Saka Energi Indonesia Overview

pipes
PERTAGAS INTEGRATED PIPELINE AND ENERGY SUMMIT

PERTAMINA GAS

PT Saka Energi Indonesia (PGN Saka) was established on 27 June 2011, as a wholly owned *Upstream Oil and Gas Subsidiary* of **PT Pertamina Gas Negara Tbk (PGN)**

West Bangkanai PSC
- Location : onshore Kutei basin
- Working Interest : 30%
- Operator & Partner : Medco (70%)

Bangkanai PSC
- Location : onshore Kutei basin
- Working Interest : 30%
- Operator & Partner : Medco (70%)

Muara Bakau PSC
- Location : offshore Kutei basin
- Working Interest : 11.666%
- Operator : ENI (55%)
- Partners : Neptune (33.334%)

South Sesulu PSC
- Location : offshore Kutei basin
- Working Interest : 100%
- Operator : PGN Saka

Muriah PSC
- Location : offshore Java sea
- Working Interest : 100%
- Operator & Partner : PGN Saka

Pangkah PSC
- Location : offshore Java sea
- Working Interest : 100%
- Operator : PGN Saka

Ketapang PSC
- Location : offshore East Java
- Working Interest : 20%
- Operator & Partner : Petronas (80%)

Fasken   International
- Location : Webb County, Texas, United States
- Working Interest : 36%
- Operator & Partner : Silverbow (Previously Swift Energy) (64%)

Sangkar
- Location : offshore Java sea
- Working Interest : 100%
- Operator : PGN Saka

West Yamdena
- Location : offshore Maluku
- Working Interest : 100%
- Operator : PGN Saka

■ Production ● Exploration

Map labels
Tarakan
Tj. Selor
Pontianak
Samarinda
Bontang LNG Facility
Muara Bakau
Donggi-Senoro LNG Facility
South Sesulu
Palangkaraya
Banjarmasin
Muriah
Sangkar
Pangkah
Ketapang
Tangguh LNG Facility
Timika
Future Masela LNG Facility
West Yamdena
Merauke

