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# Realizing Value From Real Time Well Monitoring in BP's FIELD OF THE FUTURE Program

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## Abstract

BP's FIELD OF THE FUTURE program makes use of in-well sensors, automation, and computer networks to move real time operations data to remote sites for analysis, enabling informed and faster intervention decisions. Realizing the value from such technology investments is not automatic, and requires an integrated approach to technology insertion that holistically addresses diverse issues of technology installation, stakeholder engagement and alignment, business process change, roles and skills as a managed project. We refer to this type of integrated approach applied to digital oil field developments as business transformation, which was described in outline in SPE 99779. This paper describes a recent case study from a Deepwater Gulf of Mexico field where there has been rapid and quantifiable business impact from the use of real time well data in the performing dynamic surveillance and allocating production processes.

BP's proprietary Integrated Surveillance Information System (ISIS) was put into global deployment starting in 2006. The system delivers well performance data to field and office sites in near real time. To realize the value from the ISIS tool, asset teams must be informed and aligned about the possible impacts on roles, skills, and business processes before, during, and after technology deployment. The case study starts with an examination of some of the historical factors that have limited rapid, global adoption of new technologies in BP. It describes the unique aspects of the overall business transformation project design and timeline, and some of the key work products required to establish both the case for change and business case. Finally, it presents some of the dimensions of business value that can be associated with the use of intelligent well information.

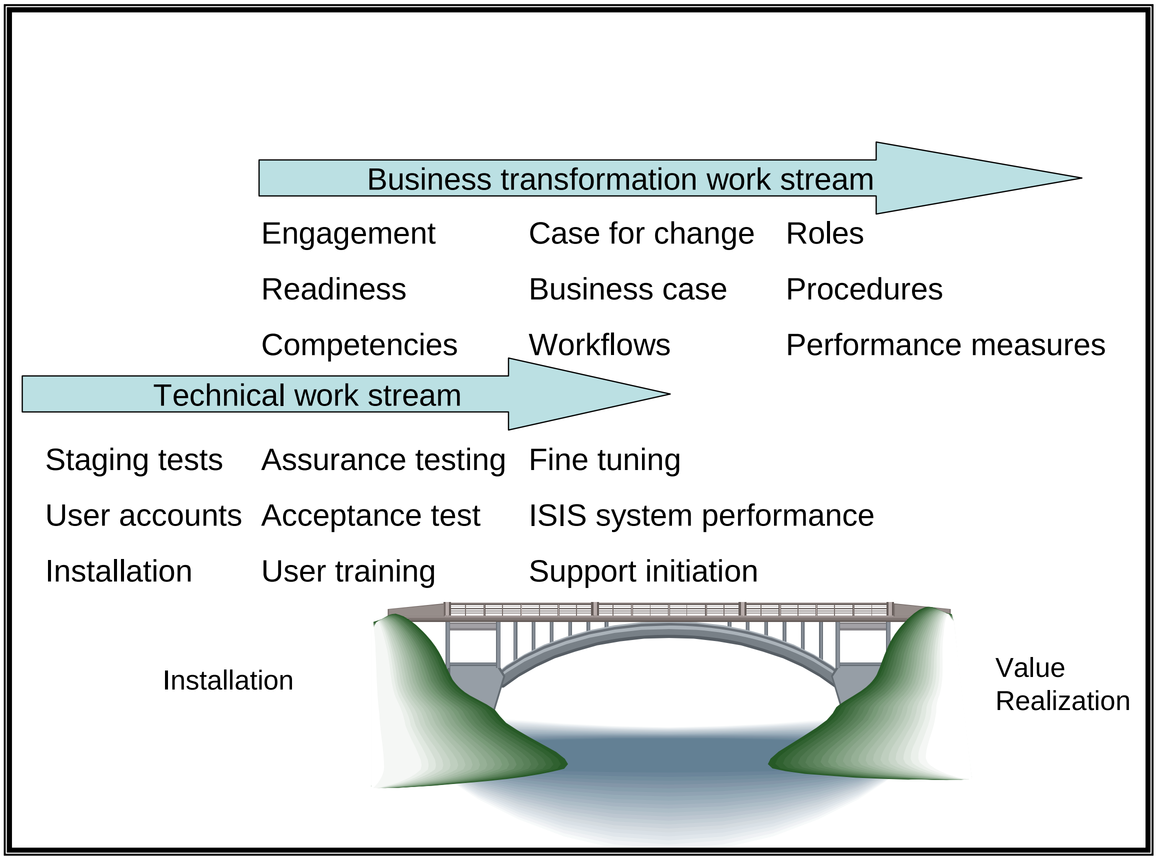
Looking forward, the paper describes some of the remaining challenges and opportunities dealing with scale up, acceleration, and centralized business process governance.

