PETRONAS Petrotechnical Suite Digital Transformation

A Journey of a Thousand Smiles

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PETRONAS Group adopts zero tolerance against all forms of bribery and corruption. As an employee, it is incumbent upon each and everyone of us to internalise and abide by the PETRONAS Code of Conduct and Business Ethics (CoBE) & Anti-Bribery and Corruption (ABC) Manual while remain guided by our shared values of loyalty, integrity, professionalism and cohesiveness.
Siloed technical landscape drains financial and technical resources into non-value adding activities

Case for change

Cloud Based solution (SaaS)

Entrenching digital in the new way of working – Integration, Collaboration and Innovation

Delivering step change in core business – cost, efficiency and safety

Maximize value across the integrated chain – precision, reliability and agility
DELFI PTS As-Is Platform Integrates Petrotechnical Application on Cloud & Orchestration of Multiple Scenarios from Exploration & Development

**E&P Data Ecosystem**
- Exploration Software
  - GeoX
  - Petrel G&G
  - Petromod
  - Visage & GPM
- Petrophysics Software
  - Petrophysical Software
  - Techlog
  - Petrel RE
- Geology and Geophysics Software
  - Seismic
  - Stratigraphy
  - Petrophysical
  - Sedimentology Core
- G&G Model
  - Volumetrics
  - Rock Model
  - Properties, Facies, Structure Model
- Reservoir Engineering Prod Technologist Facility Network Software

**PETRONAS OSDU Data Ecosystem**
- Drilling Well Intervention
- Front End Engineering
- Operation Readiness
- Economic Framework and Evaluation
- Production DB Integrated Operation
- UPMS FDP Database
- Production (P10,P50,P90)
- CAPEX (P50,P80)
- OPEX(P50/P80)
- ABEX
- Production Injection Pressure Fluid samples
- Well history
- Geomechanics
- Geomatic
- Trajectory
- Historical Data
- Static Model
- Completions
- Well location
- FACET
- Production Concept
- Plan
- Well Completion
- Rock Properties
- Geomechanics
- Economic Framework
- Decision Support
- Production Optimization
- Facility Network Software
- Geomechanics
- Trenching
- RMP
- NPV
- IRR
- Notional FDP
- COE

**Technical application in various domain integrated to Delfi PTS platform**
**API Connector Ready with 3rd Party Integration Platform**
**Minimum data standard for OSDU compliant**

**Project Benchmarking**

**Framing (FEL0)**
- PETRONAS OSDU Data Ecosystem as single point of truth

**Feasibility (FEL1)**
- Minimum data standard for OSDU compliant

**Concept Select (FEL2)**
- Technical application in various domain integrated to Delfi PTS platform

**Scope Define (FEL3)**
- API Connector Ready with 3rd Party Integration Platform

**Production**

**Abandonment**
What is Delfi Petrotechnical Suite?

- Delivered as Domain Profile
- Work on the cloud – access to data & technology anywhere with internet
- Access to full suite of applications by profile (not dependent on modules, etc.)
- Cloud High Performance Compute Power (Elastic Computing)
- Call on unlimited computing power where required—improving the speed and quality of decision making
- Users move seamlessly between tasks, applications, and petrotechnical data sources.
- Empowers users and teams to achieve more, unconstrained by hardware, applications or data
- OSDU complaint

Delfi Domain Profile
- Geophysicist Plus
- Geologist Plus
- Reservoir Engineering Plus
- Petrophysicist Plus
- Production Engineering Plus
- Exploration Portfolio (GeoX)
- Project Data Manager
- Reviewer Plus Profile
Migration Journey of Delfi PTS

Delfi PTS Deployment plan was prepared and implemented to ensure smooth transition from on-premise environment to Delfi cloud and to minimize the impact of changes of project delivery.

**Pre-Deployment**
- Transition strategy planning
- Workflow assessment & technical scoping
- Multitude system & workflow regression testing
- Technical validation across all domains

**Deployment**
- Migrated 280TB databases from multi-domain
- Onboarded total of 440 PTS profiles users
- Deployed 3 digital initiatives
- 3rd party application hosting

**Transition**
- Bubble Support
- 24/7 system support
- Weekly Project Meeting

**Adoption 1.0**
- Continuous user support (CCS & Hypercare Support)
- 8 framing sessions
- 58 technical adoption activities
Enable **continuous support** for all PETRONAS DELFI PTS users transition from deployment & onboarding landing to DELFI PTS Go Live and ensure an **effective adoption** of DELFI PTS.

- Single Point of contact for DELFI PTS and Domain Applications related
- Extensive PETRONAS knowledge from applications to domain solutions experiences
- Easy and efficient communication through PETRONAS MS Teams and Chat functionalities
- Strategic adoption plans based on user needs and requirements
Benefits of Adopting the Clouds Solution

**INSTANT PROVISIONING**
- Save weeks or months on acquiring and installing new/extended HPC

**ELASTIC COMPUTE**
- ‘Limitless’ capacity for everyone
- Simulation driven by activity and operations not hardware and license availability

**COMPREHENSIVE SECURITY**
- Data protection
- Secure access
- Agile security

**APPLICATION RELEASE MANAGEMENT**
- Software update
- OS and software patches
- Bug fixes

**AZURE PLATFORM**
- Azure support for low latency networks over RDMA InfiniBand
- Scale out using IB for multimode HPC and ML workloads on any MPI stack
Case Study: GeoX Centralized Database

Delfi enables GeoX database centralization between two regions (HQ and Regional Office) resulting a better collaboration and technical assurance between both project teams.

Benefits of centralized database:
- Single database for multiple region
- Easy database maintenance
- Cost effective
- Faster turnaround time in decision making by HQ and Management team
Case Study: Simulation Performance Improvement on Delfi

- Improved simulation performance for Project X - The simulation run for one case was completed in 14 hours on Delfi compared to on prem in which the analysis took more than 26 hours to complete for one case.
- The shorter time taken for simulation run on Delfi enabled team to run more cases in a day and to obtain quicker results for better decision making.
- Quoting an example, where one of the asset team on project Z were able to achieve a 50% improvement, running their capture and storage (CCS) workflow, coupling VISAGE and ECLIPSE leveraging high-performance computing (HPC) engines on DELFI as compared to the conventional runs on premise, shortening the simulation runs.

<table>
<thead>
<tr>
<th>Project</th>
<th>Simulation hour (on prem)</th>
<th>Simulation hour (on Delfi )</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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<td>14</td>
</tr>
<tr>
<td>Y</td>
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<td>Z</td>
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Delfi PTS User Feedback

The SLB Bubble-Support Team has made the process of adoption to DELFI smooth.

Thank you for assisting Techlog data migration onto DELFI. Smoother and faster interpretation/analysis using Techlog on Delfi.

As of now Hypercare support is great 😊

Delfi provides a simple workflow for depth conversion in Petrel.

Increase work efficiency.
Summary & Acknowledgement

Summary

Delfi PTS is a proven concept with these benefits:

1. Business continuity with online technology, support and single point of truth.
2. Improvement in process efficiency through reduced time in simulation runs (80%) & optimization runs, accelerate technical analysis evaluation (50%), instantaneous access to licenses/modules and real time drilling monitoring.
3. Reduced total cost optimization up to 13% comparable to on-prem solution.
4. Collaboration with cross domain & different department
5. Moving forward, to integrate Delfi PTS platform with PETRONAS OSDU to establish single source of truth for corporate data stores.

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Thank You