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Petronas: Upstream Surface Data Platform (USDP)

Unlocking data silos by implementing Unified Data platform for Engineering and Operational Data

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AVEVA

Agenda



- About PETRONAS
- Why are we creating Upstream Data Platform (USDP): Business Drivers and Case for Change
- USDP Data Governance Framework
- Reference Data Library (RDL) & Data Model
- USDP Architecture Overview
- Implementation Challenges
- USDP Achievements
- Summary
- Q&A



About PETRONAS



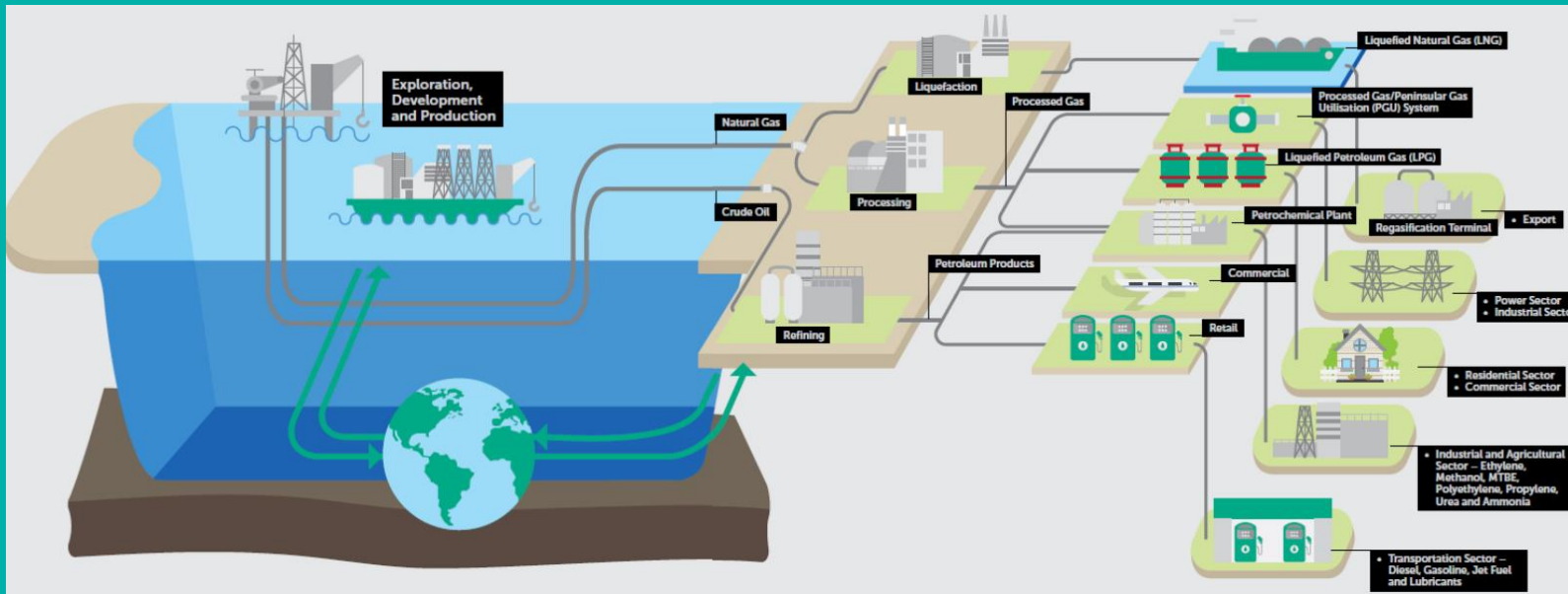
PETRONAS

PETRONAS Overview

PETRONAS is a global energy company committed to powering society's progress in a responsible and sustainable manner. We have three core businesses, namely Upstream, Gas and Downstream, supported by Project Delivery and Technology division, which acts as an enabler.

Since our establishment in 1974, we have not stopped pursuing new way of working and pushing boundaries across the entire oil and gas value chain. We continue to strengthen our portfolio through technological advancements, operational excellence and by being responsible corporate citizen wherever we are.

