Fit for Purpose and Cost Effective Integrated Operations Implementation for Mature Assets

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#1 19 May 2011
Perspective and Kick-off Idea

- Group of assets with varying age of infrastructure and production facilities
- Maersk taken over operatorship
- Subsea development

Initial Idea
- Smarter way of handling data
- Increased focus on integrated production optimisation
- Improve peoples efficiency
Project Summary

Timeline

- Phase 1 & 2 – Identify and Select July – November 2009
- Phase 3 – Design & Plan, February to June 2010
- Phase 4 - Implementation to July 2010 to February 2011

Value Creation

- Production improvement and loss mitigation
- Improved people efficiency
IO – Staircase

OPTIMISE (Predictive/Proactive)
- Use historical patterns and real time information to predict behaviour
- Predict or anticipate problems and opportunities
- No manual data entry
- Model driven generation of options for optimisation
- Prioritised and focused interventions

Second to none mature field operator

SURVEILLANCE (Active)
- Data provided via visualization tools to disciplines at the same time
- Trend data automatically to understand behavior patterns
- Automatically trend performance against targets and potential
- Automated well test data entry
- Semi automated well test validation
- Integrate real time data and models

MONITORING (Passive)
- Common and consistent data shared across disciplines
- Visualise well and reservoir status
- Understand what key decisions are required on the things you monitor
- Analyse data collected to understand historic performance

BASICS
- Established asset data hierarchy
- Data availability and ownership (systems of record)
- Infrastructure fit for purpose
- Roles & responsibilities defined & documented
- Capability of engineers to use required tools

Delivered Projects
Potential Future Projects

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Our Approach - People and Process

How senior business sponsorship was obtained and retained, how business needs was identified and addressed

People Involved
- Corporate Technology and Innovation
- UK Steering Committee MD, Dir. PED, Dir. Production and Head of IM&T
- Offshore - Production Supervisor and Control Room operators
- Onshore - RE, PE, Process Eng, Onshore Production Supervisor, Installation Manager, Onshore Ops engineers, Allocations Engineer, Leadership, IM&T

Business Processes Addressed
- Well Test Validation
- Well and Reservoir Monitoring & Surveillance
- Production Optimisation
## Technology Requirements

### Better use what you already have before you buy and avoid building from scratch

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Component</th>
<th>Feature</th>
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<tbody>
<tr>
<td>OSIsoft</td>
<td>PI</td>
<td>Real time data</td>
</tr>
<tr>
<td></td>
<td>Asset</td>
<td>• Equipment and well templates (eliminates need to know equipment tag numbers)</td>
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<tr>
<td></td>
<td>Framework</td>
<td>• Unit conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Aggregation of Real Time and PARIS data</td>
</tr>
<tr>
<td></td>
<td>DataLink</td>
<td>• Content for engineers desktop</td>
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<tr>
<td></td>
<td>Webparts</td>
<td>Real time data extraction to excel</td>
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<td></td>
<td>ProcessBook</td>
<td>Visualisation and process graphics</td>
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<tr>
<td>Petex</td>
<td>IPM</td>
<td>Prosper, mbal and GAP modelling</td>
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<tr>
<td>IFM</td>
<td></td>
<td>• Model catalogue</td>
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<tr>
<td></td>
<td></td>
<td>• Multiple automated workflows including well test validation and well rate calculation</td>
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<tr>
<td></td>
<td></td>
<td>• Optimisation scenario generation</td>
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<tr>
<td>.NET</td>
<td>PARIS</td>
<td>Key production data storage and reporting</td>
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<tr>
<td>Microsoft</td>
<td>SharePoint</td>
<td>Framework for the data portal</td>
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Embedding and Sustaining the Capability

- Know your audience
- Be tenacious
- Listen to dissenters and work to find common ground
- Use many communication channels and different types of communication
- Ensure everything works and there are well defined roles and responsibilities to keeping it working after the project team disbands
- Share success and failure
Well Test Validation

Objective: Faster turn around for well test, less manual input, clearer ownership

- Automated data input from offshore metering through IT systems for final validation
- Generated standard well test data for different types of meter system
- Formalised workflow
- Built offshore validation into daily offshore report
- E-mail notifications to ensure more timely onshore well test approval
- Built simple automated intranet visualisation portal

Business Value

- Well test now available within hours rather than weeks
- CRO focus on safety not well test data entry
- Increased accuracy and fewer rejected well tests
Well & Reservoir Monitoring & Surveillance

Objective: Spend less time finding data and more time analysing data. Improve transparency of information across departments

- Standardised and provided real time process graphics
- Automatically transferred real-time and allocation data into the Production System Modelling
- Repository for target profiles
- Improved visibility and organisation of production related models
- Implemented a single access portal for daily production information (Performance Portal)

Business Value
- Loss deferment of ~4000 bopd due to hydrates identified by new engineer in first 3 weeks
- Ease of locating models and data makes engineers more productive
Production Optimisation

Objective: Optimise production with integrated focus on loss of oil, well test and reservoir management

- Improved communication for optimisation opportunities and reduce lost production
- Defined the optimisation workflows and develop consistency across assets and functions
- Automatically generate and present optimisation scenarios to engineers

Business Value
- Within first month ~700 bopd production improvement from one well
- Reduced manual data manipulation releasing the engineers to analyse and execute
Key Lessons Learned

• Time spent selecting the right projects at the beginning was time well spent. We designed a Fit-for-Purpose project which the organisation was able to absorb within the agreed time frame.

• Communicating the capabilities being developed would have assisted with buy-in earlier in the project.

• Splitting the project up into smaller chunks made it easier to communicate and to deliver.

• Management buy-in is crucial for full and integrated engagement.

• Integrated Asset Management as a project name is more of a curse than a blessing – it implies something bigger than the project we delivered.
What did we achieve

• Successfully implemented technical and process improvements on mature assets with immediate positive effect
• Proved that Fit-for-Purpose project can be implemented and can create value
• Increased appetite for doing things smarter
• Similar Fit-for-Purpose project being defined

Future

• A step towards becoming “Second to None Mature Field Operator”
• Strengthened the awareness that IO is important in the design phase of Green Field Development