الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

CONFERENCE OMAINTEC 2026 EXHIBITION FM

The 23rd International Asset Facility and Maintenance Management Conference

Asset Performance Management in Power Generation, Digital Twin Deployment on Gas Turbines

Yahia Roshdi Daif
Saudi Electricity Company (SEC)

12-14 January 2026

Riyadh, KSA

www.omaintec.com #OmaintecConf

Organized by

OMAINTEC In Partnership with SAFMMA

Executed by

Organizational Partner

TSG | EXICON.
The Specialist Group • شركة مجموعة المختص

الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

CONFERENCE
OMAINTEC
2026
EXHIBITION
FM

المؤتمر الدولي الثالث والعشرون
لإدارة الأصـول والمرافق والصيانة

إدارة أداء الأصول في مجال توليد الطاقة: تطبيق التوأمة الرقمية على التوربينات الغازية

يحيى رشدي ضيف
الشركة السعودية للكهرباء

تنفيذ
الشريك التنظيمي
TSG | EXICON.
The Specialist Group • شركة مجموعة المجلس

تنظيم
SAFMMA
الجمعية السعودية لإدارة الأصول والمرافق والأصيانة
بالشراكة مع
OMAINTEC

14-12 يناير 2026
الرياض، المملكة العربية السعودية

www.omaintec.com #OmaintecConf

الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

Yahia Roshdi Daif

- Asset Management Expert, Saudi Electricity Company (SEC)
- 20+ Years of Experience in Asset Management, Reliability, Maintenance Planning, Asset Reliability & Integrity and Asset Performance Management.
- Bachelor of Mechanical Engineering, Alexandria University, Egypt
- Post-graduate Studies in Industrial Engineering, Alexandria University, Egypt
- Master of Business Administration (MBA) , GSU, USA
- Certified Reliability Leader (CRL)
- Lead several Asset Management Initiatives and Projects
- Speaker in different conferences world wide
- Professional Trainer for Asset Management, Maintenance Management, Project Management, Reliability & Integrity

الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

CONFERENCE OMAINTEC 2026 EXHIBITION FM

Is the Digital Twin a real thing?