FASKEN BLOCK
USA
New York
Houston
Legend

BLOCKS*
6 operated
5 non-operated

WELLS**
22 exploration
91 production

PLATFORMS**
2 manned
3 unmanned

PIPELINES**
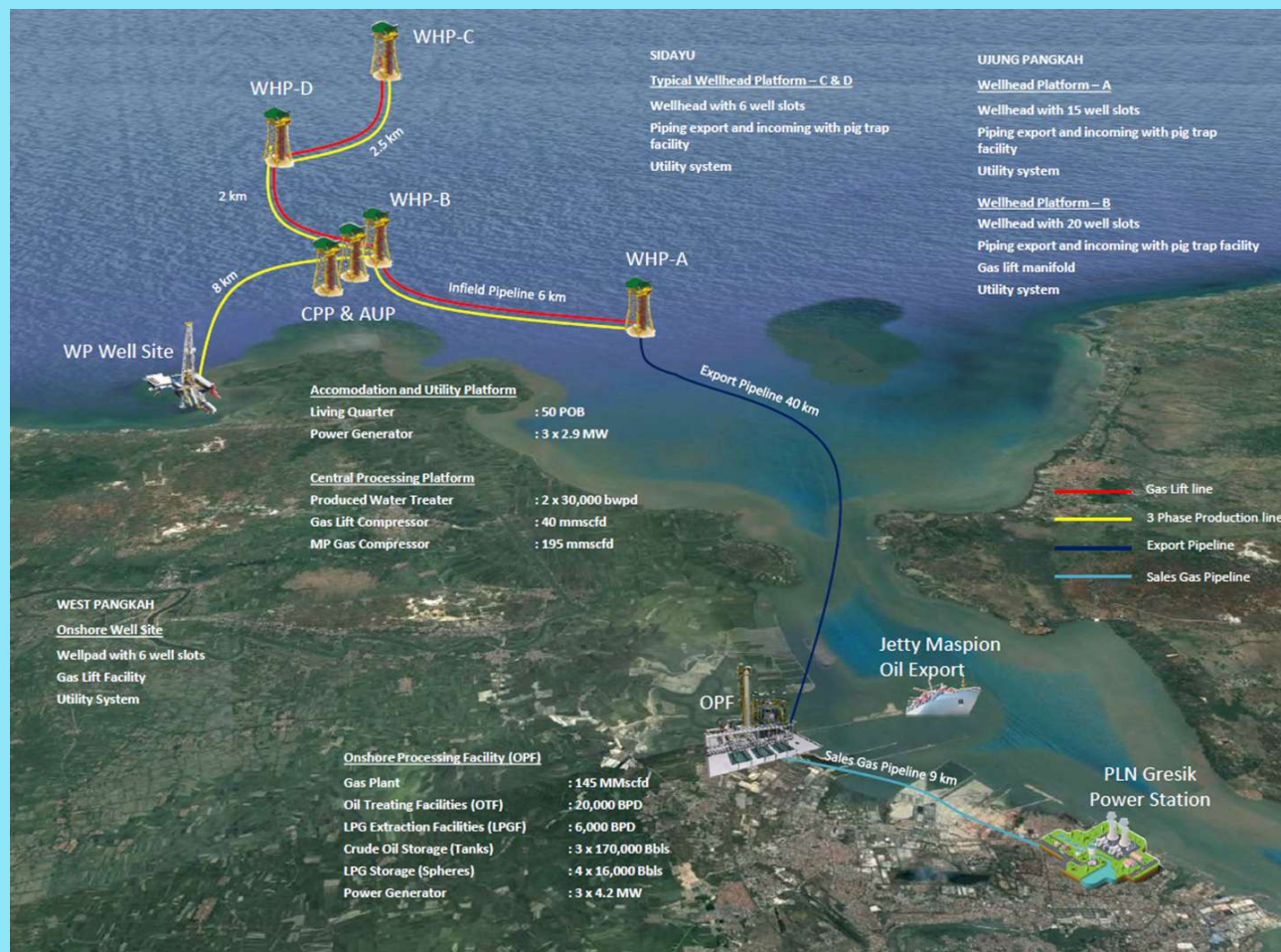263.66 kilometers

PRODUCTION*
22,000 – 25,000 BOEPD

* All asset ** Operated asset

Pangkah PSC Introduction

Summary

Operator	**Saka Indonesia Pangkah Ltd.**
Fields	Ujung Pangkah, West Pangkah, Sidayu and Tambakboyo
Reservoir	Carbonate Reservoir with Naturally Fractures.
Reservoir Depth	~ 4860 ft TVDSS
Start Prod	2007
Well Number	32 active HZ & Directional Wells
Artificial Lift	Gas Lift
Production Facility	❑ **Offshore Facility:** ▪ 4 WH platforms w/ total 32 active wells. ▪ Central Processing Platform (CPP) ▪ Accommodation & Utility Platform (AUP) ❑ **Onshore Processing Fac (OPF)** ▪ Gas Plant ▪ LPG Facility ▪ Crude oil & LPG storage

SIDAYU

Typical Wellhead Platform – C & D
Wellhead with 6 well slots
Piping export and incoming with pig trap facility
Utility system

UJUNG PANGKAH

Wellhead Platform – A
Wellhead with 15 well slots
Piping export and incoming with pig trap facility
Utility system

Wellhead Platform – B
Wellhead with 20 well slots
Piping export and incoming with pig trap facility
Gas lift manifold
Utility system

Accomodation and Utility Platform
Living Quarter : 50 POB
Power Generator : 3 x 2.9 MW

Central Processing Platform
Produced Water Treater : 2 x 30,000 bwpd
Gas Lift Compressor : 40 mmscfd
MP Gas Compressor : 195 mmscfd

WEST PANGKAH
Onshore Well Site
Wellpad with 6 well slots
Gas Lift Facility
Utility System

Onshore Processing Facility (OPF)
Gas Plant : 145 MMscfd
Oil Treating Facilities (OTF) : 20,000 BPD
LPG Extraction Facilities (LPGF) : 6,000 BPD
Crude Oil Storage (Tanks) : 3 x 170,000 Bbls
LPG Storage (Spheres) : 4 x 16,000 Bbls
Power Generator : 3 x 4.2 MW

Gas Lift line
3 Phase Production line
Export Pipeline
Sales Gas Pipeline

Jetty Maspion Oil Export

PLN Gresik Power Station

Digital Twin Introduction

What is Digital Twin?

