Digital Oilfield

“How IT enables the Oil and Gas Industry”

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Outline

• Intro
• Lifecycle of a Well
• IT in Oil & Gas
• Challenges
• What is Digital Oilfield?
• Opportunities/Solutions - BEACON
• Examples
• What’s next Digital Oilfield
• Questions
About Baker Hughes*

<table>
<thead>
<tr>
<th>Revenue</th>
<th>R&amp;E</th>
<th>Employees</th>
<th>Facilities</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>$14.4 billion</td>
<td>$425 million</td>
<td>53,000+</td>
<td>72 countries</td>
<td>80+ countries</td>
</tr>
</tbody>
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*FY 2010: Baker Hughes and BJ Services
The lifecycle of a well

**Physical Environment**
- Ms
- Micrometers
- +250°C
- 30,000 PSI

**IT Environment**
- $10^{10}$ b/measurement
- 100's gb/s
- ms

**Business Environment**
- $20K/Day
- $20+B
- Local Farm
- 10 Major customers

**Decades**
- Km
- -50°C
- 10s PSI

- 10s b/day
- 10s b/s
- Hours/Days

- $500k/Day
- $10ks/hr
- Arctic
- 1000’s “mom & pop”
• Approx 1.4% of its total revenue being spent on ICT
• In 2008, the total spending reached $37.6 billion.

Global O&G IT budget spending
(US$ billions, 2010*)

- IT Outsourcing, $9.1
- IT Services, $5.0
- Computer Equipment, $5.9
- Telecom Services, $4.7
- Comms Equipment, $1.2
- Software, $9.7

*Baker Hughes

*Source: Forrester Research 2010 report
Challenges in Oil & Gas?
Challenges in Oil & Gas

• Complexity of new wells
  • HPHT
  • Deep-water
  • Unconventional oil & gas
  • Extended reach
Challenges in Oil & Gas

- Complexity of new wells
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Challenges in Oil & Gas

- **NPT (non productive time)**
  - Cost $26b
  - Wellbore Stability (37%), Rig Failure (22%)

- **Human Factors**
  - Health and Safety
  - Aging Workforce (majority to retire in next 5 years)
  - Inexperience
  - Time
Challenges in Oil & Gas

- **Geographical**
  - Emerging markets/experts
  - Remote locations
  - Travel
  - Time zones
  - Local legislation/regulations

- **Demand**
  - Increased Energy consumption
  - Government pressure
  - Oil Price Up and Down
How much data does an oil rig produce per day?

1 Terabyte per day
i-Field, Digital Oilfield, Smart Fields, Integrated Operations, Field of the Future???
What is Digital Oilfield?

„The vision for the Digital Oil Field is one where operators, partners, and service companies seek to take advantage of improved data and knowledge management, enhanced analytical tools, real-time systems, and more efficient business processes”

CERA: Digital Oil Field of the Future

• Move to a real time or near real time way of working

• Connection of one or more remote sites or teams to work together

• Moving to more multidiscipline way or working
The Digital Oilfield

Commonly terms used

- Virtual Collaboration
- Remote Operations
- Real-time Data
- Production optimization
- Condition monitoring
- Control of Subsea Production Systems
- Flowline Monitoring
- Visualization
- Knowledge Management

Source: Step Change Global
Building the DOF platform

Capability Deployment
not
Technology Implementation

Organisation
People
Process
Technology & Environment
Solutions/Opportunities
Baker Hughes’ vision of Digital Oilfield

BEACON - The Baker Hughes platform for remote operations, managed at the enterprise level, deploying common standards and services to provide a global, secure service delivery model.
Opportunities – “Re-Manning”

Traditional offshore crew configuration with additional specialist services:

2 DD + 2 MWD + 2 DE + 2 ML + 2 Spec = 8 – 10 people offshore

BEACON offshore crew:

DDx + ARTE + Spec = 2 – 3 people offshore

BEACON onshore crew:

DDx + ARTE + Spec
Opportunities – Data Delivery

WITSML
Wellsite Information Transfer Standard Markup Language
Opportunities - Real-Time Visualization
From the Driller ...... to the Geologist
Opportunities - Real Time Collaboration’s Network

From Driller to Geologist
IT Enablers
Where “Core” IT enables the Digital Oilfield

- Infrastructure
- Hosting & Storage
- Digital Oilfield
- Security
- Software
- Video Conferencing
- Process
Results

• Operations and Maintenance
  – Opex Cost Reduction 5-15% Standard Industry figures
• Drilling and Well Planning
  – Reduction in NPT 5-15% reduction in total well time
• HSE
  – 25% Reduction in offshore staff
  – Environmental monitoring opportunity
What’s Next?

• More utilization of Cloud technologies
• Increased automation at rig sites
• DOF included in the design of new oilfields
• Preventative prediction
  – think *Minority Report*
• Integration of other disciplines
  – Supply Chain
  – Finance
THANK YOU!