الشركة السعودية للكهرباء
Saudi Electricity Company

Asset Performance Maintenance (APM) and Digital Twin

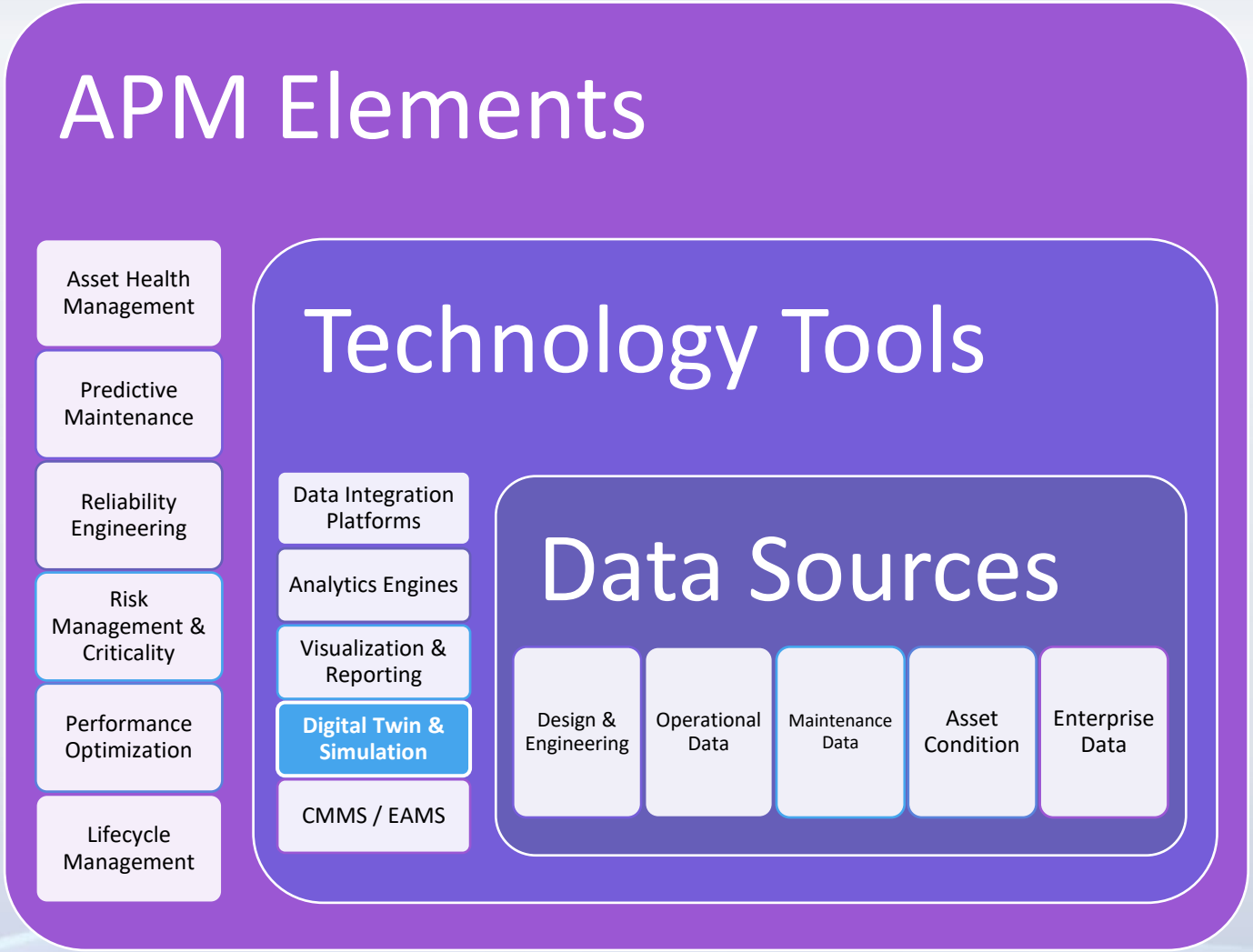
OMAINTEC CONFERENCE 2026 EXHIBITION FM

APM

- Strategic framework for maximizing asset performance, reliability, and availability.
- Combines condition monitoring, predictive analytics, and risk-based strategies.

Digital Twin

- A virtual replica of a physical asset that evolves over its lifecycle
- Continuously updated via sensor data, simulation, and analytics.



الشركة السعودية للكهرباء
Saudi Electricity Company

Digital Transformation in Power Generation

OMAINTEC CONFERENCE 2026 EXHIBITION FM

Adoption of digital technologies (IIoT, AI, cloud, mobility, analytics) to change how power-plants manage assets, moving beyond manual workflows to digitalized, data-driven, automated, and integrated processes.

	Traditional Power Plant	Digital Power Plant
HSE	Manual Incident Recording & Analysis.	End-to-end Digitalized Process, Automated Monitoring & Documentation, Computer-Aided RCA & Action Creation.
Energy Efficiency	Heat-rate losses analysis by Performance Engineers based on manually-created reports.	Heat-losses and root causes visualized in real time, triggering immediate actions.
Operations	Focus on safe and reliable operations depending on manual reporting, issues resolution, and control walk-downs.	Real-time performance optimization supported by automated reporting, guided issue resolution, and digitalized walk-downs.
Maintenance	World-class reliability based on engineering experience, OEM recommendations, and diligent execution.	World-class reliability and reduced planned outage time and maintenance cost – using data analytics and digital process support.

