Embracing Subsea Digitalisation

.... Together

12\textsuperscript{th} June 2018
- 2002 Forbes Cover
- 2007 51% Market Share
- 2007 iPhone release
- 2008 Google Android
- 2013 Sold to Microsoft
- 2013 3% Market Share
Digital Enablers

Data Analytics & Artificial Intelligence

Digital Twin

Process Digitalisation & Automation

Smart Technology & Robotics
SSES Digital Framework & Goals

- Optimising the design and delivery of Capital Projects
- Leveraging data and smart technology to optimise subsea production and inspection
- Digitalizing & automating internal processes to maximise efficiency and improve service delivery
Concept Selection

**Opportunities**
- Digital tools to more quickly and reliably evaluate concepts
- Digitalisation & democratise 40+ years of subsea knowledge
- Creating the Operational feedback loop
- Replication, standardization using digital analogues
- … Artificial Intelligence

**Expected Outcomes**
- Shorter Operator internal approvals schedule
- More robust technical & cost models
- Reduced engineering hours
- Enable engineers to run more scenarios
**ACES$ | Field Concept Development**

- GIS-based concept optimization & costing tool
- Manage and compare multiple development scenarios – optimizing Drilling vs Subsea vs Surface costs
- Develop field architecture accurately using GIS mapping capability and survey data
- Check configuration against project specific rules & automatically calculate quantities
- Dynamic reports & charts from database for ease of interpreting results
- Provides reference repository for design & cost information throughout project lifecycle
- Produce accurate quantities and costs estimates

CAPEX
Enabling Successful Design Collaboration

- Model Centric Engineering
- Integrated CAE
- Discrete Engineering Tools
- Digital Twin
BIM: Model Centric Engineering Approach

1. Greater design coordination & collaboration
2. Upstream decision making & fewer design changes
3. Less rework, fewer change orders
4. Less drafting
5. Quantities & cost estimating
6. Schedule optimisation
Benefits

Source: Dodge Data & Analytics, Bentley Systems
Enabling Successful Design Collaboration

- Common info/ data standards
- Greater information transparency
- Integrated Data Platforms

- Discrete Engineering Tools
- Integrated CAE
- Model Centric Eng
- ?
Subsea Operations: Primed for Disruption

Operational Costs have increased by **300%** from 2002 to 2014.

- **50%+ assets 10yrs +**
- **3-5% Ops data used**
- **Unplanned events (failure, repair)**
- **Dependency on large vessels**
- **Dependency on visual inspection**
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Halfing Subsea Inspection Costs

- **Reduce “nice to haves”**
  - Use existing production data to reduce scope of IMR
  - Install monitoring systems to generate new data to reduce IMR further

- **Use new Camera, LIDAR, AUV technology to accelerate remaining IMR work**

- **Data Analytics & Visualisation**

- **$4BN spent on IMR**

- **Goal: $2BN 50% Cost Reduction**

- **Growth for in New (substitute) Services & Capability**

- **Smart Tech**

- **Smart Tech (Sensors) & Analytics**
Data analytics: Extracting value from the 95%

1. **Data integration**
   - Data handling, cleaning, integration and storage solutions

2. **Data Visualisation**
   - Custom asset intelligence web dashboards
   - Reporting on key data, KPIs, alerts and notifications

3. **Advanced analytics**
   - Fault detection
   - Process optimisation
   - Operational optimisation
   - Forecasting
   - Cognitive computing
Case Study: Valve Actuator Predictive Maintenance

Clear indicators in data from open and close events when performance is starting to degrade, i.e. P point from P-F curve can be predicted.

**Installed 🎉**
Data indicates healthy performance

**Prediction Point 👎**
Signs of degrading performance

**Fails Function ⚠️**
No longer fit for purpose

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**P-F Curve** (typical reliability centred maintenance)
Smart Tech: AUV & Inspection Systems

• Disruptive change in ROV & autonomous vehicle technology
  – Subsea infrastructure
    • AUV Pipeline inspections
    • Infield ROV for normal infield inspection
    • Minaturised “suitcase” ROV inspection, esp near surface (e.g. FPSO / turret based inspections) often at a fraction of cost of a DSV.
  – Visualization Technology
    • LiDAR
    • Adv. Camera Technology

Reference: Subsea 7, 3D at Depth, CAthx
Where is Nokia now?

- 2016 HMD & Foxconn
- 30m/year phones
- No. 1 in low cost market
- No. 4 in UK sales
Thank you for listening