ABB Ability Industrial Analytics and AI Suite

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Strategic decision making in industrial operations leading to differentiating performance is challenging: all data may not be available, some of it may be inaccurate or outdated, and optimization requires complex algorithms. In addition, the human mind tends to make errors and apply cognitive biases.
Data-driven operations can improve decision making and today's technology can help personnel in accessing, cleaning and combining data. Industrial information modeling can help derive information from data. This information must be presented in a meaningful way to the different profiles in the organization and assist in decision making by applying AI and machine learning. Today's industrial analytics platforms, such as ABB Ability Genix Industrial Analytics and AI Suite have these capabilities and can contribute to lower cost and risk, improve return on assets, improve sustainability and profitability.

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Strategic Decision Making in Industrial Operations

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Whether a company's overarching strategy is cost competitiveness, client intimacy, product performance, added value through services or combinations thereof, it experiences the pressure to be resource-efficient, sustainable, flexible and agile, and its assets must be safe, long-lived and reliable. Reaching a few of those objectives is a challenge, but reaching all of them at the same time represents truly differentiating performance.

In some cases, not all variables can be optimized independently so we should not be naïve about the potential of optimization, and intuition about this can be wrong; it could be either overly optimistic or overly pessimistic. Most of us would not have guessed what research has shown to be possible: to lower maintenance cost while improving reliability (Laurens and van der Molen, 2009). The study reports reliabilities of 95 to 98 percent are reached even in older facilities, by increasing the proportion of predictive maintenance relative to reactive maintenance jobs. Operational excellence was improved by focusing personnel on value-adding activities and optimizing production processes. Depending on the industry sector, and the pressures it may be subject to in a particular period, the impact of these factors may vary somewhat. What remains is that these factors can be managed when the right information is presented to the right people in the right time, to base their decisions upon.

We should also recognize that intuition can be realistic and accurate if it is properly trained, but we need to build in checks and aids, because it is not trivial to know when intuition is right or wrong (Kahneman, 2011). Therefore, decision support must provide accurate, contextualized information, enriched with analytics and predictive capabilities rooted in domain

knowledge and science. It should include information on capacity utilization, asset integrity, health, performance and reliability, and provide assistance in managing and optimizing performance and remediating risks.

Information-driven Operations and Optimization

A first step towards improved operation and improved decision making is getting access to information based on accurate data. Today, data sources are ubiquitous. Enterprises can mine their operational, maintenance, supply chain-related, client and vendor-related, and business-related data sources. Where the access to data was most challenging, (that is, for operational data sourced from legacy equipment, instruments and control systems) modern operations platforms provide a broad range of standard connectors. Should a company want to add a measurement, the platforms can take in (IoT) sensor data, or ingress sound and visual information streams. These platforms can also provide the access to historical operational data, engineering information, quality data, asset information and performance data and more.

Technology Maximizes the Value of Human Contribution

The potential of combining these data sources is enormous. Strategic planning, maintenance, process and reliability engineering, and many more functions become far easier if personnel can look up facts, find root causes, compare implications, run optimizations, etc. This potential is conditioned by two main factors.

- The first factor is context. Data make sense only when placed into proper context. For example: *Production was lower during the period that maintenance activities were carried out*, or *Maintenance on the chiller must be carried out before the peak in production expected next week*. More strategically: *The upcoming turnaround could be shortened by several weeks if design and asset information integrity could be improved*. In order to be able to execute these analyses and make proper decisions, the engineers, managers and excutives must have data that is understandably linked to equipment, has human readable-labels, and is linked through time stamps, in order to be able to replay the "film" of plant states, decisions and events. At a more granular level, data must also be organized according to uniform, ideally standardized information models, that is, organized according to asset hiearchy at a minimum, and possibly also according to process (phase), transaction, material and people manipulating products or processes.

- Second, to be exploitable, data quality and integrity are essential: data must be complete, up-to-date, accurate and consistent. The latter is easier said than done. Technology can help in the ingress, normalization, cleansing and contextualization of data. In particular, modern industrial platforms can perform part of these tasks in an automated way. While this takes away repetitive work from personnel, their engagement in entering valuable data when required, contextualizing data, identifying outliers, and complementing areas of scarce data is necessary; and guiding and motivating these personnel is essential.

Providing Meaningful Information

When the basis of accurate and up-to-date information is in place, the next goal is to represent information in a way that is meaningful at a glance for different roles such as operators, supervisors, managers, experts and executives. These representations shouldn't be laborious to create, so this pre-supposes easy-to-configure dashboard components and reports, that can be used in a self-service mode; and create standardized, uniform views for sharing information and best practices across the enterprise and beyond. Given that these dashboards and reports can provide additional context and insight by combining information categories as described above, the value of these fact-based views is potentially very high in themselves. They will improve the quality and timeliness of decision making and thereby impact the bottom line.

This section has highlighted the benefits of good quality data and information. We also need to mention that the lack of these creates considerable risk in making inaccurate operational and maintenance decisions. In particular in the case of abnormal plant behavior, these can have catastrophic consequences, impacting people's lives and health, both inside the plant and in the surroundings. The cost of such disasters can wipe out up to a decade of profit, and sometimes lead to asset sell-off to pay for the liabilities. In ARC's opinion, it is worth getting your information right to get the right information.

