AI in Operations and Maintenance

"Driving Efficiency, Reliability, and Future Engineering Competencies"

Delivering reliable results with quality

AI in Operations and Maintenance

"Driving Efficiency, Reliability, and Future Engineering Competencies"

Delivering reliable results with quality

الفنار
alfanar
Engineering Services

AI in Operations and Maintenance

Operations and Maintenance today is no longer just about fixing failures. Assets are becoming more complex, expectations are higher, and downtime is far more expensive. This creates a clear need for smarter, data-driven approaches, and this is exactly where AI comes in.
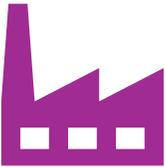
Asset-intensive industries under pressure
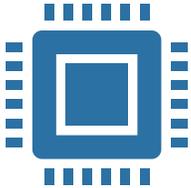
Reliability, cost, and complexity challenges

Why AI matters in O&M today

Why Conventional Maintenance Falls Short

Traditional maintenance models rely heavily on reacting to failures or following fixed schedules. Both approaches have limitations: either responding too late, or intervening too early. In complex systems, this leads to inefficiency, risk, and unnecessary cost.

Reactive maintenance → unplanned outages

Time-based maintenance → inefficiency

Limited visibility of real asset condition

Increasing system complexity

Where AI Fits in O&M

AI does not replace engineering expertise. However, it enhances it. By using existing operational data such as Monitoring Sensors, Supervisory and Data Acquisition systems, and historical records, AI helps engineers see and analyze patterns that are difficult to detect manually.