- A representation of physical assets, systems or processes designed to optimize business value through real-time analytical activities including detect, prevent, and predict failures *(General Electric).*

- The purpose of a digital twin is to simulate real-world systems, to help people make better decisions that impact the real world.
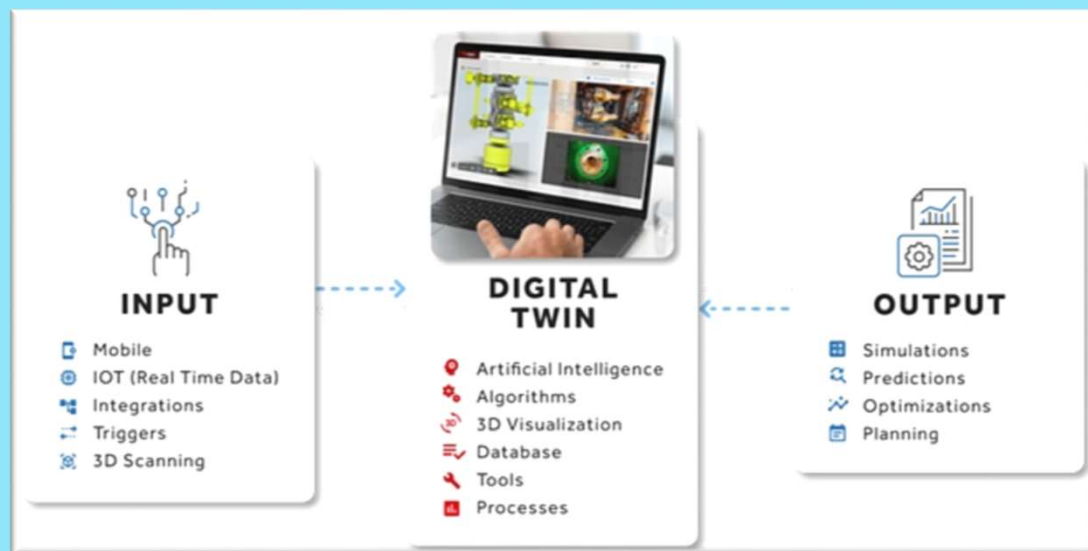
Basic Process of Digital Twin (*Vidya Technology*)

Why uses Digital Twin?

- **Quality**: *Improve decision making/avoid re-works during Projects and Operations of Energy Upstream Business*
- **Delivery**: *Enhance Collaboration/minimize site visit by providing web-based Integrated Data, Information and 3D visualization.*
- **HSSE**: *Avoid Lost Time Injury by improve Situational Awareness during simultaneous Projects/Operation.*
- **Cost**: *Minimize LPO during Turn Around/Planned*

How to build Digital Twin?

- *Phase 1: Component/part Twins* simulate the smallest example of a functioning component.
- *Phase 2: Asset Twins* simulate two or more components working together and analyze the interactions between them.
- *Phase 3: System/unit Twins* simulate how multiple systems assets work together, simulating an entire production line, for instance.
- *Phase 4: Process Twins* the top-level view of systems working

iSquare Digital Twin Background

Problems and Definition

- Scattered, dormant and under-utilized data (Engineering, Operations and Maintenance).
- Constant threat of Land Subsidence in SAKA Production Facilities with no tools for monitoring.
- The need of collaboration platform that Integrated Data, Information and 3D visualization to Improve decision making and breaking up silos during Projects and Operation activities.

