Digitalisation and Disruptive Innovations for Upstream Oil and Gas

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IIOT 2019
Background

- Low oil price prediction ($55-$75)
- No Significant change in production rate
- Old design strategy
- Old and inefficient maintenance strategy
- Bad cost management
- Lack of standards

- Need significant design cost
- Need significant OPEX reduction
- Think OPEX when calculate the CAPEX

But the question is how???
Oilfield Digitalization allows to “know about everything in the heavens”

But

Oilfield Intelligence allows to “do everything in the heavens”
DISRUPTIVE TECHNOLOGIES

- Change the way of doing business and engage customers
- Deliver services that would make it easier to achieve the goals
- Many disruptive technologies are available but some are useful

Some useful technologies we need to focus on
- Artificial Intelligence and Machine Learning
- IoT, Cloud Computing and Edge Computing
- Virtual Reality/Augmented Reality/Mixed Reality
- Blockchain
- Digital twin
INVESTMENT IN DIGITALISATION OF UPSTREAM OIL AND GAS

Digital Oilfield Market >US$30.7 billion by 2020

Source: Upstream Oil and Gas Digital Trends Report, Accenture
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

- Design Optimisation
- Schedule Optimisation
- Cost Optimisation
- Predictive Analytics for ROL
- Predictive maintenance
- Fatigue Life Estimation
- Field Life Extension
- Asset Management
IOT, CLOUD COMPUTING AND EDGE COMPUTING

- Smart way of monitoring assets
- Real-time monitoring
- Process the data at the source
- Work from remote location
BLOCKCHAIN TECHNOLOGY

- Promoting transparency and compliance
- Fighting security and cyber threats
- Lowering inefficiencies involving third parties
- Smart contracts
- Well & Equipment Identification and Maintenance
VIRTUAL REALITY/ AUGMENTED REALITY/ MIXED REALITY

- Risk Assessment
- Maintenance
- Training
- Rapid prototyping
- Carbon footprint
DIGITAL TWIN CONCEPT

- FE Model of Physical Asset
- Data Driven Model
- IOT Sensors
- Cloud Data Storage
- Predictive Analytics using Machine Learning
- Predictive Maintenance Strategy

DATA FLOW

1. Cloud Computing
2. Machine Learning
3. Data Flow in Digital Twin
4. Wireless Data Transmission
5. Predictive Maintenance
6. IoT Sensors

Digital Twin
DIGITAL TWIN FOR SUBSEA PIPELINE/JUMPER*

*Ref: S Bhowmik, Conceptual Digital twin for Subsea Pipelines, OTC Conference, Houston, 2019
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SUBSEA TWIN AND CLOUD BASED ENGINEERING DESIGN

- Field Development
- Automated Schedule
- Automated Cost and CTR
- Subsea pipelines and Structures
- Subsea Jumpers and Risers

INTEGRATE AUTHORING TOOLS

- Input from Subsea XD
- Pipeline Design & Code Check
- Pipeline Advanced Analysis
- Riser Design Tool / Installation Analysis