PETRONAS Business Activities



PETRONAS Energy Transition Strategy

Core Business
*More Energy,
Less Emissions*

New Business
*Capturing New
Growth
Opportunities*

**Net Zero
Carbon
Emissions**
Pathway to Zero

Our activities contribute towards the United Nation's Sustainable Development Goals (SDGs)

We have prioritised 7 of the 17 SDGs that can contribute towards our sustainability efforts

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

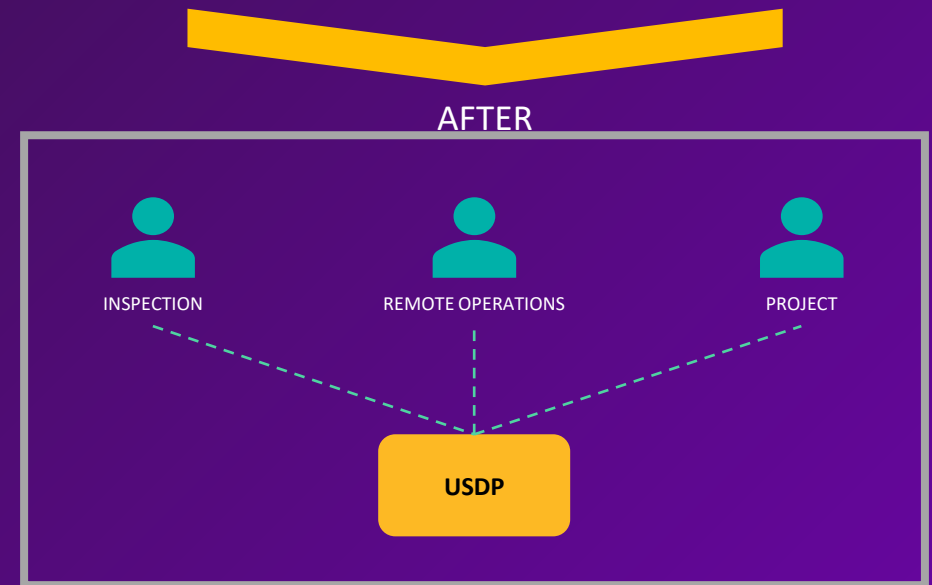
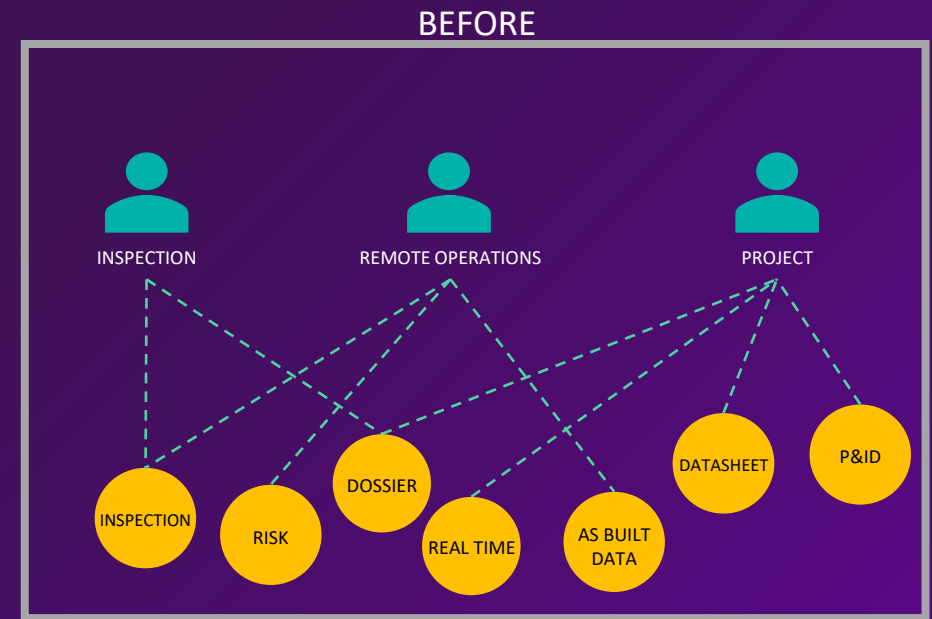
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

Why Are We Doing This?