Opportunities

- The Availabilities of 3D Models, Engineering, Maintenance & DCS system can be optimized to provide further insight:
    1. *Descriptive Analytics* (Asset Documentation, Defect Detection, Remote Monitoring, Anomaly Detection, Structural Integrity Assessment)
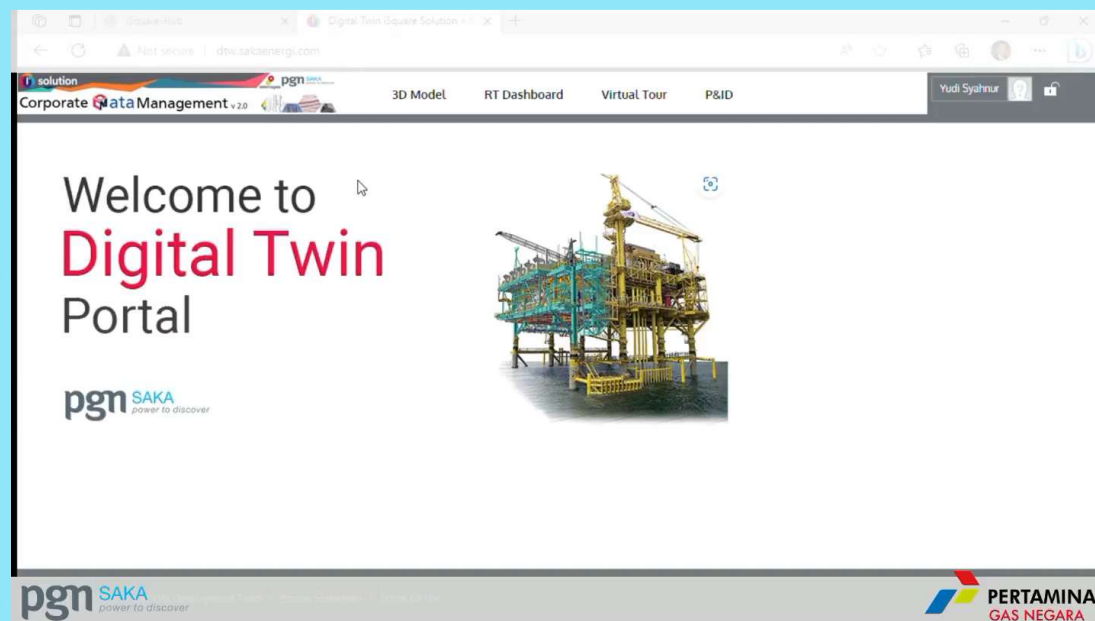   2. *Predictive Analytics* (Asset Maintenance, Asset Life Span Based/Replacement Pla
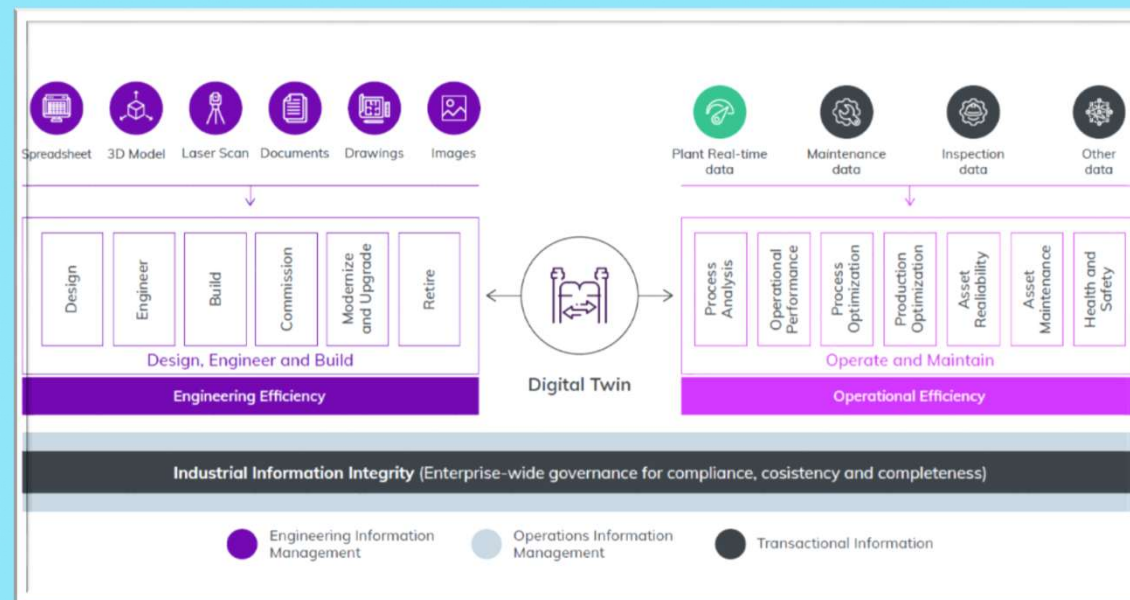
Gkovedarou, 2022 (AVEVA whitepaper)

