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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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Agenda

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- Why are we creating Upstream Data Platform (USDP): Business Drivers and Case for Change

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About 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
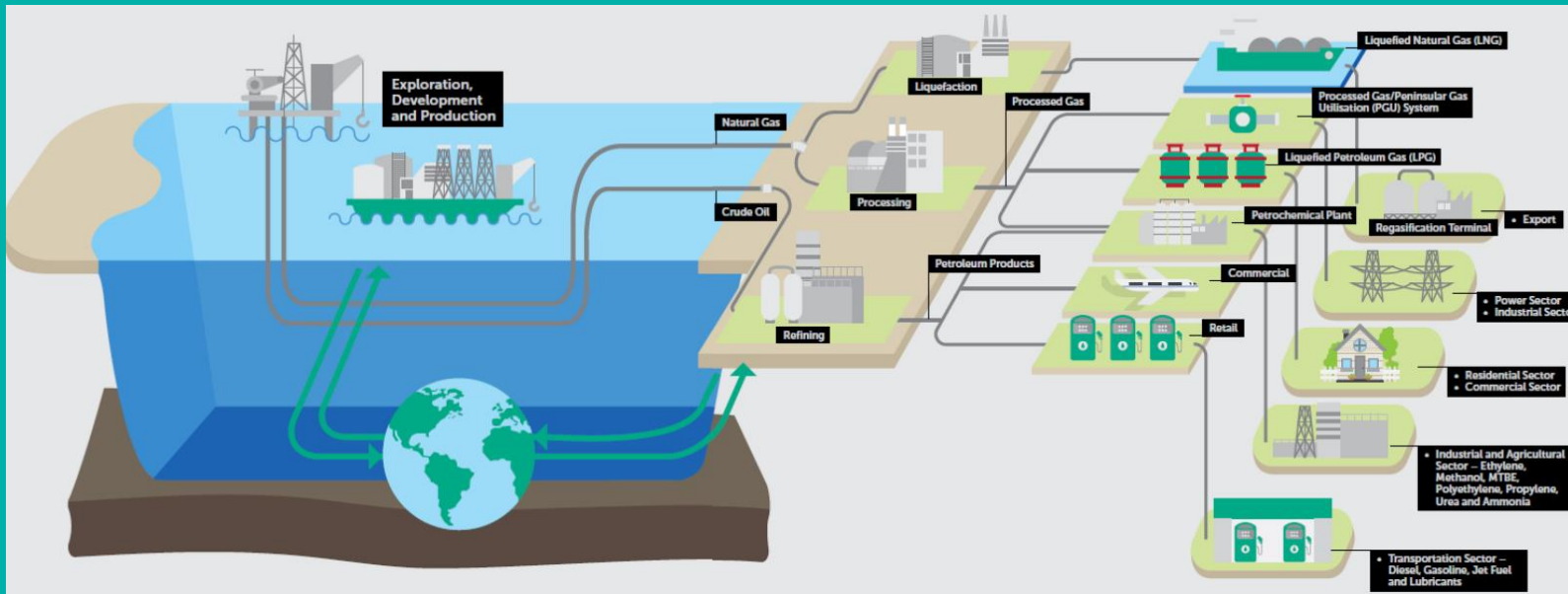
PETRONAS Energy Transition Strategy

