

Modern Asset Management in Utilities

Francisco J. Arenas

Asset Management

Asset Management is a key activity for utilities. Adding intelligence and analytics, the asset management can be moved from a traditional preventive maintenance approach to a 21st century digital approach which enables better decisions, resource optimization and customer satisfaction.

Traditional Maintenance Management

Traditionally, maintenance management of grid assets like transformers and switching devices are characterized by the maintenance strategies run to failure or maintenance in defined cycles.

Researches are showing that only 18% of asset failures are age related so there is huge amount of failures which can't be recognized with the traditional asset management strategies.

Information about existing assets

Today, information about the existing assets can be found in different software solutions like the geographic information system, the enterprise management system and advanced distribution management systems. These solutions are targeting the static data management, geospatial assignment, administration and operation of the assets.

Asset Health Related information

Primary source of asset health related information are the sensors installed in the field

- Existing sensors in high voltage and medium voltage substations providing electrical measurements
- Additionally, sensors like temperature sensors in the switchgears to monitor the contacts or online dissolved gas analyzers for transformers health monitoring supporting the indication of maintenance needs.

Asset Health Related information

- The substation automation system is the next level which should be investigated with respect to the asset management process.
- The existing and new sensors are connected to the substation automation systems and are available for further processing, though necessary information regarding asset management is lost due to restricting this information to network operation.

Asset Health Related information

To analyze the influences on the assets it's important not just to communicate alarms but the analogue sensor data

- Transformer oil level or temperature are giving a more detailed information about the assets

Even more valuable information is an unused potential in the substation automation systems

- Modern systems can activate by configuration advanced statistics like operation counters, operation capacity and sum of switching current