## Introduction

The digital oilfield concept has been widely discussed for more than three years in E&P literature. Benefits of enhanced recovery, decreased operating costs, and increased production derived from continuous monitoring and proactive intervention have been forecast as the consequence of this transformation to real time asset optimization. Nevertheless, there have been references to the difficulty in crossing the chasm in adoption between some early trials or pilots and main stream uptake. BP's FIELD OF THE FUTURE program makes use of in-well sensors, automation, and computer networks to move real time operations data to remote sites for analysis, enabling informed and faster intervention decisions.

Even at the single asset level, there is a big difference between installation of new technology and adoption. Since many IT technology projects are heavily front-end loaded, it is only by reaching the adoption stage where people use it to support their work tasks that technology introduction begins to generate benefits. If our common goal is predictable, fast, cost effective adoption of one or more real time technologies, understanding how to replicate successful adoptions and reduce adoption risks makes an important case study. Our thesis was that a second project, which we refer to as business transformation, was required after installation to meet the goal of effective adoption. The two project stages are shown diagrammatically in Figure 1.

**Figure 1: Relationship of business transformation to technical installation activities**




## Historical Experience in Technology Adoption

The BP FIELD OF THE FUTURE program is underpinned by the concept of realizing value from technology investment on a global scale. There are many issues inherent in moving from large scale technology rollout/installation to large scale adoption. Examples culled from a variety of sources resulted in the list in Table 1. Such issues are reported or acknowledged by many companies, both in the oil industry and elsewhere.

**Table 1: Historical issues in rapid global technology adoption**

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|---|
| Failing to achieve sustainable use (technology falls into disuse) |
| Deploying the technology takes too long |
| Encountering resistance to change |
| Seeing technology as a solution in its own right |
| Assets inventing unique (and sub-optimal) working practices |
| Business value is not clearly defined and managed |
| Lacking clear business sponsorship and prioritization |
| Not making resources available to support the adoption |
| Failing to get adoption prioritized by the asset |
| Assuming that the uptake in use of a technology is automatic |
| Underestimating the effort required to prepare people for new working practices |

A variety of models have been applied across many industries to try and understand the adoption issue, and deliver more successful outcomes. Nevertheless, Muduganti, R, et al. (2005) noted: “there remain puzzling and unexplained patterns of technology acceptance or rejection that are not accounted for by existing theories.” They cite examples of highly usable and valuable applications that fail to get user acceptance, applications where there is initial adoption which is later abandoned, and oscillating patterns of adoption and rejection.

It is obvious that there are many dimensions to technology adoption, spanning sponsorship to project structure to change management. Within the FIELD OF THE FUTURE business transformation program, adoption success is based on the consistent application of tools to assure:

- stakeholder identification and engagement
- clarity of expectations of staff during and after the implementation project
- deep understanding of how work will change through process walkthroughs to clarify roles and their interactions
- identification of risks to adoption, and potential mitigations
- understanding concurrent initiatives that will impact the same team members
- clarity of a specific team's readiness for change

The remainder of this paper illustrates these concepts by looking at a case study of a successful adoption and transformation.