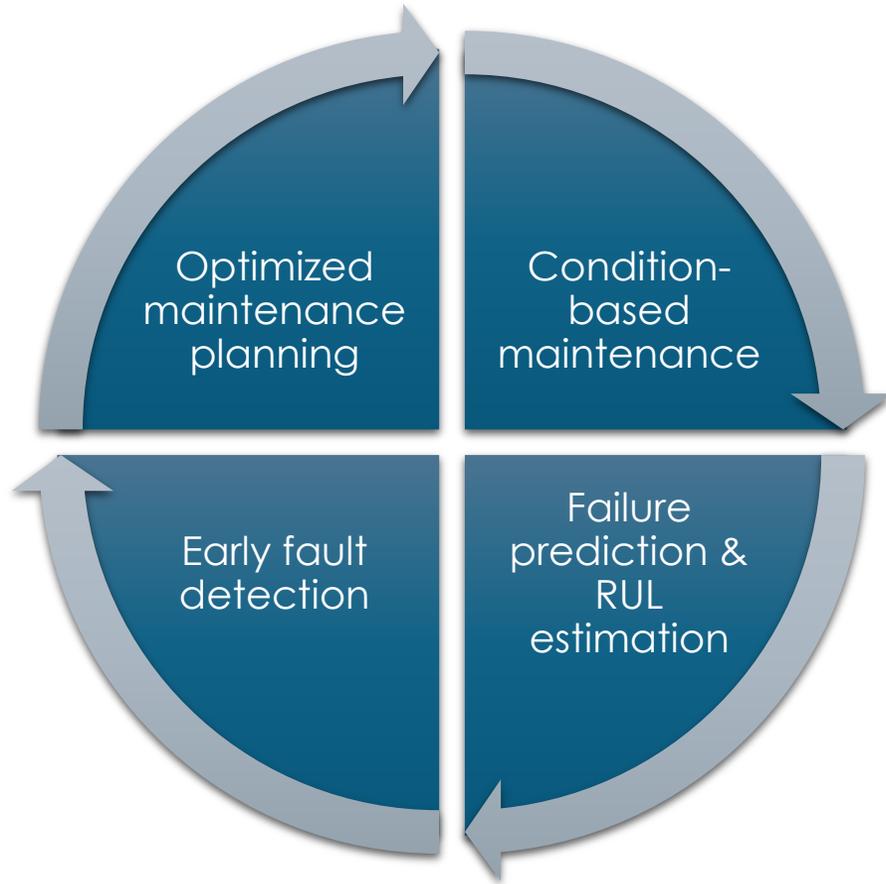Machine Learning & Predictive Analytics

Anomaly Detection

Digital Twins

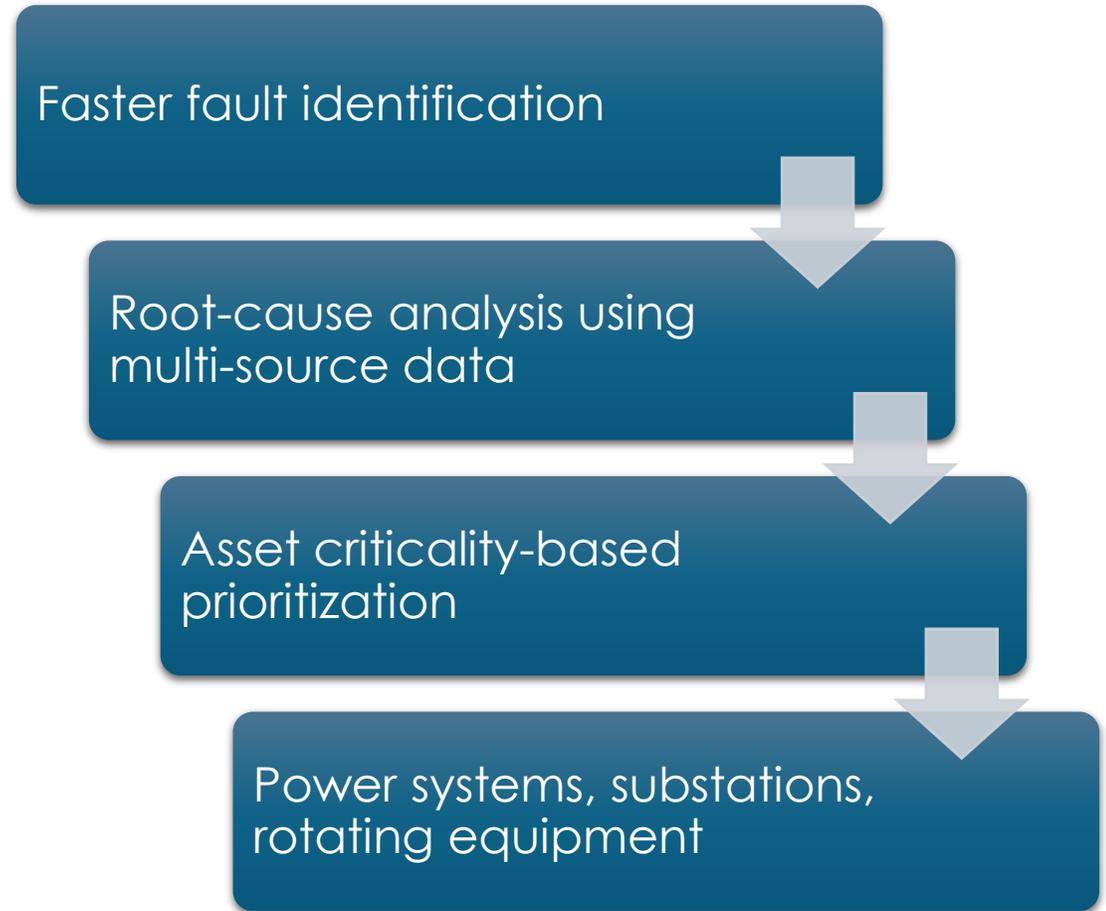Data Sources: Sensors, SCADA, Protection, History

الفنار alfanar
Engineering Services

From Reactive to Predictive Maintenance

Optimized maintenance planning

Condition-based maintenance

Early fault detection

Failure prediction & RUL estimation

With AI, maintenance shifts from reacting to failures toward predicting them. Engineers can identify early signs of degradation, estimate remaining useful life "RUL", and plan interventions at the right time not too early and not too late.

AI in Fault Diagnostics & Reliability

In critical environments such as power systems and industrial facilities, early fault detection is essential. AI supports faster diagnostics and more accurate root-cause analysis by correlating data from multiple systems, improving reliability and safety.

