Improving Uptime and Productivity at Alliander with Asset Information Data Integrity

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Summary
Good maintenance practices are necessary to achieve financial objectives for revenue and margin – particularly for asset-intensive industries. The equipment must function properly to produce the product being sold to customers. Dreaded unplanned downtime interrupts production, causing lost revenue and can lead to safety or environmental incidents. Regulatory and competitive pressures led Alliander to start a condition-based maintenance program to improve asset reliability and the sustainability of the company.

Planning and executing repair work orders involves orchestrating technicians, parts, documentation, GIS location, and more. Effective and credible management of this maintenance requires a foundation of asset information with high data integrity and good governance. Alliander has deployed the SAP Master Data Governance, enterprise asset management extension by Utopia software. This provided a solid foundation of asset information for a broad condition-based maintenance (CBM) program. Alliander is now on a path to reduce unplanned downtime and improve uptime with lower maintenance costs.

Criticality of Data Management and Governance
Companies in asset-intensive industries have tens of thousands of assets needing regular maintenance or inspections. Most have limited resources to execute the necessary tasks. Managing these resources – people with the needed skills, spare parts, work instructions, and more – requires an enterprise asset management (EAM) system. However, data integrity issues often cause these systems to devolve into just a “cover your butt” record of what
was done in the past to deflect the blame when things went wrong. To serve as an effective planning and management tool for high uptime and safety, information in an EAM system requires high data integrity. Key benefits of asset lifecycle information management (ALIM) include:

- Reduced unplanned downtime with accurate data for maintenance scheduling and execution, including predictive maintenance (PdM)
- Improved efficiency with a standard data model across asset management, i.e., maintenance, reliability, and asset integrity inspections
- Reduced costs through efficient labor and parts management

As ARC Advisory Group learned, the SAP Master Data Governance, enterprise asset management extension by Utopia (the extension) can provide the means to achieve the needed cross-functional data integrity. Key functions include:

- One source of accurate and unified master data with high data integrity with intelligent master data governance and rules to validate data input
- Predefined and standardized master data models to keep asset master data up-to-date throughout the asset lifecycle
- Visibility and insights with reporting to improve business processes for maintenance budgeting, PdM, and benchmarking

**Alliander N.V. Case Story**

Alliander provides energy transport and distribution for electricity, gas, and heat to a large part of the Netherlands. ARC had the opportunity to interview Walther Rasche, IT Manager, Operations and Jaak Rosendaal, SAP Solution Architect. Both are involved in applying the SAP Master Data Governance EAM extension by Utopia at Alliander N.V.

Alliander has several value streams: e.g., energy and heat to consumers, power grid construction and maintenance and outage and maintenance management of the assets. The initial focus of the CBM program involves the above-ground assets for the power grid.

**Increasingly Complex Power Grid**

Most of the electric power Alliander distributes is still produced by power stations, but this is changing. Grid complexity has been increasing due to:
• Consumers and businesses generating energy via solar or wind and feeding the power back into Alliander’s grid. In 2018, the installed solar capacity in Alliander’s service areas expanded by 76 percent. Of the three million customers, over 107,000 (3.6 percent) feed power back into the grid.

• With more electric vehicles, the number of charging stations rose from 3,570 to 4,350 (up 20 percent) in 2018.

• New data centers consume huge amounts of power.

These changes significantly increase grid complexity and sources of failure.

Reducing Outages and Fines
In the Netherlands, customers - both consumers and companies - obtain compensation when downtime exceeds four hours. Several years ago, Alliander had an incident with its gas distribution system that affected 1,300 consumers. The payments averaged 750 euros each for a total of about a million euros – which is high enough to get everyone’s attention.

Compared to the general industry across several countries, Alliander has a good ranking with 99.9 percent uptime. But, Alliander’s mission is to make energy reliable, affordable and accessible for all. Because of the economic damage to people and companies, reducing outages is an important KPI.

Inspection Costs and Capacity
Being both manual and labor intensive, an inspection-driven asset reliability program is expensive. These are scheduled frequently for two key reasons.

• To catch problems early and prevent issues evolving into a major failure, reliability practices schedule inspections at half of the mean-time-to-failure (MTTF), i.e., twice as often as maintenance is required

• Reliability studies by Nowlan & Heap and others show that 82 percent of assets have a random failure pattern\(^1\) which drives a need for shorter inspection intervals to catch problems before equipment fails

Nevertheless, the high rate of inspections does not catch all problems. Some get through the inspection filter and outages still occur. With generational

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1 \textit{APM 2.0 with Industrial IoT}, Ralph Rio, ARC Advisory Group, Sept. 2015, pg. 14
change, technicians became more difficult to recruit. The limited number of available technicians restricts the ability to increase inspection capacity.