الشركة السعودية للكهرباء
Saudi Electricity Company

Evolution of Informed Decision Making Through Analytics

OMAINTEC CONFERENCE 2026 EXHIBITION FM

Operational Analytics

Descriptive
- State Detection
- Alarm Limits

Diagnostic
- Pattern Recognition
- Anomaly Detection
- Health Assessment

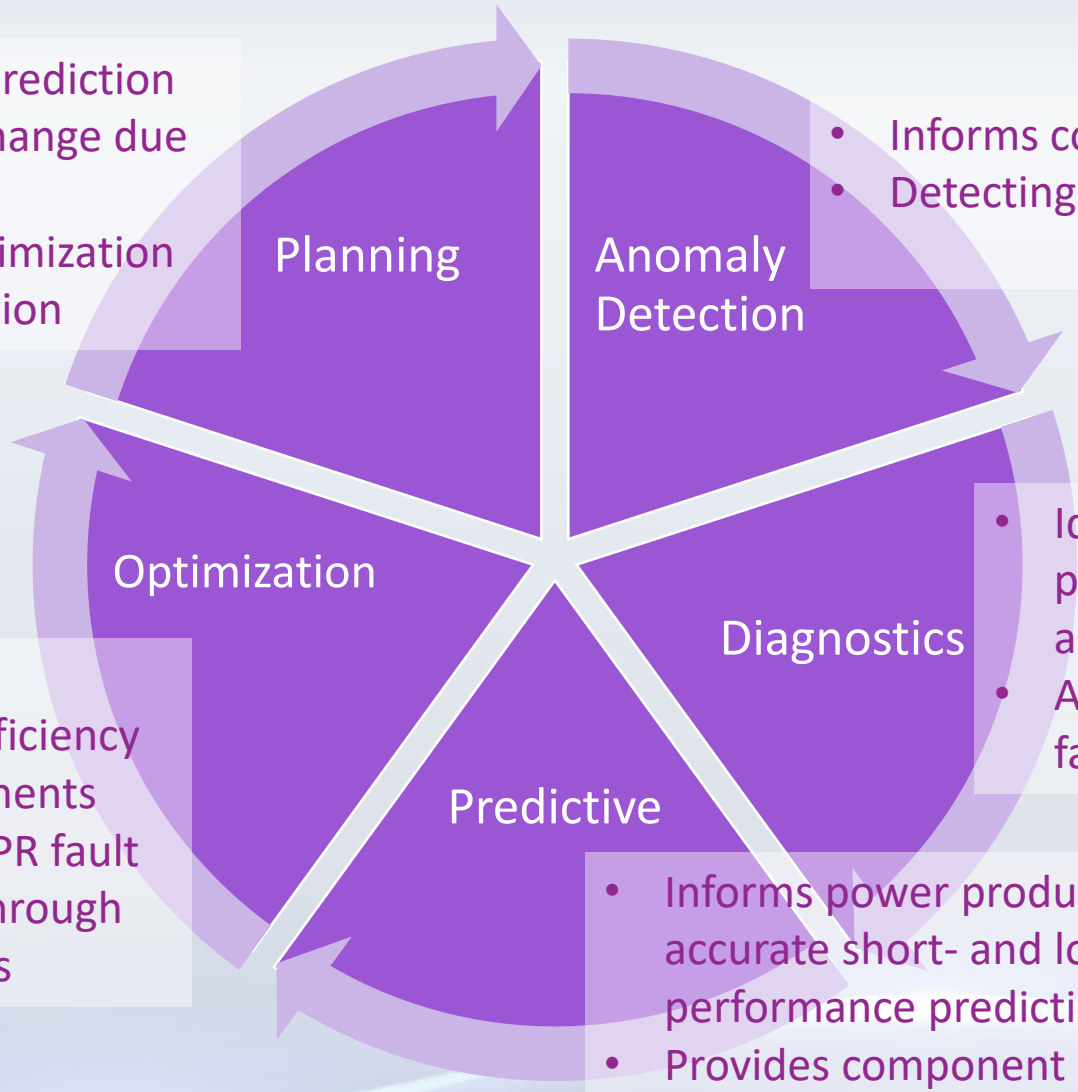
Advanced Analytics

Predictive
- Process Modeling
- Edge Analytics
- Prognostic RLE

Prescriptive
- Integrated Data Analytics
- AI / ML

Digital Twin Applications in Power Generation

- Provide physics-based prediction of plant performance change due to upgrades.
- Transient Response Optimization for Renewables Integration