Faster fault identification

Root-cause analysis using multi-source data

Asset criticality-based prioritization

Power systems, substations, rotating equipment

الفنار
alfanar
Engineering Services

Future O&M Engineering Competencies

❑AI changes the tools, not the responsibility.

❑Engineers remain accountable for decisions.

❑However, future O&M professionals must be comfortable working with data-driven systems and integrating AI insights into sound engineering judgment.
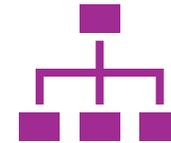
Engineering fundamentals remain critical

Data-driven decision support

Interpreting AI insights

Structured training & upskilling

الفنـار
alfanar
Engineering Services

Strategic Value of AI in O&M

From a management perspective, AI enables

- Better governance

- Clearer visibility of asset health, and

- Informed decisions.

The value is not only technical it directly impacts cost, availability, and long-term asset performance.
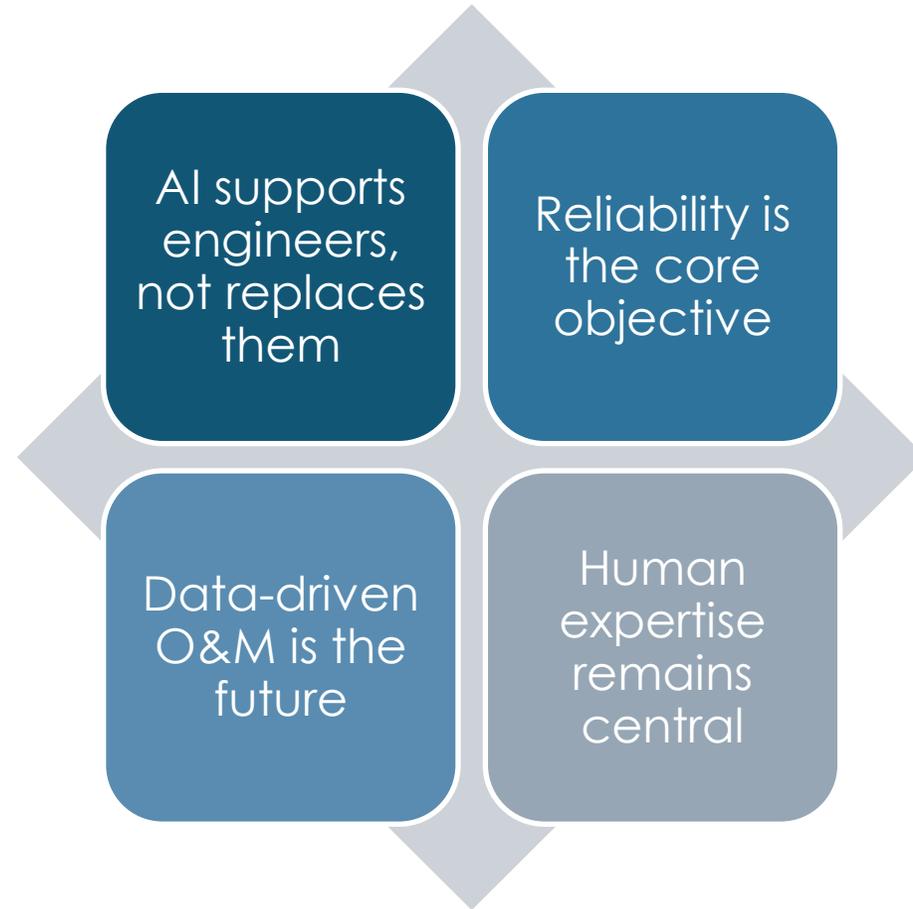
| Improved reliability KPIs | Reduced unplanned outages | Optimized O&M costs | Better asset lifecycle management |

alfanar
Engineering Services
الفنار

AI and Human are Integrated

The future of Operations and Maintenance is intelligent, but still human-led. AI is a powerful tool that supports engineers in delivering safer, more reliable, and more efficient systems.

AI supports engineers, not replaces them

Reliability is the core objective

Data-driven O&M is the future

Human expertise remains central

الفنار
alfanar
Engineering Services

Thank You

Delivering reliable results with quality