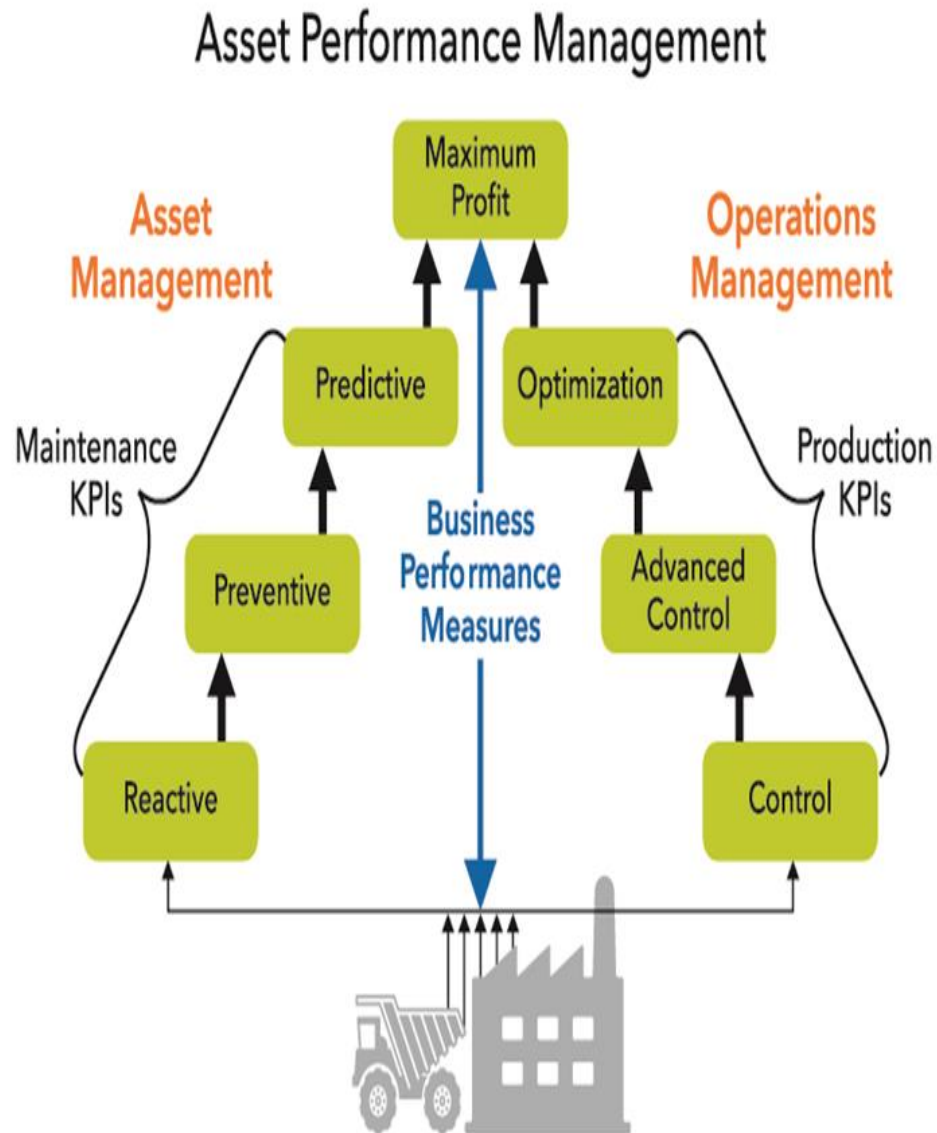
Asset Health Related information

- Typical communication path from decentralized substations is to the front-ends of the electrical SCADA or distribution managements systems (DMS)
- Further barriers must often be overcome to communicate non-operational data due to license, resource or organizational reasons
 - Due to security reasons these systems and networks are usually dedicated to a very limited user group in the control center, responsible for the operation of the network

Real-time Data historians

- Provide a functional way to bridge the operational (OT) and informational (IT) technology, providing powerful tools to analyze real-time and historian data
- Can be connected to the OT network to gain the relevant time series of data and directly to the field using the large portfolio of implemented protocols
- Can be mirrored into a central IT implementation which can collect information from very different data sources like other OT systems, for example in power plants

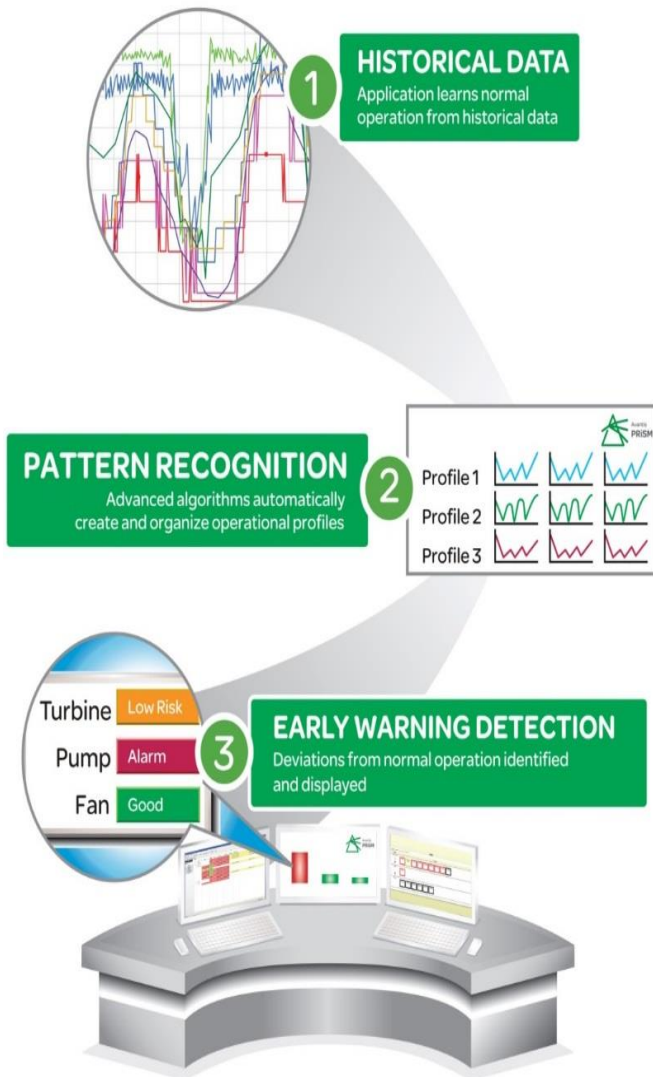
Asset and Operations Management



Predictive Maintenance

- Provide early detection of upcoming failures that can prevent further damages on assets and enable well-aimed countermeasures
- It is based on advanced pattern recognition equipment modeling by using historical data to describe how a piece of equipment normally operates
- It continuously monitors behavior and generate alerts when the operation differs from the historical norm
- Early warning detection of equipment problems providing root cause analysis

Predictive Maintenance



In Duvha Power Plant (6x600MW) Eskom first installed this system with an investment below 0,7M USD and savings of 1M USD within 4 months.

This extraordinary payback of just 3 months made Eskom implement the system to the entire fleet of Generators.