iSquare Digital Twin
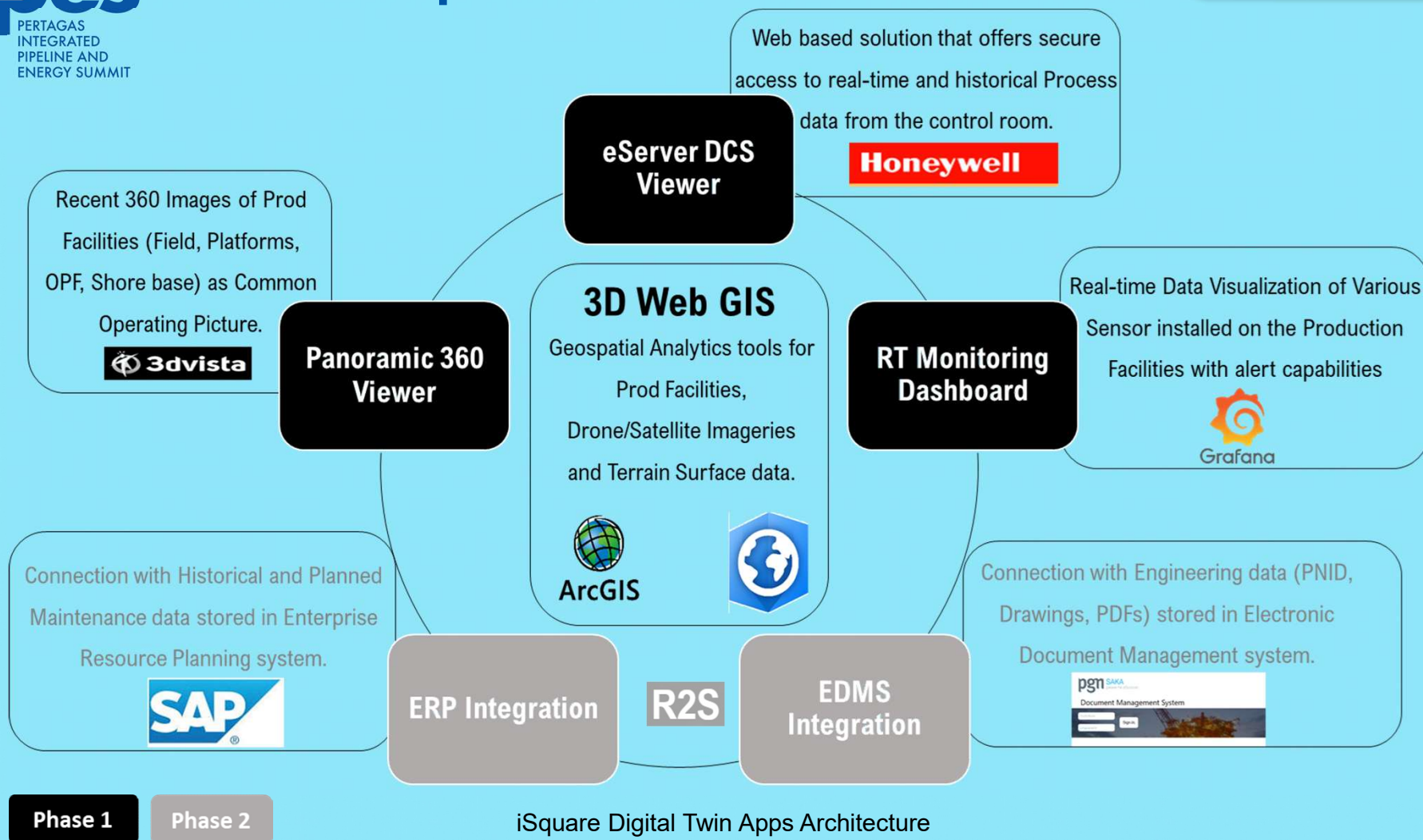
How to create a solution that:

