, ice, etc. to deliver the most aid faster to the appropriate location. In addition, satellite photos of existing platforms can be updated and compared to previous photographs to determine the extent of potential damage to offshore assets. We have extended the use of this technology to help with hurricanes in the Gulf of Mexico, fires in California and other natural disasters around the United States.

Optimization

After we developed the Foundation and Integration layers, we were ready to move onto the upper-most level where the rewards are greatest. The Optimization layer includes advanced control, predictive analytics, real time optimization and the expanded use of Advanced Collaborative Environments (Castro et al, 2007). As documented there, we have demonstrated significant savings based on making better decisions faster during process upsets and efficiencies gained by bringing support onshore. Figure 3 shows an ACE in practice.

Figure 3 Advanced Collaborative Environment

In addition, we have integrated many portions of our business into our portal environment. Besides those already mentioned, these include: an updated wells community, commercial teams and integrity management. With the installation of an 800 miles long fiber optic cable to our Gulf of Mexico assets in 2007, the offshore community becomes a candidate for integration into the portal. Previous bandwidth limitations due to the limitations of satellite links are removed and many other possibilities can become reality, such as remote hosting of servers.

Conclusions

Increasing technology use in the exploration and production business is a great goal to have due to the many rewards possible. In order to be successful in this, the journey must include the following:

- Merge information management and FIELD OF THE FUTURE strategies
- Develop a compelling vision and strategy to align the business behind the effort
- Consider the foundation requirements for long term sustainability.
- Keep the integration of the foundation data sources developed on off the shelf applications.

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