Benefits of a Good Asset Maintenance



Strategic

(increased asset utilization, improved performance and better maintenance planning)



Financial

(reduced operational and maintenance costs)



Operational

(reduce downtime, asset utilization, improved quality, production performance)



Safety

(reduced risk, early warning of impending catastrophic equipment failures)



Engineering

(decision support, less-time analyzing and more time acting, mobile solutions)

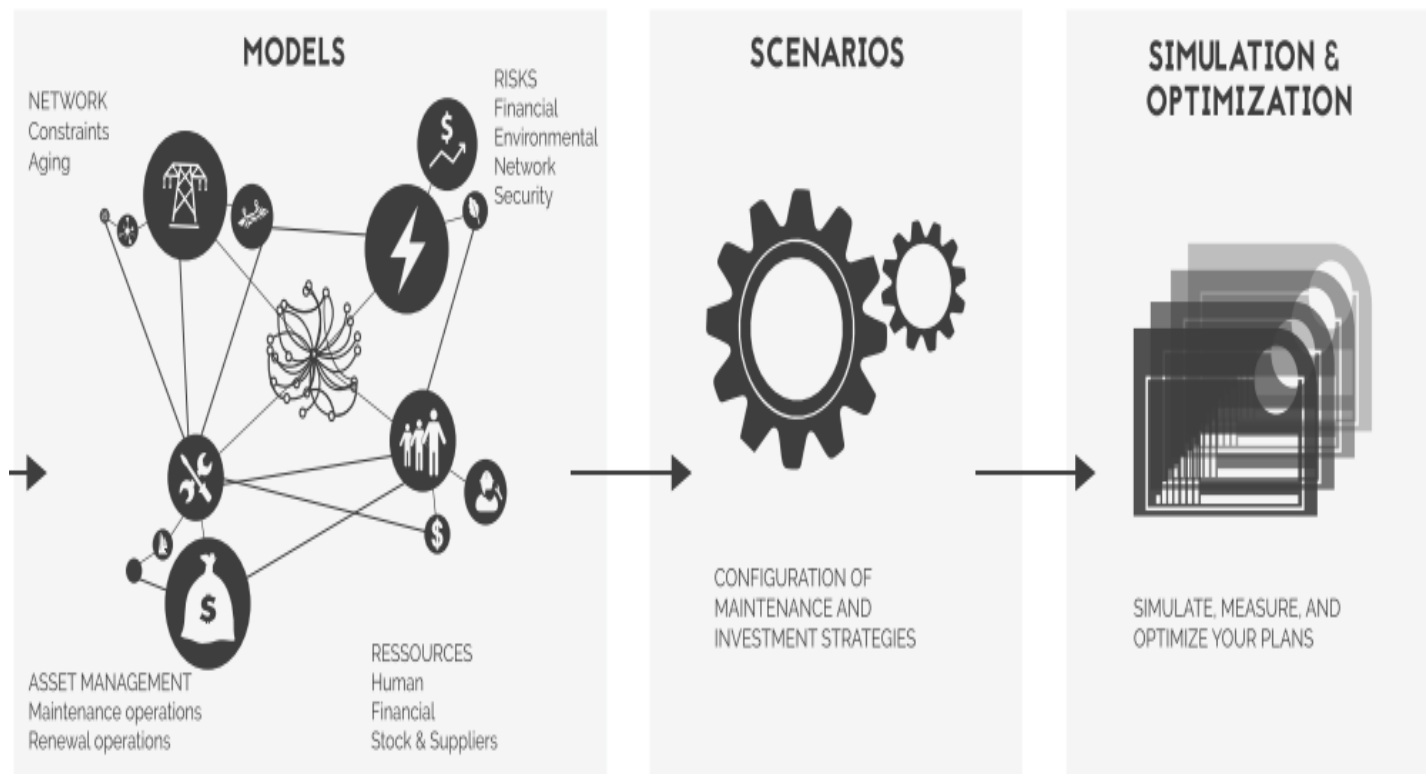


IT

(data quality, utilization, improved models, real-time and predictive insights)

Asset Investment Optimization solutions

Optimize financial results defining the right maintenance and renewal cycles simulating capacity based on the asset inventory, renewal and maintenance costs



Asset Investment Optimization solutions

With this new approach decisions are taken with a whole-of-company focus, optimizing risk, TOTEX and quality of service and providing a clear understanding of medium and long-term impacts of decisions.

Models, simulations and integrated planning help departments achieve consensus by understanding impacts of decisions, optimizing goals and mitigating risks related to over or under-investment.

Benefits of Asset Investment Optimization solutions

The case of RTE

- 14.5% reduction in OPEX/CAPEX
- 20% reduction in operational conflicts

Benefits of Asset Investment Optimization solutions

The case of EDF Nuclear Generation

- An investment program to maintain and revamp nuclear plants was needed considering cost of unplanned downtime can go up to €1M per day.
- Main objectives were optimization of power plant maintenance (shutdown) planning, reduction of conflicts during maintenance operations, improvement of availability factor at the fleet level and improvement of robustness of the operational planning against random events.
- As a result, EDF could better identify risk in maintenance plans and optimize power plant shutdown by modeling and simulating optimal planning scenarios.

Life Is On

Schneider
Electric