Digital Transformation in Oil & Gas

NAPE Technical Session
March 2019, Lagos
The upstream industry has implemented several types of digital oil fields and smart field technologies. However, this should not to be confused with digital transformation.

The concept of the digital oil field is defined by Andre (2016) as “having the right tools and technology to maximize the profitability of the field, and make it as secure and environmentally responsible as possible in a mostly automated way.

And to achieve that, it is necessary to bring the data of many disparate systems (reservoir, production, network, supply-chain, models/simulation, maintenance and operations) to process/analyze and find the ideal balance for one’s operation and field.”
<table>
<thead>
<tr>
<th>Industry</th>
<th>Digital Business Maturity</th>
<th>Digital-Native</th>
<th>Paradigm Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Music/Entertainment</strong></td>
<td>Pre-Digital: Records, Cassettes</td>
<td>Digital Data: CDs, MP3s</td>
<td>Online Business: ITunes</td>
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<tr>
<td><strong>Healthcare</strong></td>
<td>Pre-Digital: Filing Cabinets</td>
<td>Digital Data: Digital Records</td>
<td>Online Business: Online Healthcare</td>
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<tr>
<td><strong>Auto</strong></td>
<td>Pre-Digital: Carburetors</td>
<td>Digital Data: Fuel Injection, Hybrids</td>
<td>Online Business: Autotrader.com</td>
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<tr>
<td><strong>Travel</strong></td>
<td>Pre-Digital: Paper Scheduling</td>
<td>Digital Data: Real Time Scheduling</td>
<td>Online Business: Expedia, Travelocity</td>
</tr>
</tbody>
</table>

- **Why should the customer have to own or retain the music?**

- **Why should the customer have to go to the doctor?**

- **Why should the customer have to drive the car or the business need to own taxis?**

- **Why should the business need to own hotels?**

- **What fundamental assumptions should we be challenging?**
The Difference between Digitization and Digitalization

Digital Maps

Sensors & Actuators

GPS / Geofence

Optimized
Digital Shift in other industries.....

Transform: Age old human activity
......
Groceries

Optimize:
- Waiting
- Payments
- Retail
- Supply Chain
- ...
- ...

$600 Billion
THE TRANSITION TO NEW BUSINESS MODELS THAT LEVERAGE DIGITAL TECHNOLOGY TO CHALLENGE PREVIOUSLY HELD ASSUMPTIONS ABOUT THE INDUSTRY
It’s **Not** about enhancing *existing* business practices and technology

**Today**

- Individual and instinct-driven
- Incremental
- Historical and operations-based
- Siloed and fragmented
- Multiple and proprietary
- Speed of traditional IT

- Decisions
- Change
- Insights
- Data
- Platform
- Pace
Digital E&P will fundamentally change how E&P companies operate

**Today**
- Individual and instinct-driven
- Incremental
- Historical and operations-based
- Siloed and fragmented
- Multiple and proprietary
- Speed of traditional IT

**Digital E&P**
- Collaborative and data-driven
- Innovative
- Real-time and asset-based
- Bridges field, front office and back office
- Common and open
- Speed of Cloud

**TRANSITION TO NEW BUSINESS MODELS**
The **Four Pillars** of Digitalization

- **SMART HARDWARE**
- **CONNECTIVITY**
- **INTEGRATION & CLOUD**
- **BIG DATA ANALYTICS**
Smart Hardware / Cloud – Collaborative Innovation

E&P in a box (Private Cloud)
Running in your data center

Hybrid Cloud
Linked data centers (private fiber or over the Internet)

Software-as-a-Service - SaaS
Running in vendor data center
Utilization-Based Maintenance is a clear example of **smart hardware** and **big data analytics** at work.

1. **Install** sensor network on engines, transmissions
2. **Create/update** analytical model of equipment wear
3. **Monitor** operations against model & **Schedule** maintenance jobs
4. **Maintain** equipment at optimal intervals
Digital Well program – Plan- Design- Execute and Optimize

Very Manual with lots of Touch Points

Casing

Tools

Mud

Drilling Manager

Cement

Bits

BHA

Digitize & Orchestrate Well Construction Process

DWP

Integration Platform

Data Lake

iEnergy® Cloud

Drilling Program
How does the Digital Well Program™ solution continuously optimize your well design process?

**The Workflow**
Business process management addressing process digitalization

**The Engineering Microservices**
Facilitating a lean and optimum use of engineering calculation and its validation

**The Report**
Integrating the multiple phases of the well lifecycle process
How the Digital Well Program™ Solution Works In Different Assets

High Tier

- Deepwater
- Green Field

Complex process, custom engineering

- Audits and Safety compliance
- Risk management and corporate process compliance

- Management of change, streamlined communication, during design and execution phases

High Volume

- Mature Field
- Unconventional

Repetitive process, factory drilling

- Immediate incorporation of lessons learned & accelerated learning

- Full automation of program based on local parameters

- Cost and NPV optimization (DWOP, TL, Ops BPs)

- Audits and Safety compliance
- Management of change, streamlined communication, during design and execution phases
End to end suite of solutions (Tools/Technology) based on a single subsurface/surface representation delivered on a single enterprise platform

Delivering Asset Intimacy
Digitalization **not about gadgets**

Planet to Plate to Pore…

… on a single platform
The digital transformational journey is not one-size-fits-all.

You know the pieces… but to create sustainable business value…

they need to fit the unique you.
Where do we start?

[SmartTransform^sm]

[SmartVision^sm]

[SmartDeploy^sm]

**Target Business Outcome**
- Increase in exploration success
- Optimization of CAPEX
- Reduction in OPEX/BOE
- Improvement in EUR

**Define Problem Statement**
- Data Analysis
- Known Challenges
- Strategic Benchmarking

**Understand Current State**
- Process Workflow
- Technology
- Data
- People / Org

**Create Digital Vision**
- Identify Digital Levers
- Challenge Paradigms
- Design Thinking
- Customer Centric Design

**Transform the Business**
- Digital Operating Model
- Front/Back Office Integration
- Organizational Effectiveness
Innovative Differentiators

- Applied E&P High Science Capabilities
- Domain and cross-domain Expertise
- Open and flexible Platform
- Cloud and Hybrid cloud integration
- Standardized approach – SmartDigital
- Data management Insight
- Big Data Analytics and Capabilities
Exercise

In your opinion, how can new technologies transform the way things are done in E&P?

Tips:
- Look at other industries for inspiration, ideas e.g., Amazon, Uber etc.
- Highlight E&P-specific expertise and differentiation