Pain points and Case for Change

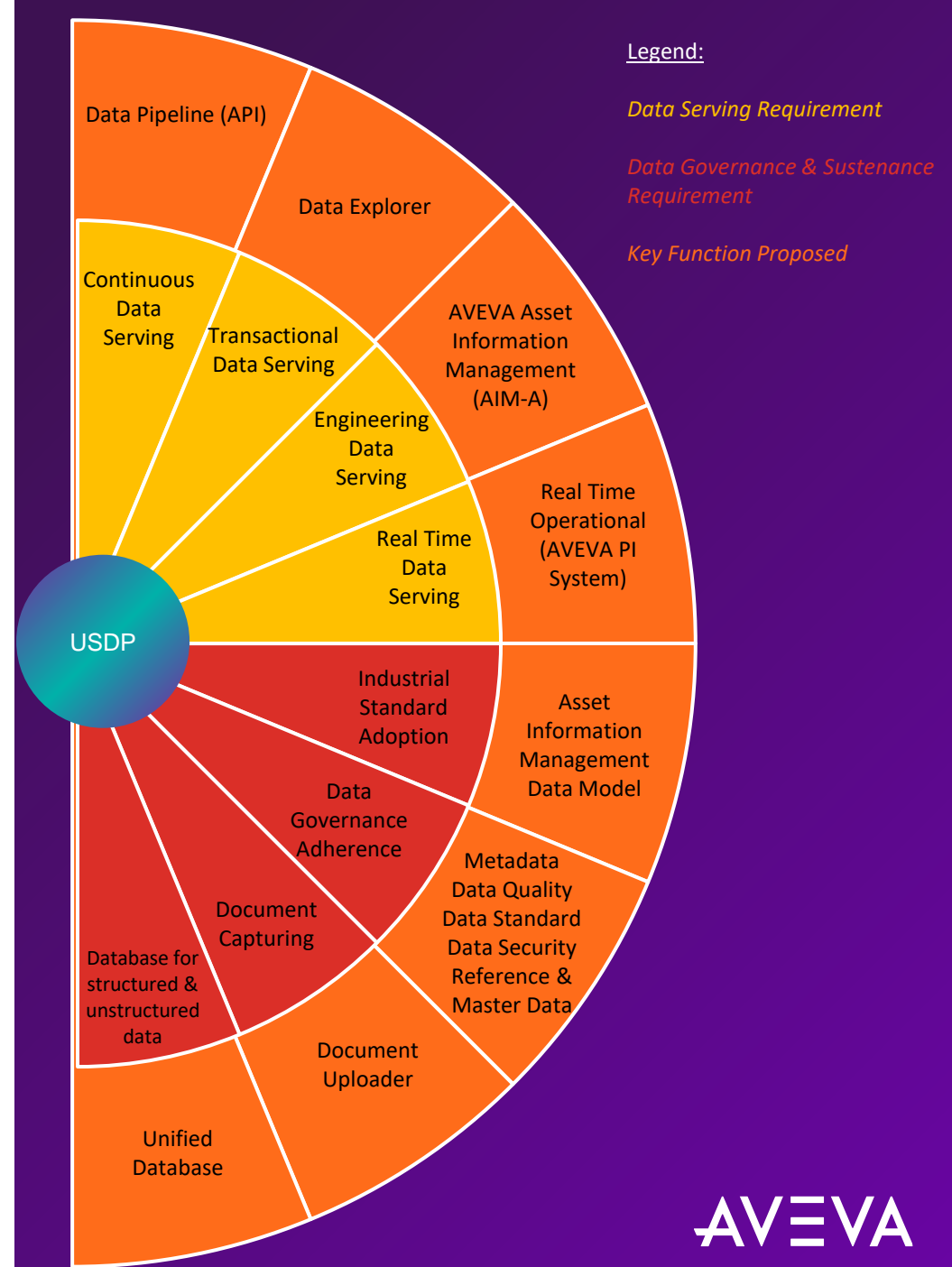
- **Scattered data leads to inefficient processes.** Users spend large amount of time for searching and reconciling data from different dataset or applications which resulted in delay in decision making.
- **Time consuming and costly** to understand and merge the data before consumption due to non-standardized data taxonomy.
- **Repetitive workflow** of data gathering, merging, cleaning, and loading process whenever there is new initiative involving usage of data.
- **Data governance challenges** and compliance requirements.



What We Want?

Upstream Surface Data Platform (USDP) is to address stakeholders' requirements and embed in data best practices.

- **Data serving:**
 - **Data Explorer:** Data in tabular format for transactional data and the advantage to export data to excel for reporting or analysis purposes.
 - **Engineering Data Serving:** Advantage of linking related documents and tags to an equipment in one single page by using **AVEVA Asset Information Management (AIM-A)**.
 - **Real Time Operational Data:** Give users the advantage of visualizing the real time performance of an equipment without the need to download, convert, and reload the data by using **AVEVA PI System**.
 - **Data Pipeline API:** Automated data flow and data sharing.
- **Data Governance and Sustainance:**
 - Data Governance Adherence & Industrial Standard Adoption
 - Unified Database
 - Document Capturing



USDP Data Governance Framework

USDP anchors data management knowledge areas (DMKA).