Core Business
More Energy, Less Emissions

New Business
Capturing New Growth Opportunities

NET ZERO 2050
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

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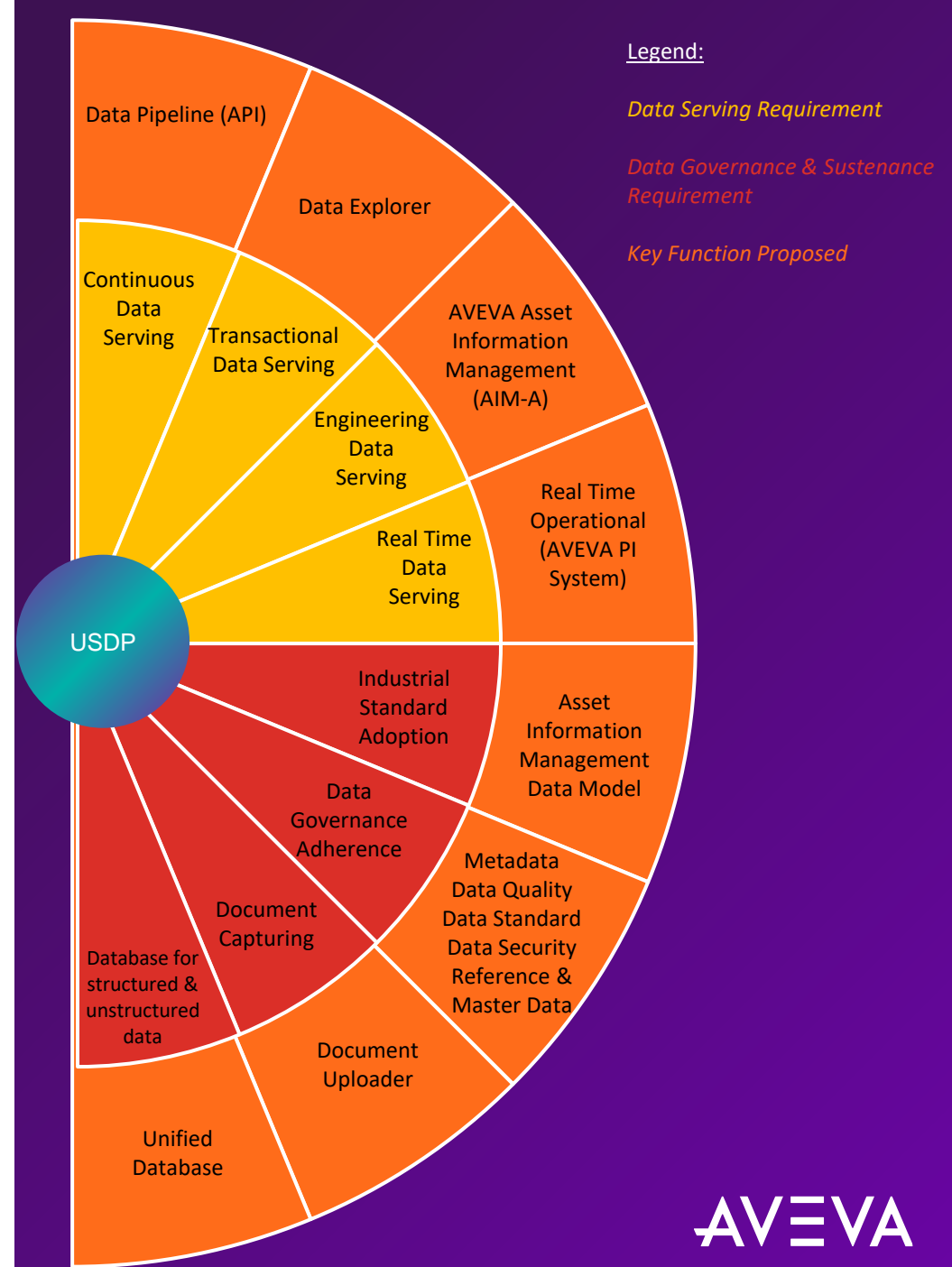# Why Are We Doing This?

