



AVEVAWORLD



Building Sustainable Solutions

- Partnership between PETRONAS and AVEVA
- Case Studies

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The PETRONAS Group adopts zero tolerance against all forms of bribery and corruption. We abide by the PETRONAS Code of Conduct and Business Ethics (CoBE) & Anti-Bribery and Corruption (ABC) Manual, guided by our Shared Values and Statement of Purpose.

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Key Messages

1. PETRONAS has been using AVEVA PI System for operation data platform to build solution like PROTEAN for Condition Based Monitoring of PETRONAS' critical assets through a centralized remote monitoring center. PETRONAS then integrated AVEVA AI infused Predictive Analytics (APA) to further enrich the quality of the alerts. The combination of PI System + PROTEAN + APA has helped PETRONAS to reduce unplanned downtime across all their operations. PETRONAS has also built custom solution on PI System like QUASAR for Energy Management Monitoring system.
2. PETRONAS leverages AVEVA's engineering data platform (AIM-A) to build Upstream Surface Data Platform to include PETRONAS and link all engineering data, maintenance data and operation data in business context to build a true digital twin representation of PETRONAS' plants.
3. PETRONAS leverages AVEVA Unified Operation Centre software to build few solutions like Enterprise Optimization Centre, PETRONAS Project Command Centre, PETRONAS Remote Operation Integrated Diagnostic Centre and PETRONAS Technical Excellence Centre. All these solutions are bringing value to provide single source of truth to bring all OT, ET and IT data into single visualization in context to support making precise decision in value optimization, operation and maintenance.
4. PETRONAS is now able to leverage on this partnership with AVEVA and provide managed services-based offerings to customers. This sets the foundation for a new commercialization business for PETRONAS while delivering value to customers in Energy industry by combining the best-in-class technology from AVEVA and the strong domain expertise from PETRONAS. PETRONAS Commercialization team has been able to standardize a lot of templates which are ready to use by customers in the Energy industry and have been able to deliver real tangible results like reducing in OPEX by 10%, reduction in unplanned downtime by 50%, improved data accuracy, increased digital solutions adoptions and decision making.
5. PETRONAS believe partnership with AVEVA make a big impact in the drive towards sustainability across the energy industry. We look forward to share the impact of these solutions and demonstrate how we can deliver value to external customers by commercializing through PETRONAS.





PETRONAS



PETRONAS Global Technical Solutions

Engineering and Technology Solutions Provider

Our expertise covers end-to-end energy value chain solutions.



Who We Are

PETRONAS Global Technical Solutions

PETRONAS Global Technical Solutions Sdn Bhd (PGT), a commercial entity of PETRONAS' Project, Technology & Health, Safety, Security & Environment (PT&HSSE) division, was founded on 10 February 2012. With a strong focus on capital project execution and operational excellence, PGT accelerates success for our clients by providing strategic technology deployment and innovative engineering.

PGT delivers expertise in Project Management and Services, Operational Excellence, Innovative Solutions, and structured Capability Development programs. These solutions enhance the entire oil, gas, petrochemicals, and clean and renewable energy value chain while also creating positive impacts on local and global communities.

PGT embodies PETRONAS' Statement of Purpose, *A Progressive Energy and Solutions Partner Enriching Lives for a Sustainable Future.*

20+

Countries

26

International
Partnership

>3,500

Intellectual
Properties
(PETRONAS)

Engineering and Technology Solutions Provider

Our expertise covers end-to-end energy value chain solutions.