1. Master Data Management

- Master Data – Region, Block, Field, PAC, PSC and Platform, Equipment ID & Type

2. Data Standard

- Naming Standard, Taxonomy & Reference

3. Metadata Management

- Define required metadata, define additional metadata, and standardize metadata content

4. Data Quality Management

- Business Rules creation & implementation and data quality monitoring enablement

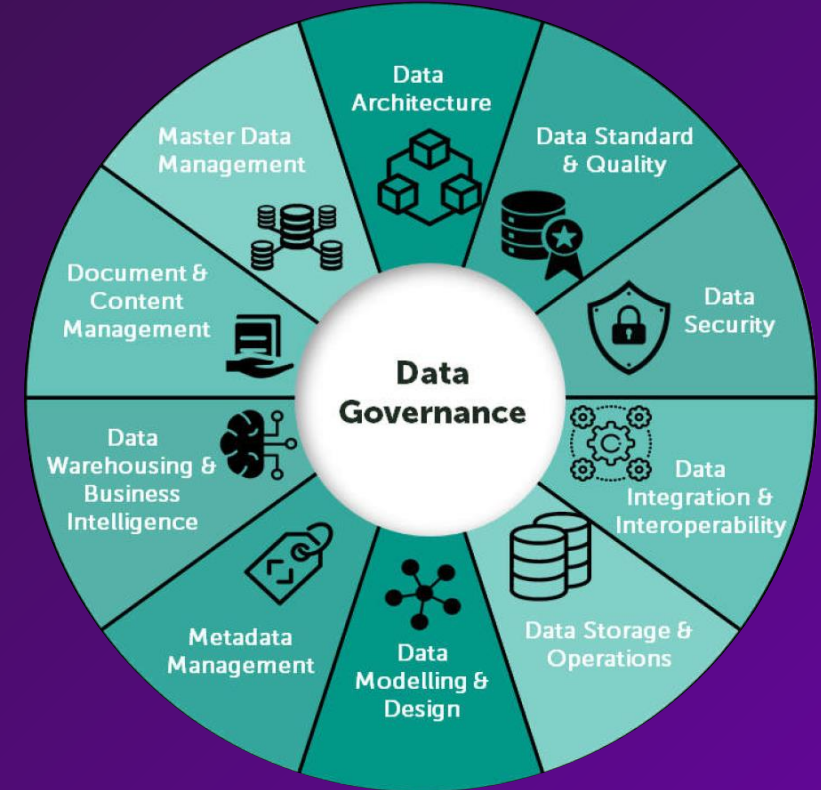
5. Data Security

- Data Security Classification Tagging, Data Entitlement / User Profile Control, Single Sign On (SSO) Authentication

6. Data Modelling & Design

- Adopt CFIHOS asset hierarchy structure and PETRONAS Data Standard engineering discipline..