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.
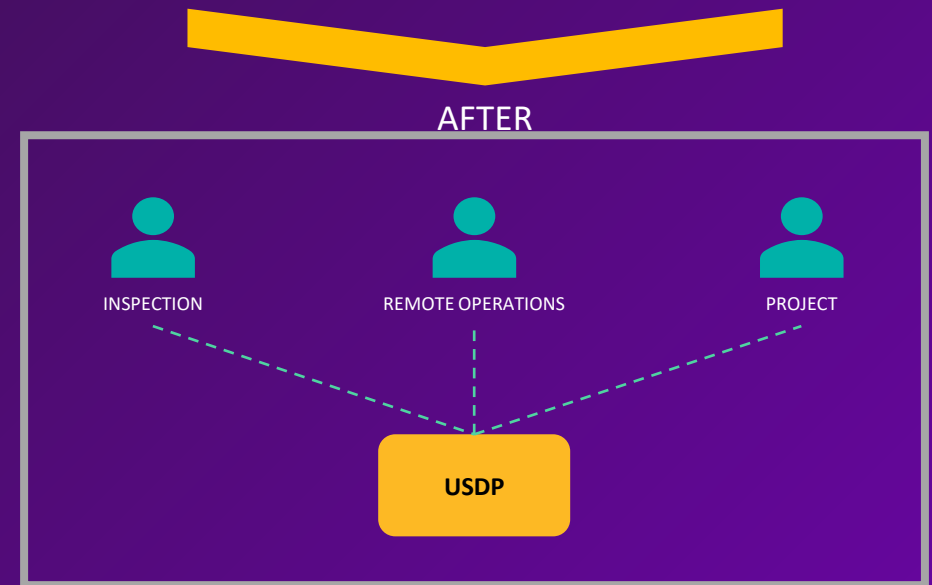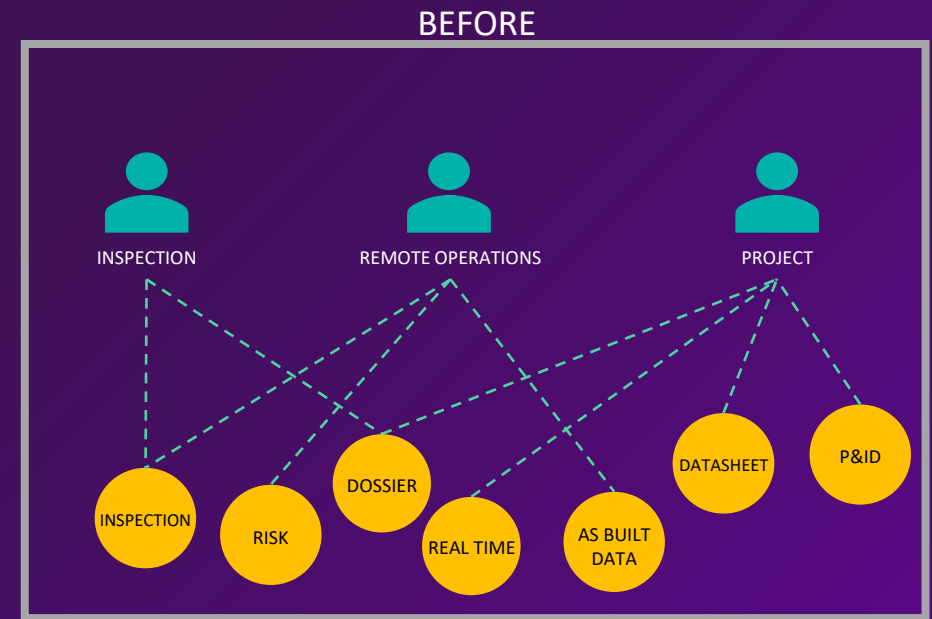
What We Want?

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 Sustenance:

  - Data Governance Adherence & Industrial Standard Adoption

  - Unified Database

  - Document Capturing

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Legend:

Data Serving Requirement

Data Governance & Sustenance Requirement

Key Function Proposed

USDP

- Data Pipeline (API)
- Data Explorer
- Continuous Data Serving
- Transactional Data Serving
- Engineering Data Serving
- Real Time Data Serving
- AVEVA Asset Information Management (AIM-A)
- Real Time Operational (AVEVA PI System)
- Asset Information Management Data Model
- Metadata Data Quality Data Standard Data Security Reference & Master Data
- Industrial Standard Adoption
- Data Governance Adherence
- Document Capturing
- Document Uploader
- Database for structured & unstructured data
- Unified Database

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..