- Integrates Engineering, Operations and Maintenance data with 3D Models;
- Have the tools to monitor the ongoing Land Subsidence in PGN Saka's Production Facilities;
- Can be safely accessed by Internal and External parties from anywhere and at anytime;
- Provide Common Operating Pictures to Improve decision making/avoid re-works during Projects and Operation activities
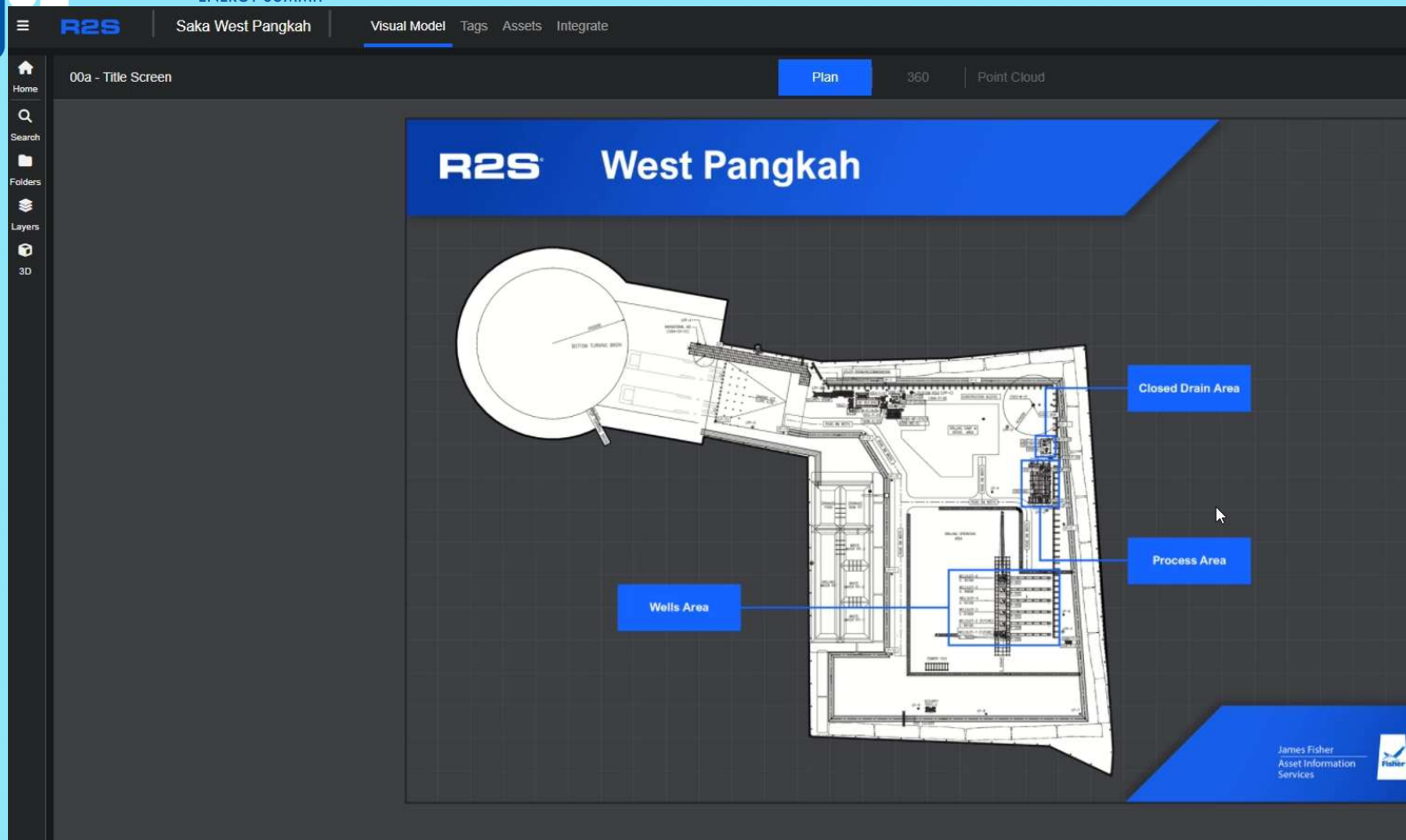
Solution:

Build a web-based Digital Replica of SAKA Production Facilities, connecting high resolution 3D Model with Equipment Tags, PNID info, real-time Equipment Sensors, Work Orders and other information stored in Enterprise Resource Planning (SAP)

Implemented Solution

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eServer DCS Viewer

Web based solution that offers secure access to real-time and historical Process data from the control room.

Honeywell

Panoramic 360 Viewer

Recent 360 Images of Prod Facilities (Field, Platforms, OPF, Shore base) as Common Operating Picture.

3dvista

3D Web GIS

Geospatial Analytics tools for Prod Facilities, Drone/Satellite Imageries and Terrain Surface data.