- Informs condition-based maintenance
- Detecting unusual behavior in real time

- Identifies changes in component performance pre/post outage for assessment of outage success
- Assist in root cause analysis of failures

- Informs power production planning through accurate short- and long-term future performance prediction
- Provides component specific degradation information to inform maintenance planning

- Optimizing operational parameters to balance efficiency and performance components
- Reduces uncertainty in APR fault signature identification through addition of virtual sensors

APR: Advanced Pattern Recognition

الشركة السعودية للكهرباء
Saudi Electricity Company

Digital Twin Deployment on Gas Turbines

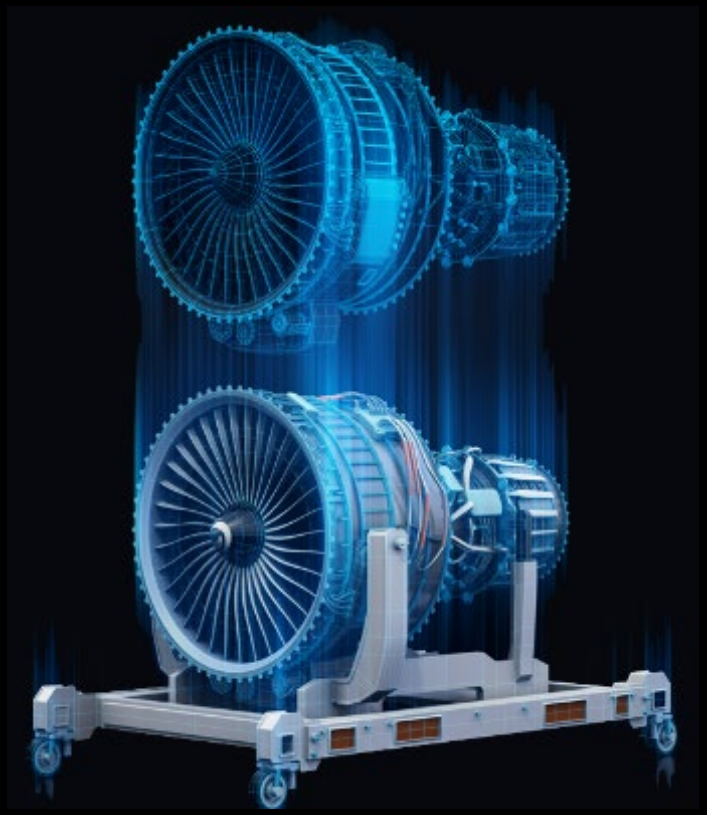
CONFERENCE OMAINTEC 2026 EXHIBITION FM

Objectives

- Identify changes in performance
- Assist in identifying root cause of under performance
- Estimate performance impact of maintenance and control changes

Methodology

- Physics-based model
- Flexible to Unit Type Expansion
- Backed by SME Knowledge