Our Expertise

Innovative and Analytics Solutions

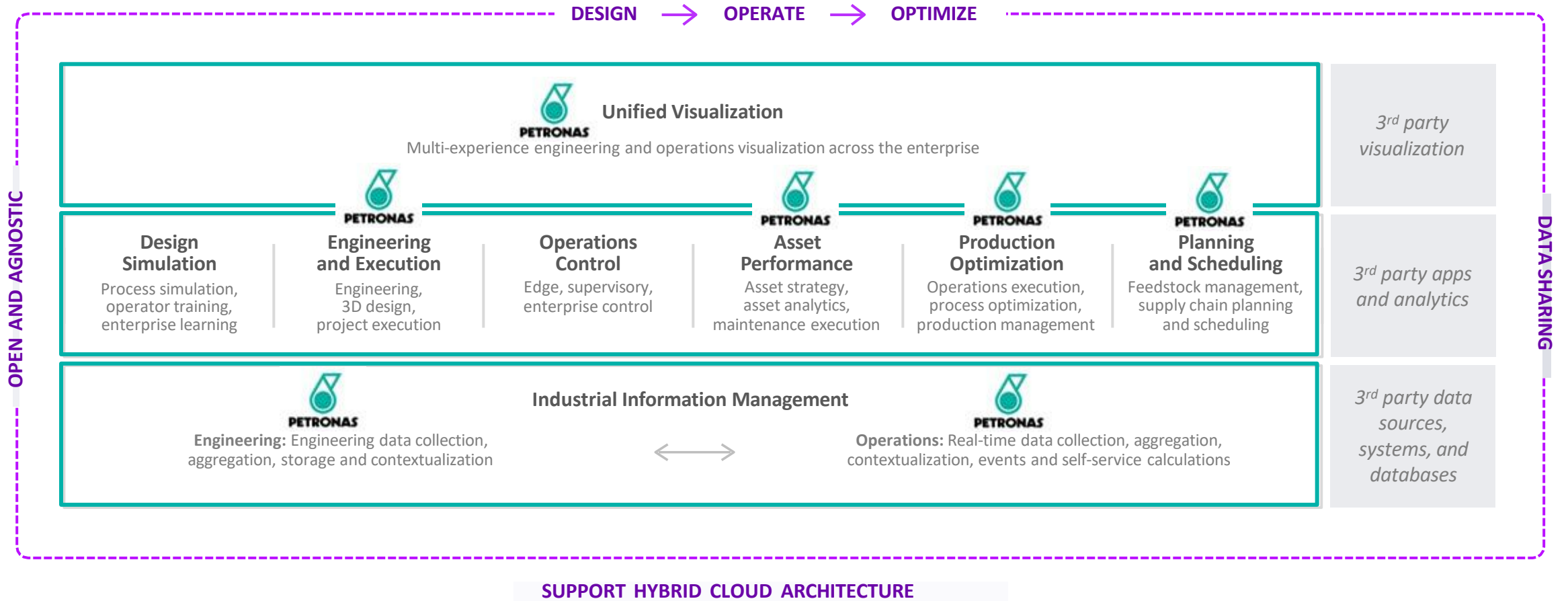
In-house Patented Future-Proof Solutions



Awards & Recognitions



Complete Digital Twin Solutions deployed within PETRONAS



PETRONAS' domain expertise leverages AVEVA Technology to provide commercialization services to external customer

Enterprise Visualization

EOC- Enterprise Optimization Centre
PCC- Project Command Centre
ROID- Remote Operation Integrated Diagnostic
TEC- Technical Excellence Centre

AI Based Predictive Analytic

+ PROTEAN
PROTEAN ++

Engineering data platform

USDP

Operation data platform

QUASAR for Energy Management
DRD – Data readiness

PETRONAS Business Challenge:

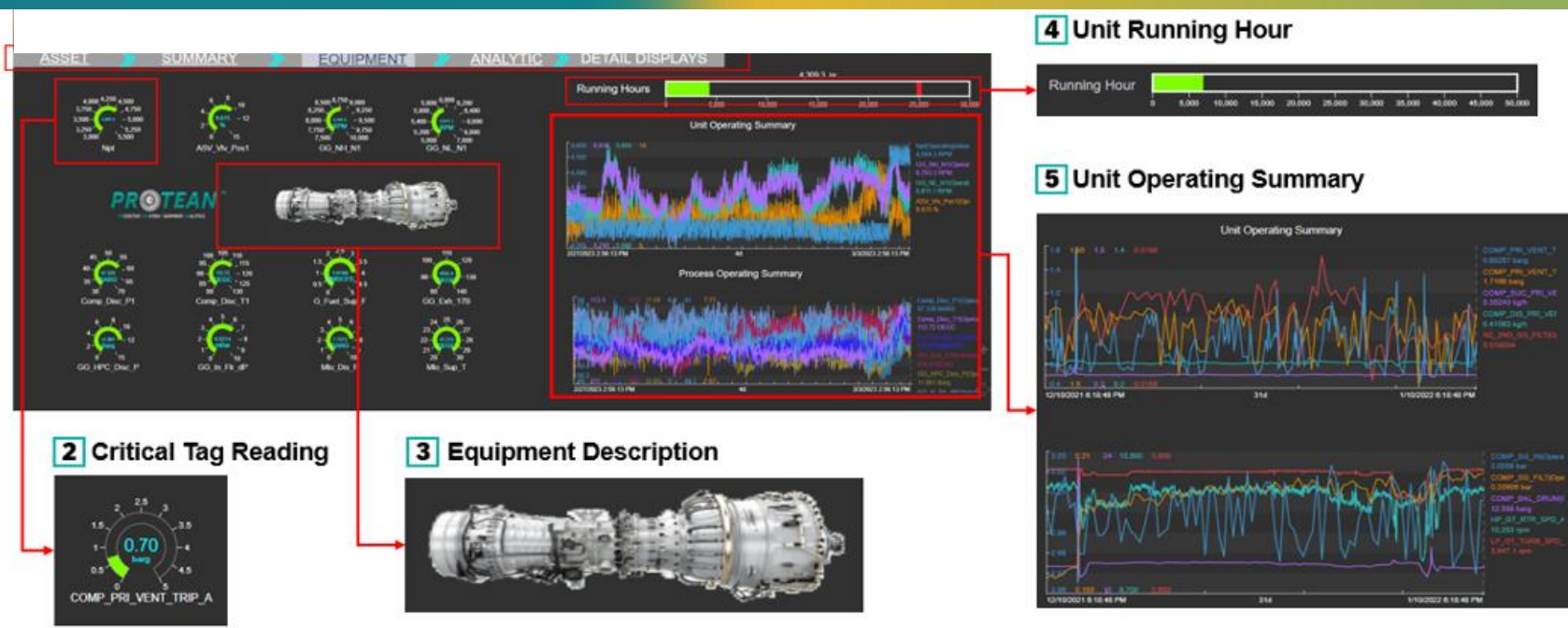
- 1) Unified visualization to overcome data silos to support faster and firm decision
- 2) Leverage AI to minimise asset downtime and improve asset reliability and efficiency which lower cost avoidance and low maintenance fee
- 3) Integrate IT/OT/ET provide transparency in support operation and maintenance decision making
- 4) Trusted data platform for engineering and operation data

Challenges

- OEM Solution based subscription becoming uneconomically challenge in high OPEX environment
- Digital solution applied on selective critical equipment instead of masses
- The needs of digitalization is increasing, and centralization effort would benefit the company in long run

Solutions

- Predictive Rotating Equipment Analytics (PROTEAN) developed by PETRONAS, is a digital solution that enables **remote monitoring of rotating equipment anytime, anywhere**. Developed with in-house algorithm, PROTEAN is proven highly effective in **detecting anomalies in rotating equipment**.
- Utilizing PI AF and Pi Vision, with AVEVA Predictive Analytics providing the multivariable analysis functions



Clients' Feedback

- Operational expenditure (OPEX) and unit maintenance cost (UMC) reduction
- Lower dependency on remote monitoring solutions subscription
- Higher unit reliability for rotating equipment (up to 4%)
- Capability building through digital retooling



■ **PROTEAN Anomalies Detection**

PROTEAN provides predictive alerts to user when the machine operates beyond its normal operating limit, indicating potential anomalies

■ **PROTEAN+ Centrifugal Compressor Performance Benchmark**

Using digital twin of compressor performance, PROTEAN provides the expected performance of the compressor and indicates potential deterioration

■ **PROTEAN+ Gas Turbine Performance Benchmark**

Using data driven approach, PROTEAN provides the benchmark of gas turbine performance based on zero-hour unit