More inspections are not the answer due to both cost and inability to increase capacity. Clearly, Alliander required a new approach to ensure the limited resources available are applied effectively.

**Improve Reliability with CBM and Technician Scheduling**

To improve its asset management effectiveness, Alliander also started a program to improve the order management process to couple inspection information with the new asset management system. Soon, historical and real-time operating data combined with analytics will provide an indicator of the health of the asset. Upon finding an issue, the system can generate an alert. Then, resources can be deployed when they are truly needed, i.e., for a known problem and just before a failure.

Another needed improvement involved managing and scheduling the technicians. Alliander chose the SAP EAM system for managing maintenance work orders, and ClickSoftware’s ClickSchedule for field service management. The technicians were provided with tablets and mobility software based on HANA/XSA/UI5 to process their work orders while they are doing the work.

**Data Integrity with “One Version of the Truth”**

The manual methods and paper-based systems for inspection allowed the users to overcome and mitigate many data integrity issues. The new, more automated approach exposed data quality and inconsistency issues that broke business processes and was unacceptable. Alliander attacked this problem head-on by transitioning towards an integrated asset register. It moved from complex, decoupled and fuzzy systems to a simple, integrated and transparent program with “one source of the truth” using SAP Master Data Governance, enterprise asset management extension by Utopia.

The Extension is being applied to the company’s above-ground gas and electricity assets and inspections. It includes integration among NRG/GIS (Smallworld), SAP EAM, and SAP MDG systems.
**Benefits of Using the Extension**

Alliander’s CBM program recently finished its pilot acceptance of the Extension and achieved one of its primary goals for high quality data. The asset management system updates occur automatically using templates. This automated business process replaced manual data entry with its inherently unacceptably high error rate.

Data integrity is critical for a successful CBM program – particularly one with dynamic data models. Utilization of the Extension provided the needed governance, including traceability of changes to the data by who and when. This includes unstructured data like a comment about a tree being near a line and the location. The Extension reduced the time needed to register an asset in the SAP system from hours to a few minutes. It also enabled integration of the SAP EAM asset management system with NRG for critical GIS asset location data. According to Alliander, the Extension can deliver the software foundation needed to implement business processes that solve the company’s asset data quality and inconsistency issues.

**Lessons Learned**

The CBM program is complex when considering the variety of applications, organizational dynamics, and multiple business processes. The primary applications included ERP, EAM, GIS, historian, and control systems. The project spanned maintenance, operations, and finance. Data integrity and governance became a common foundation. The key lessons learned from this multifaceted program include:

- **More user driven with agile software development**: The project started as an IT project for data management. Project management involved a waterfall process having linear sequential phases with low participation by the maintenance and business users. With the initial rollout, user involvement increased dramatically, and IT obtained a better understanding of the real problems. These include the need for an improved user interface. The work was revisited, which initially delayed the project. The integrated business and IT team pivoted to agile software development methodologies. Development quickly became more user driven with smaller increments of change. This removed organizational dysfunction and vastly improved business involvement with buy-in by maintenance and its management.
- **Freeze the data models and have periodic updates**: There were two existing data models, i.e. one in the GIS system and one built in SAP. The groups operated independently, and the inevitable changes caused the models to get out of line. To assure alignment, an agreement was made to freeze them. Every few months changes are made and synchronized.

- **Avoid combining two large programs**: NRG/GIS (Smallworld) and SAP EAM represent large systems with each having its unique characteristics and dynamics. Doing both concurrently created dependencies that delayed the program. Alliander decoupled GIS asset registration from SAP work order management. Less interdependency accelerated the work. Start with a sound asset registration system that puts the right data into SAP.

**Conclusion**

Asset-intensive industries require significant maintenance to prevent unplanned downtime and the related revenue losses, safety issues, and customer satisfaction problems. Increasing preventive maintenance is costly, labor intensive, and often ineffective since 82 percent of assets have a random failure pattern. CBM and PdM programs provide an alert when things start going awry. This helps ensure that problems are resolved before they become equipment failures. Also, maintenance is applied when it is truly needed, lowering costs and increasing reliability.

CBM and PdM use data models and algorithms that require high data integrity to be effective and dependable. *SAP Master Data Governance EAM extension by Utopia* provides the needed data governance for going beyond a few isolated projects and towards a program with broad adoption. With the Extension, organizations should be able to lower maintenance costs and unplanned downtime.

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