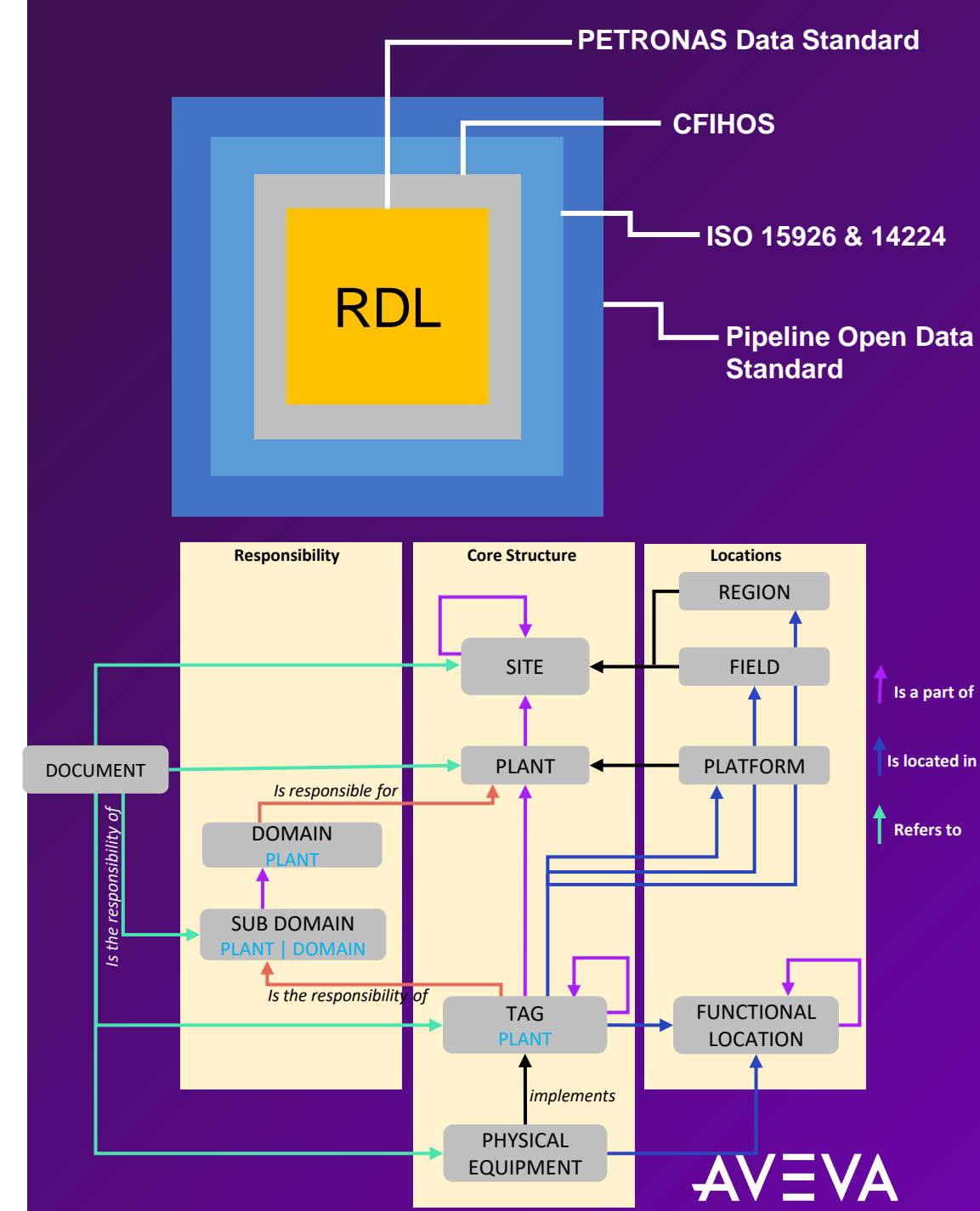
Data Management Knowledge Area



Reference Data Library (RDL) & Data Model

USDP utilized AVEVA Information Standard Management (ISM) as a tool to implement Corporate Reference Data Library.

- Corporate RDL comprises of:
 - ✓ PETRONAS Data Standard (PDS),
 - ✓ CFIHOS,
 - ✓ ISO15926, ISO14224,
 - ✓ Pipeline Open Data Standard
- USDP adopted CFIHOS asset hierarchy structure for managing engineering information.