Equipment Details



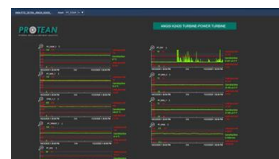
Analytics Dashboard



Alert Tracker Dashboard



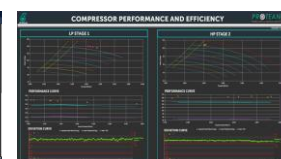
FMEA Prescriptive

PROTEAN+ Multivariable
utilizing AVEVA Predictive
Analytics

Auto Parameter Trend



Availability Reliability



Compressor Performance



Gas Turbine Performance



GHG Emission Monitoring

■ **PROTEAN+ Multivariable***

PROTEAN provides the digital twin of the predicted value for critical equipment parameter and detects anomalies based on deviation between predicted and actual value leveraging collaboration with AVEVA Predictive Analytics

■ **PROTEAN+ FMEA Prescriptive Library**

PROTEAN provides automatic prescriptions of potential failures based on in-house technical library

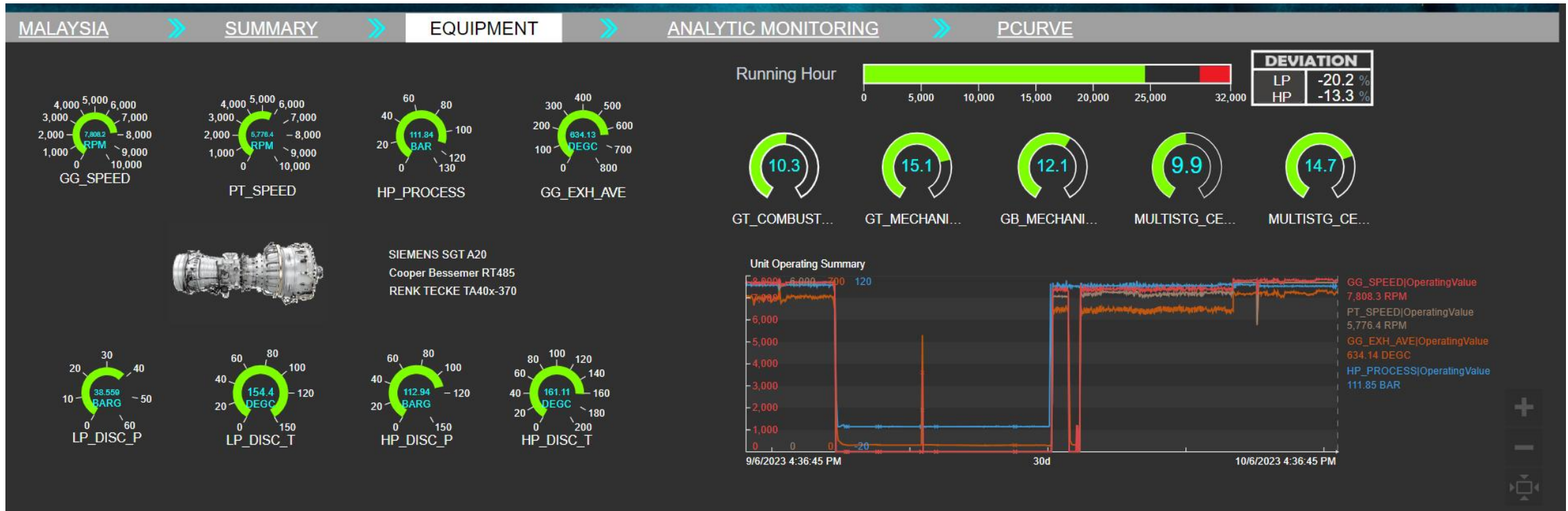
■ **PROTEAN+ Greenhouse Gas (GHG) Emission Monitoring**

PROTEAN monitors the equipment's green house gas emission based on real-time performance – subjected to availability of required parameters

Case Studies + AVEVA Predictive Analytics



Utilizing AI and machine learning to detect asset performance anomalies ahead of potential failures, **without any coding.**



Reduce Downtime



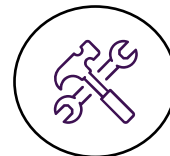
Prevent Asset Failures



Reduce Maintenance Costs



Improve Safety



Extend Equipment Life



Optimize Maintenance Planning



Plant Operations rely heavily on reliable time-series data in their digital applications for decision-making



Monitor and Predict Equipment Failure

Avoid unexpected breakdowns or failures that lead to costly downtime



Optimize Process & Energy Management

Increase production & energy efficiency by suggesting adjustments to parameters







Regulatory Reporting

Automatically generate report to regulatory (emission data to DOE)

Time Series Data Challenges

- Connectivity issues, stale data, data out of range, inappropriate PI System tag settings.
- Lack of visibility on the data reliability & quality.
- No end-to-end monitoring from the data sources feeding to the PETRONAS Solutions, to quickly identified issue or non-reliable data.
- Analytic result untrustworthy and user unable to make decision.