Optimization For Distinguished Performance

Ultimately, to optimize operations and respond to industry pressures, companies require tools that can make optimizations that individuals cannot make themselves. Important areas that can benefit from such support are:

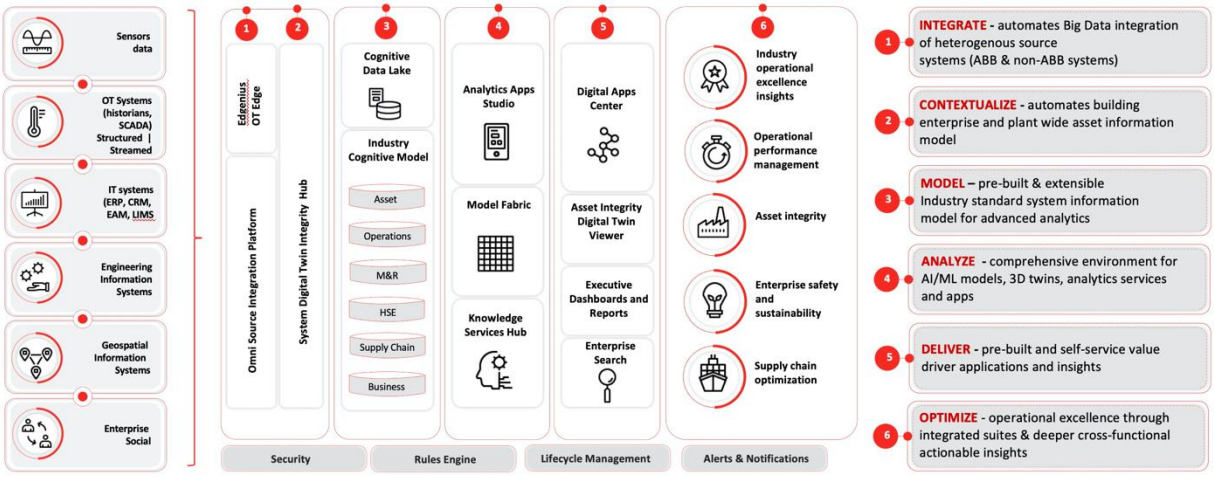
- Industrial operational excellence and performance management

- Asset integrity and performance management, including risk mitigation
- Safety and sustainability, including energy efficiency
- Supply chain optimization

Optimization may require a combination of data mining, additional data contextualization, categorization, machine learning, mathematical optimization or application of artificial intelligence routines. Recent developments in cloud computing have made mathematical methods more easily accessible but they are by no means a panacea. They must be informed by domain knowledge including physics, chemistry and engineering science. The quality of the optimization results further relies on data completeness, quality and data integrity. One possible scenario for optimization could be to mine operational and maintenance data, compare the historical performance at similar operating points with the one at hand, and propose an optimal mode of operation. Another scenario could be to provide a risk profile for the different equipment in the plant and suggest the most effective actions for risk reduction. The added value of those functions is not only that they are likely to provide an optimum for the next time window or period, but also that they are free of the cognitive biases that humans suffer from, as we discussed earlier.

ABB Ability Genix Industrial Analytics and AI Suite

Today's operational platforms are capable of providing this desired functionality. One example is ABB Ability Genix Industrial Analytics and AI Suite. This is a technology suite that complements a company's data and know-how with ABB's domain knowledge, associated services, and apps. It seamlessly integrates existing automation and instrumentation with existing



The Architecture of ABB Ability Industrial Analytics and AI Suite

IT systems, regardless of brand or make, and complements these with additional sensors and edge devices if required. It will help companies apply standard information models, provide context to data in a semi-automated way and transform them into what the company calls a cognitive data lake - that is, searchable and intelligible manufacturing data. The platform provides the analytics with built-in intelligence and optimization within digital suites to address operational performance management, asset integrity and performance management, sustainability and safety including energy. The suite embodies ABB's strategy to build a platform which is flexibly configurable, can be deployed seamlessly and securely across edge, fleet, plants and enterprise, on-premises or hosted, on private or hybrid, and on a single or multi-cloud platform according to a company's specific needs.

Recommendations

ARC Advisory Group estimates that the ABB Ability Genix Industrial Analytics and AI Suite can contribute to:

- Lower maintenance cost, improved reliability and lower operational risk
- Longer useful equipment life, reduced capital expenditure
- Improved asset integrity, occupational and process safety
- Lower operational cost, and improved sustainability
- Increased throughput, revenue and/or profitability

ARC recommends industrial operations to compare their needs and ambitions with benefits that this environment can provide, and consider the components and suites of this offering that are able to provide business benefits. It is too early to provide quantified average benefits in this report, and we encourage companies to engage in fast-track benefits studies for investment justification and project configuration purposes.

References

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Laurens, C. and O. van der Molen, 2009, "This is the time to deliver on upstream operational excellence," McKinsey Quarterly, No. 2, 2009, pp. 25-32.

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Acronym Reference:

AI	Artificial Intelligence	**IoT**	Internet of Things

Trademarks

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