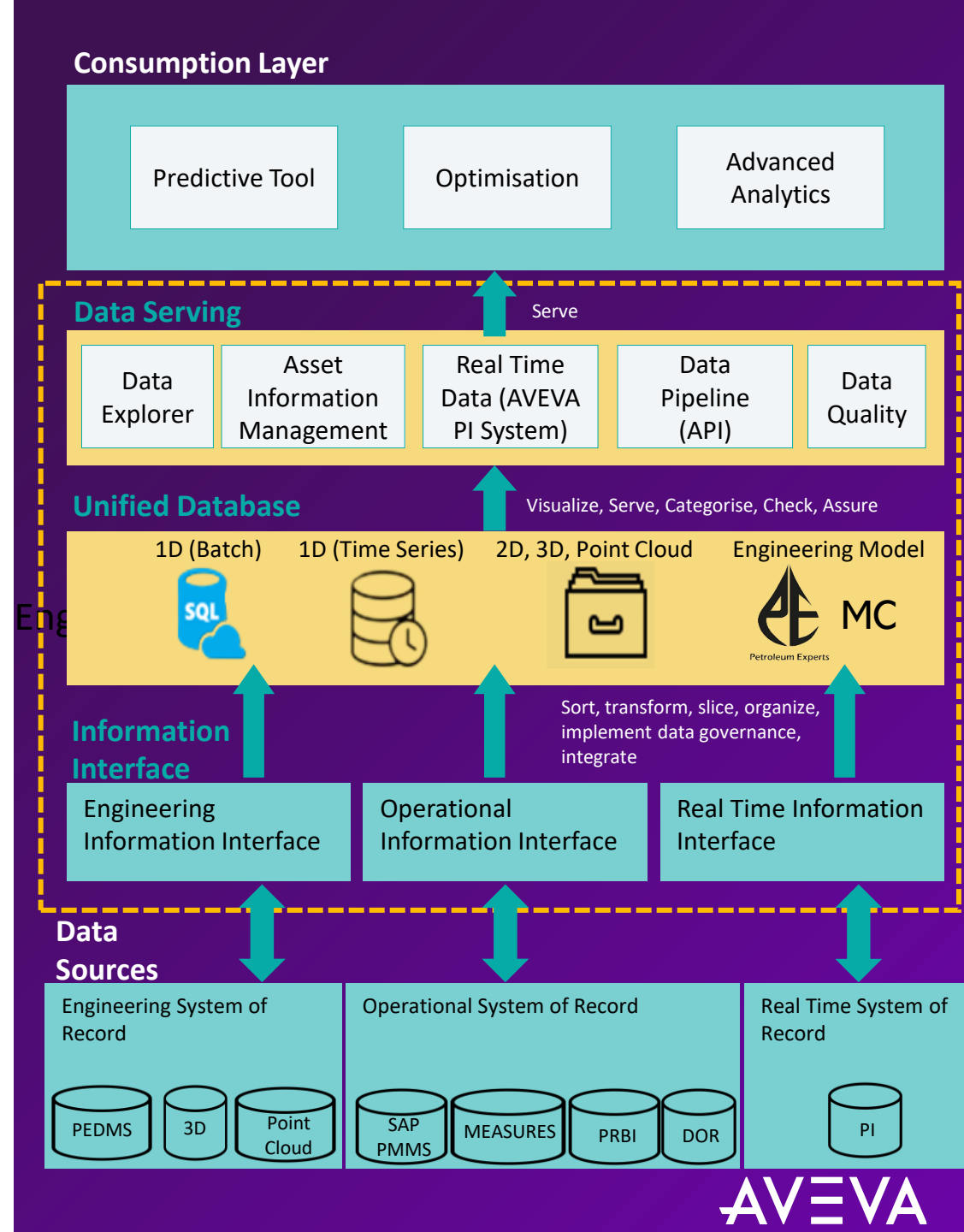


Overview on USDP Architecture

The design of USDP is to enable data self-serving for both engineering and operational data from various sources.

Key features include:

- Information Interfaces that include ELT and APIs.
- Unified database that comprises of multiple databases that can store different nature of data.
- Data pipeline that is built to ingest the data from unified database layer to data serving layer.
- Data serving layer for Asset Information Management, real time data, and business transactional data.
- Data serving via API that is designed for continuous data flow to data consumption layer.



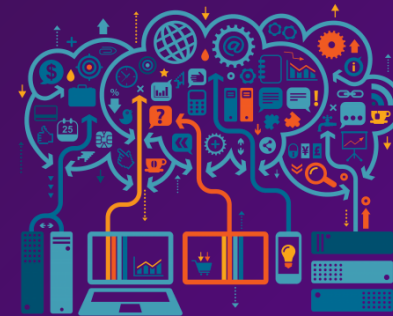
Implementation Challenges

Key challenges that impact the implementation of USDP Project are described as below.

- Standardization of Reference and Master Data.
- Normalization of Class and Data Attributes of different data standards.
- Data security in term of data classification and data entitlement.
- Change management.
- Accessibility to data silos.