## Case Study

### The Technology

BP's proprietary Integrated Surveillance Information System (ISIS) was put into global deployment starting in 2006. The system delivers well performance data to field and office sites in near real time and was described by Foot, J., et. al. (2006). Information from sensors in wells can be made available anywhere in the world in near real time over wide area communications networks, enabling enhanced remote collaborative support of well operations by office based petroleum and production engineers. It was recognized early on that the system would change the way surveillance is done: from reliance on visualization and pattern recognition, to a much earlier intervention driven focus based on patterns of well response driving targeted alerts to key roles. It is true that the combination of new information types and system capabilities create the potential for new ways of working to be introduced. It is also true that continuing to work in an unchanged way will result in new information being ignored or limited staff resources being overloaded by data. To realize the value from the ISIS tool, asset teams must be informed and aligned about the possible impacts on roles, skills, and business processes before, during, and after technology deployment.

### The Asset

The asset in this case study is a subsea field on late plateau in the deepwater Gulf of Mexico. At the time of the case study, it had approximately 10 wells on line that were being managed by a small production engineering team. The field was in very modest decline at the time the real time well monitoring software and processes were being introduced. We consider the challenges typical of those of a brownfield asset retrofit, where asset life is still on the order of 10 to 15 years.

Business challenges are primarily concerned with maintaining base production, although opportunities exist to tie in additional production from an in-fill well program to the existing infrastructure. Maintaining the integrity of well stock throughout field life is an important objective. Technical challenges impacting well operations include sand management, and flow assurance. Accurate production allocation to wells, and well surveillance are key to understanding well performance.

### Business situation

A pre-project assessment established both some of the hurdles as well as potential benefits. An earlier version of the ISIS system had been installed based on a high level business case, but the system had seen limited use because another application provided much of the raw information the production engineers believed they needed to manage the wells and they saw limited incremental value being provided by ISIS. That history meant that the users were well aware that additional effort would be required to move into full team adoption, both in terms of technical production engineering tasks, as well as working practices and roles.

The users could identify that there were staff efficiency and long term maintainability issues with continuing with their current work practices. The ISIS system provided alerting features that did not previously exist within the onshore production engineering toolkit. These would allow them to plan remedial actions earlier, and help to minimize well related losses. However, because they had not fully adopted the ISIS technology, they were either ignoring the alerts as spurious or turning them off completely.

The asset production engineering team had a mix of experience levels, but had a high proportion of recent graduates. At the time of the original project planning, a new team member had just been added who was actively dealing with the challenges of on boarding with a mature operating team. The challenges of explaining how to find key information stores and learning "how we do things around here" were comparatively fresh for most team members, and there was a desire for greater structure and rigor to the processes, tools, and methods being applied. Furthermore, there were a number of planned rotations of experienced staff out of the team. There was a collective team desire for a repeatable and efficient way to induct new team members that would bring them up to speed as quickly and consistently as possible.

### Technical situation

The earlier version of the technology was functioning, but had not become institutionalized among team members. Instead, there were a variety of special purpose surveillance displays that had been built by team members. More experienced staff were comfortable that they had all of the information that they needed to optimally monitor their own wells. However, the majority of staff didn't feel they had the knowledge or skills to be comfortable using or modifying other team member's displays.

Another technical issue concerned the configuration or "training" of the system. Out of the box, a newly installed real time software application may start producing data. Checking for fidelity of raw data in a system with thousands of input tags can be time consuming and boring. Tuning agents to recognize special performance situations like sanding and slugging requires both understanding of system parameters and functionality, and well performance knowledge. Without mobilizing specialized resources to undertake a commissioning and fine tuning project, early adopters would see erroneous information in their displays and calculations, and this would act to erode confidence in the system and its output.

There are numerous references in the literature that would say that most projects aimed at technology adoption fail[1]. In this particular case, the starting point was that the right technology had been selected and installed, but implementation had become a barrier to success. The next section describes how we addressed the need for repeatable and efficient value realization from technology investment.[2]

## Solution

An ISIS business transformation project consisting of consulting services provided to an asset to help realize the value of FIELD OF THE FUTURE technology was initiated. The term business transformation deals with initiatives designed to improve alignment of business strategy and enabling technologies. The transformation work scope includes designing and implementing new business processes; defining ISIS related roles and skills; designing organizational changes and incentives; and managing change.