ArcGIS

RT Monitoring Dashboard

Real-time Data Visualization of Various Sensor installed on the Production Facilities with alert capabilities

Grafana

ERP Integration

Connection with Historical and Planned Maintenance data stored in Enterprise Resource Planning system.

SAP

R2S

EDMS Integration

Connection with Engineering data (PNID, Drawings, PDFs) stored in Electronic Document Management system.

pgn SAKA Document Management System

Phase 1   **Phase 2**

iSquare Digital Twin Apps Architecture

Digital Twin - Demo

Digital Twin Maturity Level

AI/ML and Process Safety Integration

R2S

Computerized Maintenance Management System integration

Asset Register, Equipment Tags, Drawings

Predictive Maintenance, Remaining Useful Life

Full visibility of CMMS workflows and data

Alignment of Digital Twin + CMMS to Process Safety Priorities

Full engineering data access, as-built verification, tags and drawings

Improved Operations Management (STO/TAR, Integrity, Maintenance)

Asset Visualization

Remote Operations, Planning, Team Collaboration, Onboarding

Integrate As-Built Data

Photogrammetry, Drone, Laser Scan, 3D Models

(Modified after James Fisher whitepaper)

Value

Action

Digital Twin - Business Impact

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Financial Impact

- **Revenue : *Increase in Plant Utilization*** — *Revenue uplift from decrease of plant annual shut-down due to shutdown due to   incidents & maintenance .*
- **Cost : *Reduce Visit Travel Cost*** — *Reduction of visit travel cost due to decrease in site inspection*

Operation Value

- **Quality**: ***Providing Common Operating Picture*** - *Improve decision making/avoid re-works during Projects and Operation in   Production facilities*
- **Delivery**: **Web-based Integrated Data, Information and 3D visualization** - *Enhance Collaboration/minimize site visit.*
- **HSSE**: ***Avoid Lost Time Injury -*** *Improve Situational Awareness during simultaneous Projects/Operation.*

Value drivers calculation	**Revenue** = Reduction potential plant shut-down (%) x Annual shutdown (hour/year) x Average Throughput/hour (barrels or cbm/hour) x Price ($/barrel or cbm) **OPEX =** Reduction potential in visit actions (%) x Annual number of visit actions ($) x Average cost of visit action ($)

Value potential estimation	Assumption[1]	Baseline Data[2]	Impact estimate[3] (IDR / year)
	1 • 1 day Loss Production Opportunity (LPO) optimized	• Daily Production from Saka Assets 15.000 boepd @ US$ 80 / barrel	USD ~ $1,200,000 /year
	2 • 1 person need to visit and travel to the facility	• Each person has privilege to receive accommodations	USD ~ $500/person/year

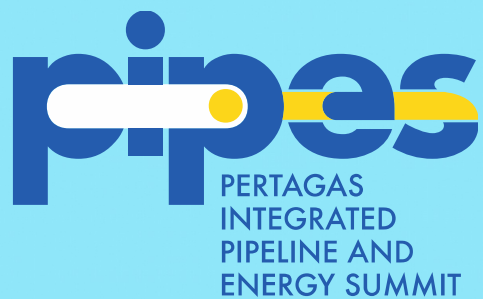Source: Initiatives Scope/Initiative Charter, BCG Analysis
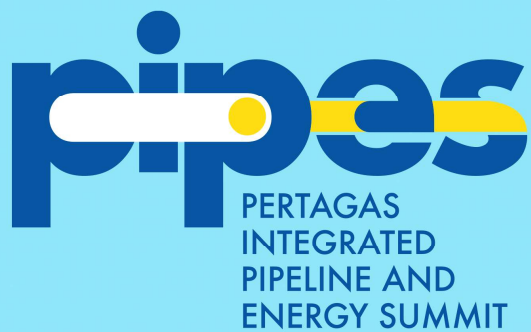
Key Take Away

❯ Conclusion

- PGN SAKA is embracing new approaches while Creating Values to perform Operations in a Safer and more Efficient way through Digital Twin.