Source: www.effective-datastorytelling.com



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ID	ACTIC - Id	Name	Description	Size	Da
343	ATT_003233	External coating	Availability of external coating and th	255	Str
344	CFIHOS-40000613	external coating specification	Is a material specification for a coati	40	Str
345	CFIHOS-40000115	external maximum allowable working	Is an allowable operating pressure th	9.5	De
346	CFIHOS-40000116	external operating pressure	The pressure at which a functional op	9.5	De
347	CFIHOS-40000117	external operating temperature	Is a temperature that occurs during o	9.5	De
348	CFIHOS-40000121	finned outside surface area	Is an area located on a surface.	9.5	De
349	CFIHOS-40000123	flanges material specification	Is a specification which describes the	50	Str
350	CFIHOS-40000124	floating roof seal type	Specify the type of seal for a floati	40	Str
351	CFIHOS-40000125	floor material	Is a possessed aspect being a role of	40	Str
352	ATT_001206	Flow Regime	A description of the flow structure, of	255	Str
		Flowrate	Volume of product that is passing thr	9.5	De
		flue gas duct height	The maximum height of a functional	9.5	De
		flue gas duct lining material	Is a material of construction of which	40	Str
		flue gas ducting material	Is a possessed aspect being a role of	40	Str
		flue gas ducting material specification	Is a specification which describes the	50	Str
		flue gas ducting thickness	Is a thickness according to a design.	9.5	De
		Fluid Density	The mass per unit volume of an objec	9.5	De
		fluid name	The name of the product in liquid or	100	Str
		Fouling Factor	Piping Fouling Factor	9.5	De
		frame size	Dimensions and output series for rot	40	Str
		Frequency	An all-weather radar transponder th	9.5	De

	User 3	Super User 2	Admin 1	Super Admin 0
Roles/Permissions				
Data Update Permission				
Add new data			√	√
Modify data			√	√
Delete data			√	√
Access Permission				
View entitled data	√	√	√	√
View restricted data		√	√	√
Download entitled data	√	√	√	√
Download restricted data		√	√	√
Action Tracking				
View access log				√
View activity log				√
User Control Permission				
Assign Admin				√
Assign User			√	√
Deactivate Admin			√	√
Deactivate User			√	√

USDP Achievement


First phase of USDP roll out focuses on three main functions i.e., Data Visualization for Engineering Data, Real Time Data, and business transactional data.

- Data Visualization of Engineering Data is enabled by AVEVA AIM-A that includes 1D data from various data sources, tag to tag information, tag to doc information (engineering docs, inspection, and service docs), events and 3D.
- Real Time Data is visualized via customized AVEVA PI System meeting specific user persona and use cases.
- Data Explorer is customized tool to visualize and serve business, operation, and transactional data in tabular form.
- USDP successfully improves:
 1. The process cycle efficiency by 30% in engineering and operational data preparation, data loading, and data contextualization
 2. Cost savings from data integration efforts.


The image displays the Upstream Surface Data Platform interface, which is divided into several functional areas:

- Top Panel:** Features a large background image of an offshore oil rig and navigation buttons for "Business Excellence Data", "Engineering Data", and "Real Time Data".
- Navigation Sidebar:** Includes icons for Home, Data Explorer, Document Explorer, Data Streaming (RTV), and New Dashboards.
- Data Explorer (Top Middle):** Shows a hierarchical tree view of data assets, including folders like "VESDA", "RCPP", and "Mechanical Static".
- Data Explorer (Bottom Middle):** Displays a table of production data with columns for "No.", "Production Date", "MML/MT", and "KEY METRICS". The table lists various YTD (Year-to-Date) production metrics for different months and years.
- Engineering Data View (Top Right):** Shows detailed information for a specific piece of equipment, "E-2420A (Air Cooled Heat Exchanger)", including its name, type, parent, location, and various attributes like "Equipment Criticality" and "Design Temperature".
- Real Time Data View (Bottom Right):** Displays a line graph showing "Barg" (Barrel per Gallon) over time, with a peak around 2.000 and a trough around 1.500.
- Process Flow Diagram (Bottom Left):** A circular diagram illustrating the data collection process: "EVENT" leads to "FORM TEAM", which leads to "DEFINE PROBLEM", which leads to "COLLECT DATA", which then feeds into "COLLECTION".

USDP Achievement



Upstream Surface Data Platform

 Business Excellence Data ↗

 Engineering Data ↗

 Real Time Data ↗

USDP Achievement

PETRONAS UPSTREAM SURFACE DATA PLATFORM

Browse | Home | Search | K-2410 x

K-2410 (Centrifugal Compressor)

Equipment Criticality - 1

Name / Title	Type	Parent	Location	Aliases
COMPRESSOR 1ST STG TURBINE DRIVEN-TRAIN 1	Centrifugal Compressor	Mechanical Rotating	RCPP.GEX.GC1.K2410-K2410	K-2410 K2410