These additional activities were needed since:

1. real time technology potentially impacts a large number of asset workflows and activities;
2. performing these activities would accelerate the adoption of new technology;
3. bundling them in a single project would effectively leverage scarce staff resources; and;
4. successfully completing the project would provide tools and methods to use technology in a more consistent fashion across multiple assets.

Key components of the approach include:

- Effective project management
- Stakeholder engagement and management
- Process and workflow review and development
- Technical and training support
- Benefit delivery management

We divide the post implementation value realization activities into a series of self contained steps, each separated by decision gates that mirrored the broader stage gate approach utilized by BP globally for project management. The objectives are to help the target user community and their management understand the benefits, costs, and risks prior to making a full cycle commitment. The stage gates are designed to move stakeholders from awareness to engagement and ultimately into transformation.

[1] Failure rates are typically cited in the range from 45% to 75%.
[2] Apparently, the view was expressed that the oil and gas industry in general is slow to adopt new technologies. See The Data Room Technology Watch Report, Nov. 2005 summary of the SPE Annual Conference and Technical Exposition.

## Benefits and sources of value

The biggest accomplishment cited during the project review was that the team felt that they had met their goals - and the team stated that “we couldn’t have done it without the business transformation project.”

The use of ISIS appears to be sustainable because ISIS is now part of the permanent day-to-day management of subsurface activities for team.

The documentation produced in this project has already proven valuable to other assets who have installed ISIS.Insights and methods from the Gulf of Mexico have so far been transplanted to North Sea and African assets. Application of the lessons to other technologies is also taking place, adding further value.

ISIS is providing accurate well rate estimates and the use of real-time information from ISIS has greatly improved their allocation factor over pre-existing methods, delivering a significant financial benefit to the asset.

The team saw an improvement in staff productivity (i.e. surveillance staff effectiveness) of 25% for the same amount of PE resource. Time spent on surveillance was more productive, since they spent less time on searching and manipulating data, and more time on value-added analysis.

## Future opportunities

The business transformation project described in the case study was seen as very successful, and suggests that the collection of work components in aggregate were generally needed. However, a single successful road test of a method does not establish its general applicability across all asset types and business circumstances. As a result, we have begun a global program, building on the experience and lessons learned so far, to replicate the outcome with both greenfield and mature brownfield assets, and to further develop the efficiency and effectiveness of the approach.

In looking at these new opportunities we have have begun to deal with a second tier of issues in business transformation dealing with scale up, acceleration, and centralized business process governance. This case study required a few months of work from initial engagement through to demobilization. While that was acceptable on a single asset proof of concept, we identified the potential for economies of scale, and efficiency improvements through recycling learning.

To address these challenges, one of our follow on projects deals with business transformation working simultaneously with multiple assets on a regional basis. As the number of assets changing their working practices increases, there is a natural tendency for each successive asset to try and customize processes, procedures, and roles to their local needs. To gain efficiency and synergy, there needs to be a counterbalancing of that divergence by centralized governance that keeps key work products from every project in a common knowledge base and enforces a policy of common where possible, different only when necessary.

## Conclusions

This paper has outlined the importance of an integrated approach which focuses on business environment understanding, stakeholder relationship management, process understanding, human roles and organizational competency assessment, and technology product understanding to support and assure technology introduction success. Application of such an approach leads to demonstrable business success.

## Nomenclature

| | |
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| Business transformation | Initiatives designed to improve alignment of business strategy and enabling technologies |
| Commissioning | A period of operation to establish that a new system can meet the performance specifications. During commissioning both verification and validation tests are performed on the complete system. |
| Fine Tuning | A necessary procedure of reviewing, setting, and very accurate adjusting of the values of configurable parameters in the ISIS system |
| HSER | Health, safety, environmental, and reputation |
| ISIS | The integrated surveillance information system, a BP *FIELD OF THE FUTURE™* proprietary remote well performance monitoring tool |
| PE | Production Engineer |

## Acknowledgements

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