Digitalization: Are we ready to leverage on it to ensure asset integrity?

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PETRONAS at a Glance

Source: PETRONAS Annual Report 2016
PETRONAS Technology
Unlocking New Opportunities

PETRONAS Technology is the world’s preferred oil and gas technology with the objective to unlock new opportunities and potential through tirelessly providing technological breakthrough which proven after successful deployment within PETRONAS to contribute to not only for the oil and gas industry but also to the world.

Provided the **Winning Formula to the F1 World Champions of 2014, 2015 & 2016**

**Changing the landscape** of the LNG industry with PETRONAS Floating Liquefied Natural Gas: **PFLNG Satu**

**Seeing** better than others via cutting-edge **GeoSenz™**
Era of 4\textsuperscript{th} Industrial Revolution

The number of connected Internet of Things (IoT) devices, sensors and actuators will reach over 46 billion in 2021.

Source: Juniper Research (data end 2016)
Aerospace, defense and security companies are already investing in digital operations solutions. Three quarters (76%) of these companies are expected to achieve an advanced level of digitization and integration within five years’ time – higher than any other sector surveyed.

Examples of sectors embarking on digitalization

Revenue growth from aerospace, defence and security sectors.

Source: PWC 2016 Global Industry 4.0 Survey – Industry Key Findings
World Economic Forum: Digital Transformation in Oil & Gas

1. **Digital asset life cycle management.** New digital technologies combined with data-driven insights can transform operations through boosting agility and strategic decision-making, resulting in new business models.

2. **Circular collaborative ecosystem.** The application of integrated digital platforms enhances collaboration among ecosystem participants, fast-track innovation, reduce costs and provide operational transparency.

3. **Innovative customer engagement models** offer flexibility and personalized experience; opening up new revenue opportunities for Oil and Gas operators and new services for customers.

4. **Energizing new energies.** The digitalization of energy system promotes new energy sources and carriers, and supports innovative models for optimizing and marketing energy. To remain relevant to customers, the industry must fully understand the impact of these changes on the broader energy system.

Source: World Economic Forum/Accenture Analysis
Digital Asset Integrity Lifecycle Management

How do we create new value from existing information in various phases of asset lifecycle management?
Going digital: SWOT Analysis

**STRENGTHS (+)**
- Massive data
- Tech savvy generation
- Technology applications

**WEAKNESSES (−)**
- Investment cost
- Trust
- Risk appetite

**OPPORTUNITIES (+)**
- Improved efficiencies
- Increased safety & redefine relationship with Regulators
- **New business opportunities**

**THREATS (−)**
- Clean energy (electric cars)
- Cybersecurity
- Employment (jobs losses)
SWOT Analysis: Strengths

Massive Data (Big Data)
- 4Vs: volume, velocity, variety & veracity
- Large amount of data available (Petabytes)

Tech Savvy Generation
- Use of internet, wearables (games, fitness, navigation, social connections)
- Access to information

Technology Applications
- Application of high-end technology for drilling in upstream and other specific areas
SWOT Analysis: Weaknesses

**Investment Cost**
- Investment decision: Upstream (drilling)/Downstream (refinery)/Retail?
- How much can the dollar be stretched and how fast is the ROI?

**Trust**
- Access to information will be made available to all.
- Are we ready to allow others to access our data?

**Risk Appetite**
- Oil & Gas industry is inherently risk averse
- Risk comes with change. “Stick with what is known”
SWOT Analysis: Opportunities

Improve Efficiency
• Enhance productivity
• Information at fingertips
• Big Data analyzed for Machine to Machine (M2M) communications
• Real time optimization, minimal downtime

Increased safety & redefine relationship with Regulators
• Lessons learnt incorporated e.g. Macondo Deep Water Horizon, BP Texas City Refinery
• Access to information means less regulators involved

New Business Opportunities
• Adopting tested technologies from other industries e.g. aerospace, medical and transportation.
SWOT Analysis: Threats

Clean Energy
• Less dependency on hydrocarbon molecules – electric cars
• Alternative energy: nuclear, solar and wind

Cybersecurity
• Exposure of sensitive information to hackers. Physical asset and data vulnerability

Employment
• Moving towards digitalization increases optimization
• Global job loss estimated from 2 million to 2 billion by 2030. (source: World Economic Forum Executive Summary)
PETRONAS Pengerang Integrated Complex (PIC)

Steam Cracker

LPG & Naphtha

300,000 BPD of Crude Oil

Refinery

Petrochemical Production Units

C2 Olefins
Commodities

C3 Olefins
Differentiated

C4 Olefins
Specialty Chemicals

Euro 4M (Mogas & Diesel) & Euro 5 (Diesel) Fuel Products

Supported by Ancillary Facilities

PCP

SPV2

UIO

PAMER

RGT2

ASU

Source: AOGC 2017 PETRONAS Downstream
Existing Effort on Refinery of the Future (ROTF)

Massive Data Integration & Analytics

Real Time Performance

Source: MRCSB
“Digital Way of Working” at PIC

Digital enabled from the beginning

**The Organisation**
- **Data-Driven**: Real-time insights for faster and better decision-making
- **Innovative**: A culture of constantly applying new way of working with digital at the core
- **Collaboration**: Platforms that support more efficient teaming and data sharing across functions

**The Worker**
- **Empowerment**: Equipping employees with the relevant information at the right time to make decisions
- **Increasing Safety**: Leveraging on smart devices and sensors to create a safe environment
- **Value-Led**: Value-based analytics enabled across the entire work force

**The Plant**
- **Reliable**: Connected plants to predict issues and prescribe mitigating actions
- **Higher Production**: Dynamic production scheduling, planning and monitoring leading to increased production
- **Efficient**: Monitor and deploy resources where needed to improve operation efficiency

The Connected Plant Worker
Are we ready to leverage on digitalization to ensure asset integrity?
Thank you