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Data Management Knowledge Area

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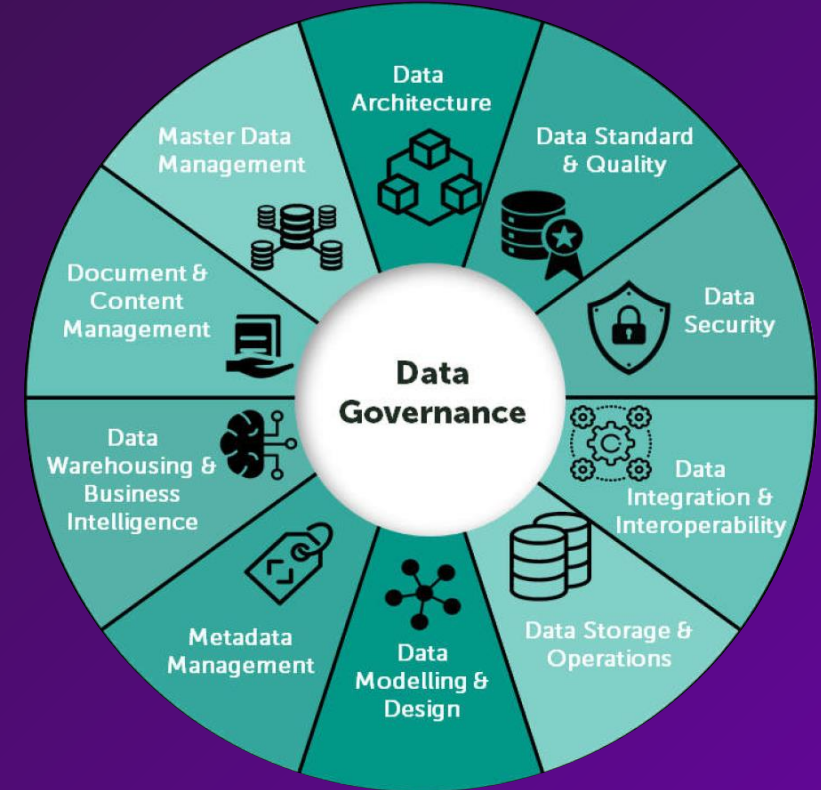
Reference Data Library (RDL) & Data Model