DRD Testimony

- 
 Maintain **data quality** with average above **90%**
- 
 realized **hundred of millions ringgit of value creation**
- 
 Reduce troubleshooting time by **66.7%**
- 
Enhanced Process Reliability:
 Early detection of anomalies leading to fewer unplanned shutdowns.



“It's a challenge to ensure uptime in our Advance Analytics solution with a complex oil and gas digital architecture.

It's crucial to have a tool that can facilitate, providing our team overview of the solution, data, applications, and network insights. DRD eases our tasks in monitoring and tracking the overall health of our analytics solution, enabling continuous value creation through high uptime.”

Shahriza,
Analytics Digital Product Owner

With common values and purposes, PETRONAS commercialization and AVEVA creates positive impacts to communities and industries ...

Our shared purposes ...



91% of industrial organizations affected by resource scarcity¹

RESOURCE UTILIZATION



37% of global energy use comes from industrial sector²

SUSTAINABILITY



\$1.4 trillion lost annually to unplanned downtime³

ASSET HEALTH



15-20% of many organizations' sales revenue lost to quality-related costs⁴

INCONSISTENT QUALITY

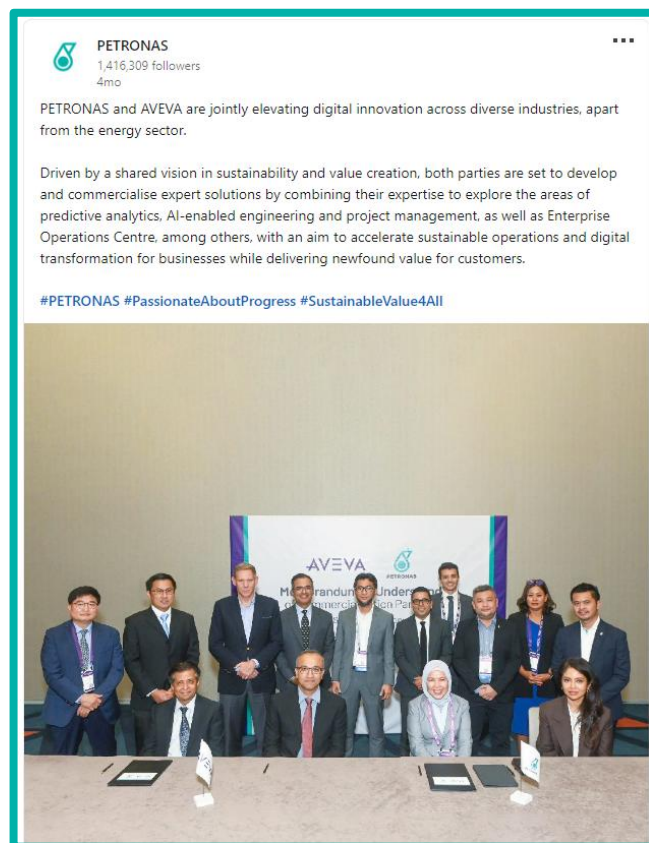


52% of manufacturing executives cite budget constraints as significant hurdle⁵

COST ESCALATION

Sources:

1. Sapio Research, *Circularity: No Time to Waste*, 2024
2. International Energy Agency, *Industry*, 2023
3. Siemens AG, *The True Cost of Downtime*, 2024
4. AVEVA, *Industrial Intelligence: 2024 Industry Insights Report*, 2024
5. American Society for Quality, *Cost of Quality*, 2024



Our common values ...

Engineering and Technology Solutions Provider

Embodies PETRONAS' SOP "A Progressive Energy and Solutions Partner Enriching Lives for a Sustainable Future "



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Thank you