الشركة السعودية للكهرباء
Saudi Electricity Company

Modeling Gas Turbines

CONFERENCE OMAINTEC 2026 EXHIBITION FM

Physical Model

General Model

Physics-based model for Physical Model

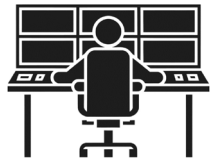
Calibration Model

Existing Sensors

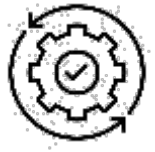
Individual Model

Tuned to Unit-specific data through AI / ML

Scalable Deployment



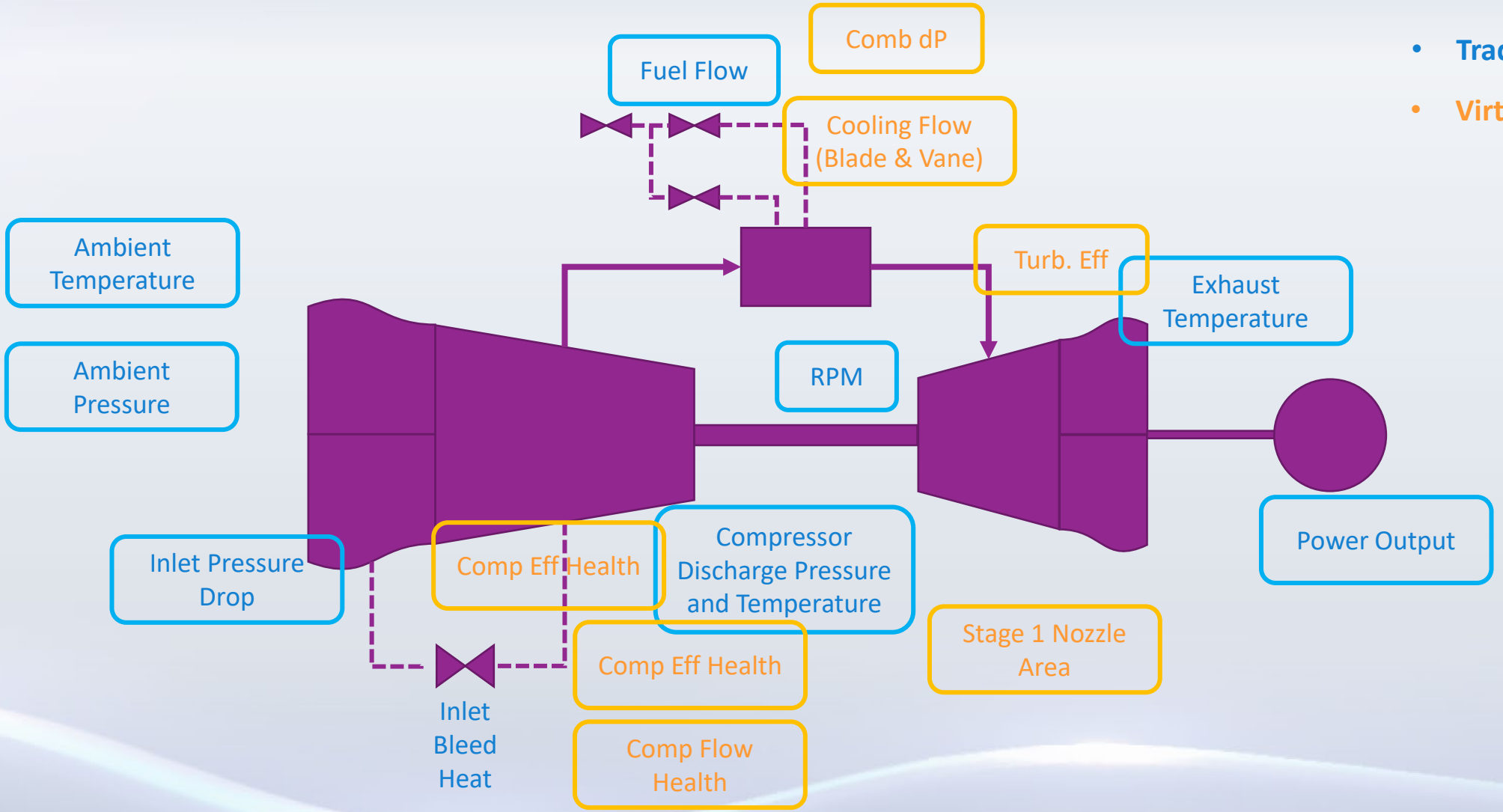
M&D Centers



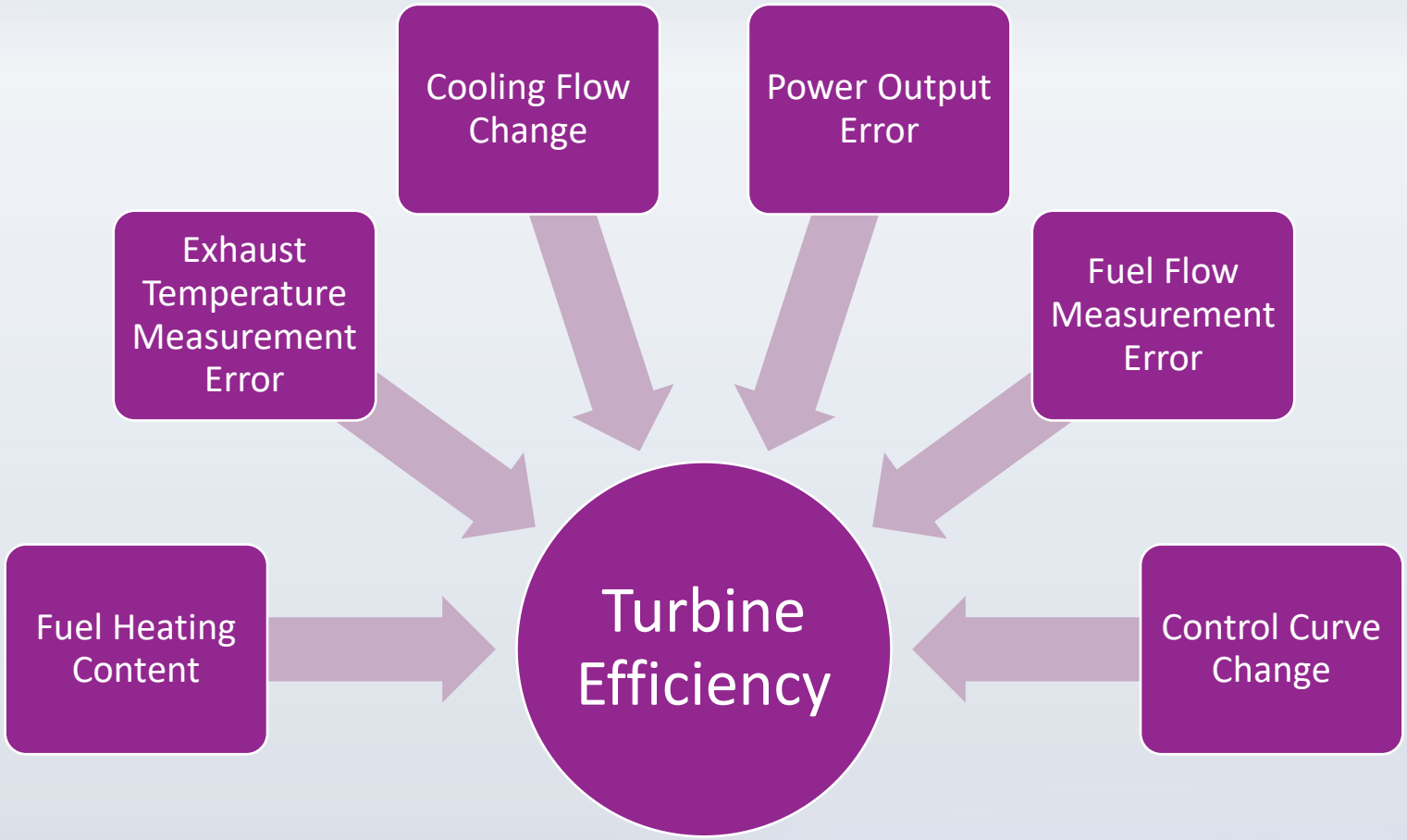
Providing actionable insights and operational knowledge

