A JOURNEY TO SMART FIELDS

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Chon Fui Chai, General Manager
Smart Fields
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- Reserves: Our use of the term “reserves” in this presentation means SEC proved oil and gas reserves.
- Resources: Our use of the term “resources” in this presentation includes quantities of oil and gas not yet classified as SEC proved oil and gas reserves. Resources are consistent with the Society of Petroleum Engineers 2P and 2C definitions.
- Organic: Our use of the term Organic includes SEC proved oil and gas reserves excluding changes resulting from acquisitions, divestments and year-average pricing impact.
- Resources plays: our use of the term ‘resources plays’ refers to tight, shale and coal bed methane oil and gas acreage.

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The Smart Fields Journey

- Driving the Corporate Smart Field Journey
- Our Vision
- Smart Fields Focus Areas
- Smart Fields Global Footprint
- Screening and Deployment

Smart Fields Challenges

Conclusions
A Smart Field is continuously optimized for lifecycle value, through the integration of technologies, people skills and workflows.
THE SMART FIELDS JOURNEY

Smart Wells

Value Loop

4D Seismic

New fields born ‘Smart’

Automated well GOR control

Real Time Surveillance & Optimisation

Screen Projects

Reservoir & EOR Surveillance

Smart Mobile Worker

Advanced Reservoir Monitoring

Mass Replication: Collaborative Work Environment

Fiber Optics in wells, reservoir, pipelines

All Assets have Appropriate Level of Smartness (ALoS)

Focus areas for archetype: DEEPWATER
Aspects:
HSE
Integrity
Availability
Performance
Integration
Optimise Production System
Operate Remotely
Transport / Evacuation

To manage:
Wells
Reservoir
Facilities

2000
2005
2010
2015

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DRIVING OUR JOURNEY TO ACHIEVE SMART FIELDS VISION

Business Challenges/Value Drivers:
- Production Deferment
- Recovery Optimisation
- Lifecycle Cost Reduction
- Process Safety

How to get there
- Complete CWE deployment and establish CoE
- Partnering internally and externally on Advanced Sensing and Control
- Deploy Advanced reservoir Surveillance opportunities
- Flagship projects screening embedded in WRFM plan
- Work with R&D to mature new integrated solutions

Where we want to be
- All Assets have Appropriate Level of Smartness (Technology)
- New sensing and control integrated solutions matured for mass deployments
- Selected solutions at 80% applicable base

Where we are
- Deploying and embedding of Smart Field Solutions for new projects and existing assets
  - CWE
  - 4D Advanced Monitoring
  - Fiber Optic Sensing
  - Smart Wells (ICD,ICV)

The Vision:
Assets achieve lifecycle top performance through integrated solutions – people, process and technology

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Smart Fields Programme focuses on the deployment/replication/application of:

1. Smart Wells and Screening
2. Collaborative Work Environment
3. Areal Monitoring/EOR Surveillance
4. Fibre Optic Sensing Solutions in Wells and Pipelines
Environments
- Deep Water
- Arctic
- Land (Desert, swamp, etc)
- Heavy oil
- EOR
- Waterflood
- Integrated Gas
- Unconventionals

GLOBAL FOOTPRINT

Collaborative work environments
Distributed Sensing (DxS)
Smart Fields Foundation
4D seismic
EOR Surveillance
Smart Wells
**Smart Fields Solutions**

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<td>Flow &amp; Conformance monitoring</td>
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**Screening & Deployment (ALoS)**

- **Know It**: Propose solutions and provide arguments
- **Have It**: Help implementing solutions in scope
- **Use It**: Help using solutions & materialize value

Field ‘born’ Smart
Most of the basic technology is here… what still continues to be a challenge?

**Organizational Capability**

**Dealing with “Big Data”**

**Consistent screening and technology deployment in projects**

- Collect and use the right data
- Keep & re-use the right data
- Algorithms that convert ‘sensing’ to ‘sense making’
- Industry Standards
- Predictive Analytics

**Sustainability, Vision, Urgency**

- Organizational Structure
- People
- Leadership
- Behavior
- Process & Technology

Project screening and follow up
Value versus cost in project phase
Life cycle view
CONCLUSIONS

- Many Smart Fields technologies were developed and widely deployed in the past 10yrs with substantial value added to the business.
- Consistent deployment of smart field solutions requires a Smart Fields organization and a compelling vision.
- Shell’s Smart Field Screening and Deployment workflows are being used to achieve the “Appropriate Level of Smartness” (ALoS) in projects and existing assets as appropriate across Global portfolio.
- Leadership commitment and tailored talent management continues to be one of the key success factors.
- Sustainability requires continued focused capability development to drive process and technology into the future.
- Big data requires understanding of data requirements and extracting relevant information to handle data management and security.
Acknowledgements / Thank You / Questions

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