Attributes | Filter | Hide Empty | Expand All

- PMMS General (2 of 2)
 - Description: COMPRESSOR,1ST STG TURBINE DRIVEN-TRN 1
 - Equipment SAP ID: GCOM-0030
- Equipment Specification (11 of 11)
 - FACILITY: RCPP
 - MAXIMUM CONTINUOUS SPEED (RPM): 12098
 - MAXIMUM DISCHARGE TEMPERATURE (DEG C): 101
 - NORMAL OPERATING DISCHARGE PRESSURE (BARG): 63.33
 - NORMAL OPERATING INLET PRESSURE (BARG): 31.03
 - NORMAL OPERATING INLET TEMPERATURE (BARG): 42.76
 - NORMAL OPERATING VOLUMETRIC FLOW RATE (M3/HR): 7841
 - PRIORITY: SAFETY CRITICAL ELEMENT
 - RATED POWER (KW): 8292.1826
 - SERVICE TYPE: EXPORT GAS COMPRESSOR
 - TAG NO.: K-2410

Links | PI Vision

External Views | PI Vision

AVEVA™ PI Vision™ | New Display | PETRONAS\lianrui.lim

Compressor K2410 (read-only) | Asset: C1 - Pump-C&M+

Upstream Surface Data Platform | PMA Field | Equipment List | PI Tag (Compressor) | K-2410

Pump-3030

Name	Description	Value	Units	Trend	Minimum	Maximum
Disch_Press PI Tag	OUTLET P3030 TO V3020/70	22.091064	barg		21.938035	22.226583
Plunger_Temp3 PI Tag	OUTLET P-3030 CONDE PUMP	32.206394	DEGC		28.741735	33.109610
Plunger_Temp2 PI Tag	OUTLET P-3030 CONDE PUMP	31.703456	DEGC		28.556496	32.867663
Plunger_Temp1 PI Tag	OUTLET P-3030 CONDE PUMP	30.688274	DEGC		27.493715	32.038742
Disch_Temp PI Tag	OUTLET P-3030 COND PUMP	31.347084	deg C		29.880524	31.356812
Suct_Press PI Tag	INLET P3030 FR V3010/60	21.904297	barg		21.751709	22.059598

10/12/2023 2:33:42 AM | 10/12/2023 10:33:42 AM


8h | Now

Parts / Components | Filter | Expand All

USDP Achievement



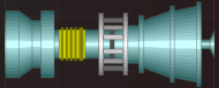
USDP Achievement







PETRONAS UPSTREAM SURFACE DATA PLATFORM


AVEVA™ PI Vision™
Compressor K2410 (read-only) Asset: C1 - Pump-C&M+ ▼

Upstream Surface Data Platform
PMA Field >
Equipment List >
PI Tag_(Compressor) >
K-2410

K-2410



Name	Description ▼	Value	Units	Trend	Minimum	Maximum
Disch_Press PI Tag	OUTLET P3030 TO V3020/70	22.075808	barg		21.936035	22.226563
Plunger_Temp3 PI Tag	OUTLET P-3030 CONDE PUMP	31.824535	DEGC		28.741735	33.109810
Plunger_Temp2 PI Tag	OUTLET P-3030 CONDE PUMP	31.573063	DEGC		28.555466	32.867653
Plunger_Temp1 PI Tag	OUTLET P-3030 CONDE PUMP	30.278475	DEGC		27.493715	32.038742
Disch_Temp PI Tag	OUTLET P-3030 COND PUMP	31.468964	deg C		29.880524	31.478691
Suct_Press PI Tag	INLET P3030 FR V3010/60	21.891481	barg		21.751709	22.059938

USDP Summary

CHALLENGE

1

Scattered data leading to inefficient processes

- users spend a lot of time on searching and reconciling data from different systems

2

Time consuming and costly to understand and merge data before consumption due to nonstandard taxonomy

3

Repetitive workflows of data gathering, merging, cleaning and loading whenever there are new initiatives involving use of data

4

Data governance challenges and compliance requirements

SOLUTION

First phase of USDP roll out focuses on three main functions – data visualization for engineering, real-time, and business transactional data

- AVEVA AIM-A for engineering data visualization
- AVEVA PI Vision displays for real-time data for user personas/use cases
- Data Explorer, customized tool, to visualize and serve business, operations, and transactional data in tabular form

USDP utilized AVEVA Information Standards Manager as a tool to implement corporate reference data library (RDL).

BENEFIT

Improved efficiency

- Process lifecycle efficiency improved by 30% in engineering and operational data preparation, data loading and data contextualization

Improved cost savings

- Cost savings from data integration efforts.



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Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!

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