Hybrid Intelligence

- Traditional Sensors
- Virtual Sensors



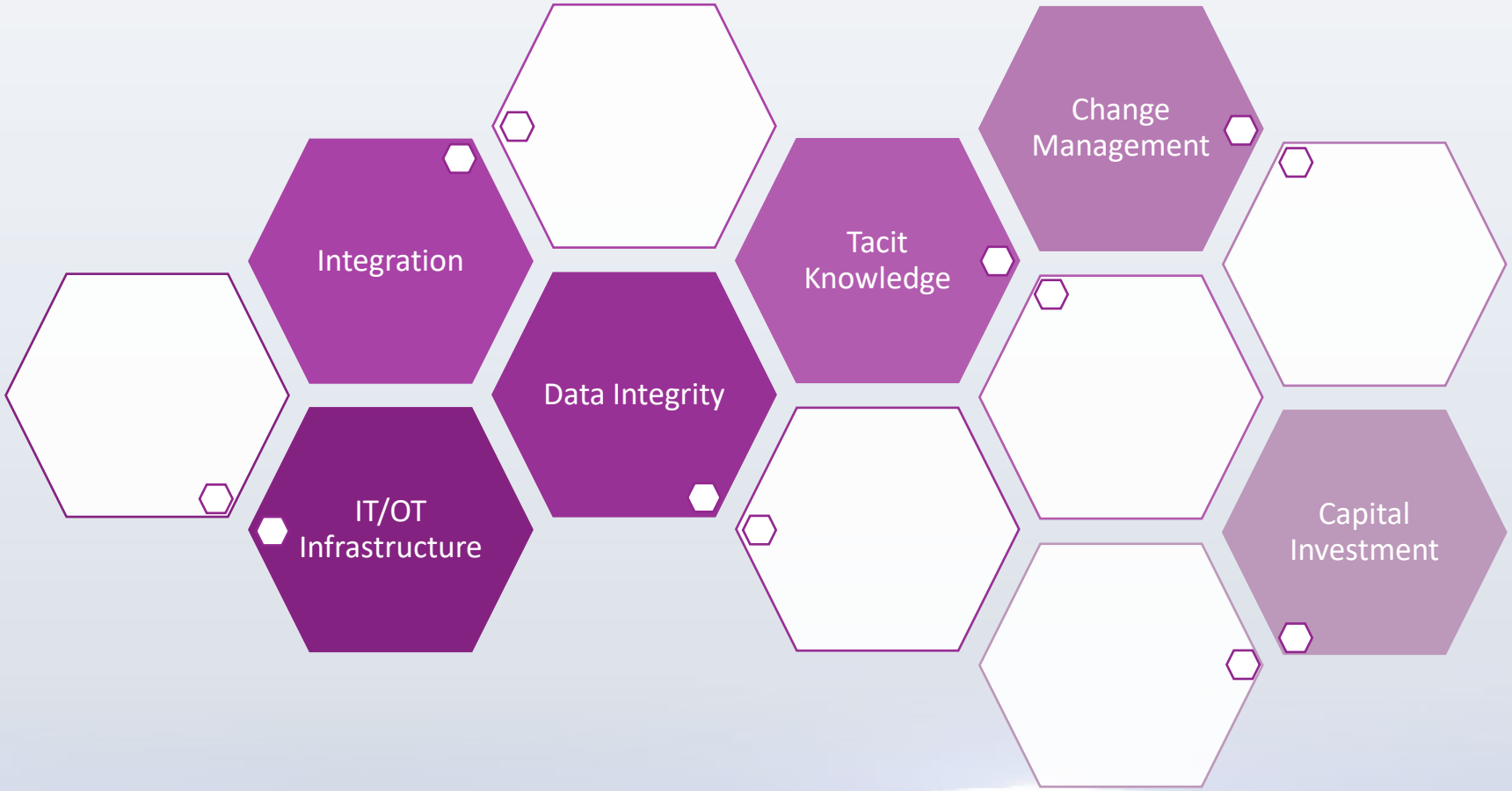
Factors Contribute to Turbine Efficiency



Digital Twin can help separate mixed factors and understand compounded effects

الشركة السعودية للكهرباء
Saudi Electricity Company

Challenges Facing Implementation



The Vision

The performance of every turbine is continuously monitored, optimized, and improved through intelligent, data-driven Digital Twins — unlocking new levels of efficiency and resilience across the Power Generation sector.

الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

CONFERENCE OMAINTEC 2026 EXHIBITION FM

The 23rd International Asset Facility and Maintenance Management Conference

شـــكراً لكم!

THANK YOU!

Yahia Roshdi Daif

Saudi Electricity Company (SEC)

Scan me!

12-14 January 2026

Riyadh, KSA

www.omaintec.com #OmaintecConf

Organized by

OMAINTEC In Partnership with SAFMMA

Executed by

Organizational Partner

TSG | EXICON.
The Specialist Group • شركة مجموعة المختص