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.
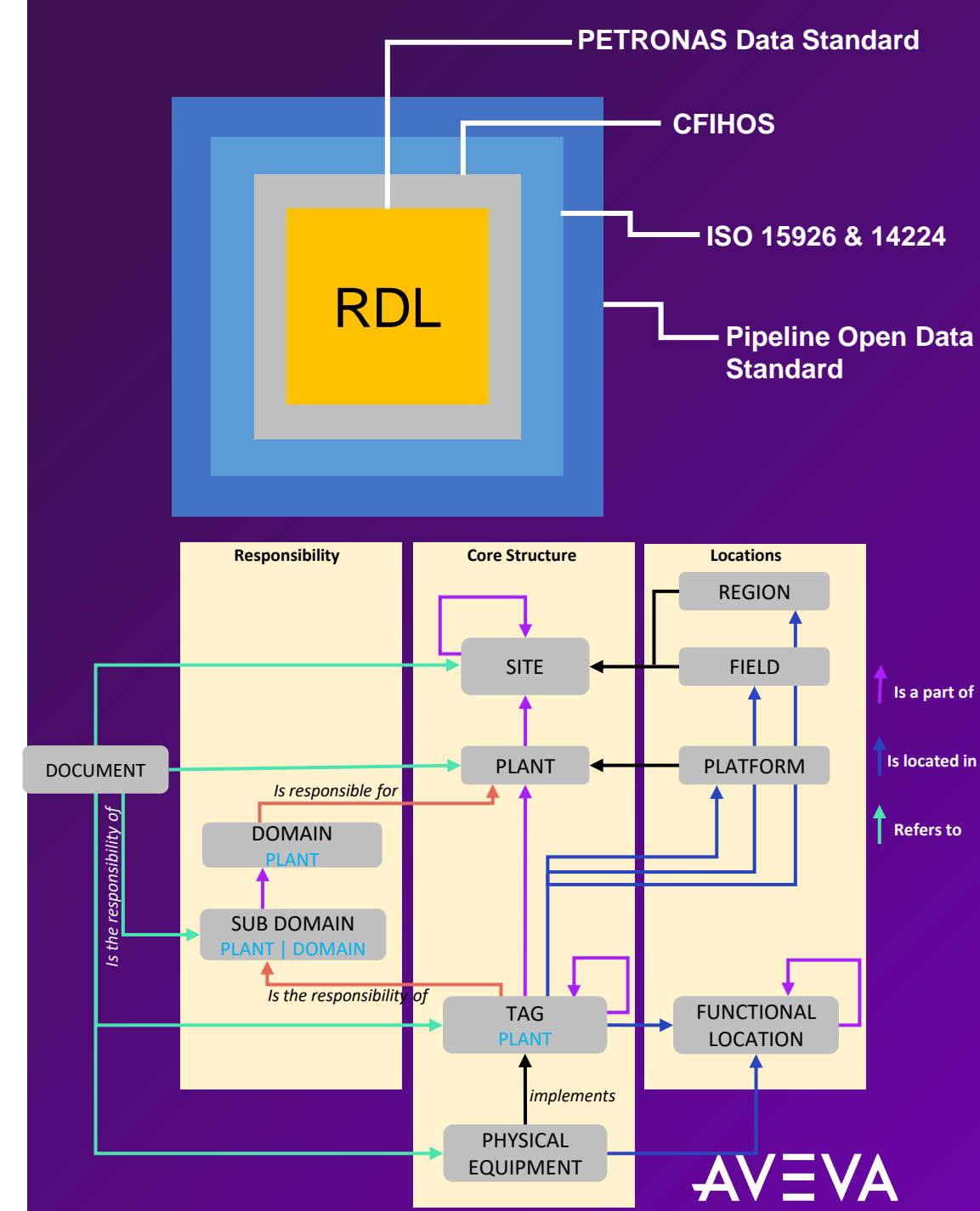
Overview on USDP Architecture

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.

Consumption Layer

| Predictive Tool | Optimisation | Advanced Analytics |

Data Serving — Serve

| Data Explorer | Asset Information Management | Real Time Data (AVEVA PI System) | Data Pipeline (API) | Data Quality |

Unified Database — Visualize, Serve, Categorise, Check, Assure

1D (Batch) | 1D (Time Series) | 2D, 3D, Point Cloud | Engineering Model

SQL | Petroleum Experts | MC

Information Interface — Sort, transform, slice, organize, implement data governance, integrate

| Engineering Information Interface | Operational Information Interface | Real Time Information Interface |

Data Sources

| Engineering System of Record | Operational System of Record | Real Time System of Record |

PEDMS | 3D | Point Cloud | SAP PMMS | MEASURES | PRBI | DOR | PI

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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.effectivedatastorytelling.com
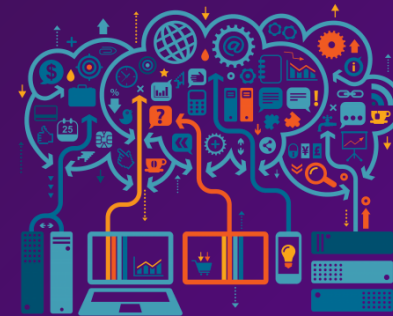
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USDP Achievement

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.

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USDP Achievement

USDP Achievement

USDP Achievement

USDP Achievement

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?

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State your name and company.

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ABOUT AVEVA

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

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