- Digital Twin is highly customizable to Fit Business Purpose, with initial development focused on integration of Operational data and workflows (Maintenance, Engineering and HSSE)

- SAKA is fully committed to foster Innovative Environment to increase business value & talent development.
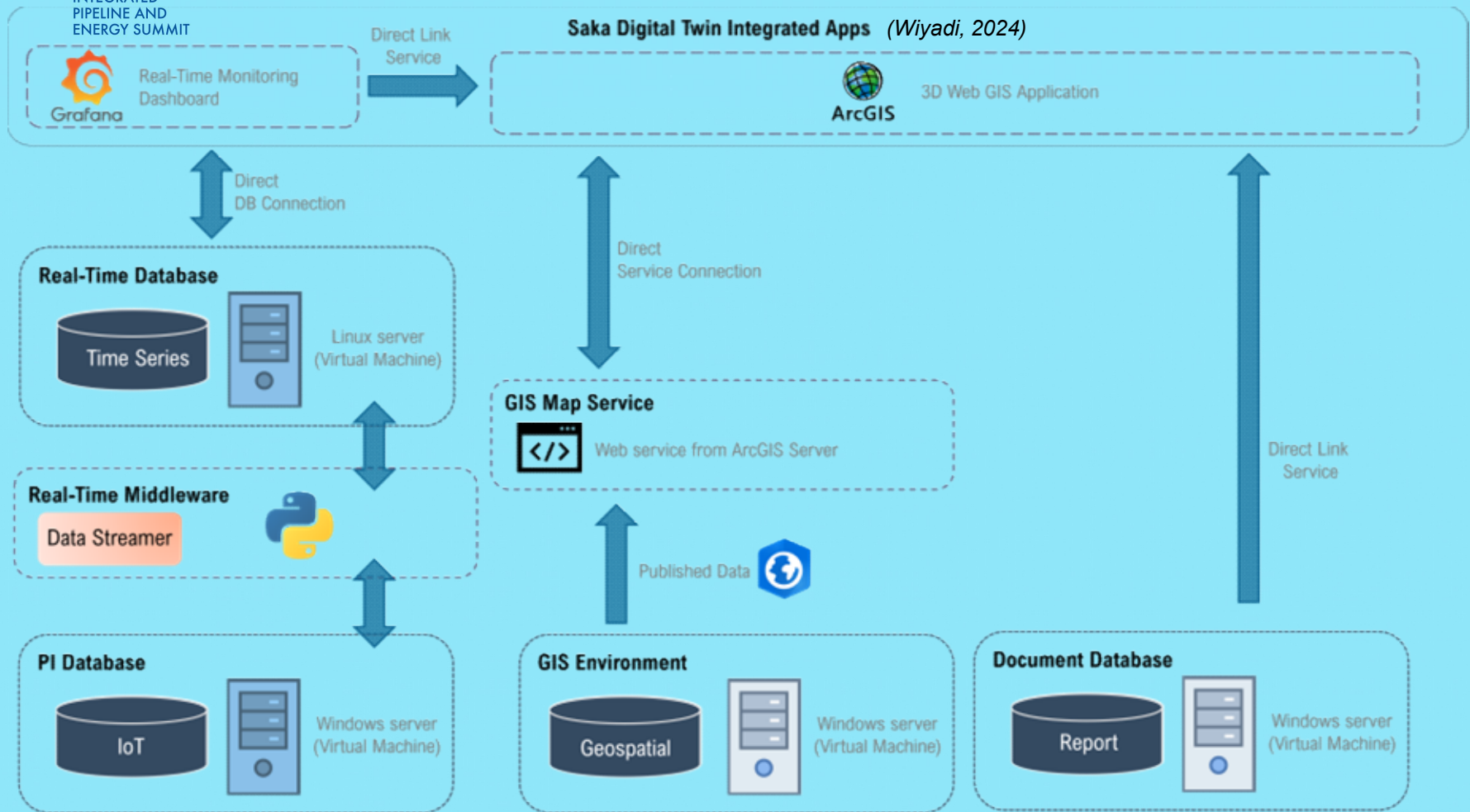
❯ Way forward

- Continue Pangkah Digital Twin phase 2B implementation for other modules in Onshore Processing Plant - Maspion Gresik to increase operations and business process efficiency.

- Implement new and emerging technologies to:
    - 3D Model Data Capture, such as Oblique Photogrammetry and Drone LiDAR.
    - Inspection Data Capture using Mobile Survey tools (explosion proof tablet).

Backup Slides

System Architecture

3D Model Data Acquisition