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Intelligent asset or asset intelligence?

The difference – and why it matters.



‘Intelligent asset’ and ‘asset intelligence’ are two terms that come to mind when we think about today’s smart grid...

What’s the difference?

Can one exist without the other?

Regardless of its functional purpose, an ‘intelligent asset’ is one that is capable of making decisions about itself, i.e., self-diagnosis. To understand the difference between an asset making decisions and making decisions about itself, consider digital and electromechanical relays. Both types of relays are capable of making decisions (open/close) depending on external inputs. However, only digital relays are intelligent, because a digital relay is capable of running a self-diagnostic and letting a user know its health status.

By this definition, all electrical assets that lack self-diagnosis capability are ‘dumb’. As it happens, one of the most critical assets in an electrical substation, a power transformer, belongs to this category. Without the benefit of monitoring and diagnostics, the transformer is literally a ‘black box’ that just facilitates the flow of power from one voltage level to another.

‘Asset intelligence’, on the other hand, is the cumulative knowledge that an operator or user has gathered or inferred about the asset over its lifetime. This intelligence is often derived from a variety of data sources including, but not limited to, operational data, nameplate data, inspections data, work order history and financial data.

So, an ‘intelligent asset’ is a single asset that can make decisions about itself. ‘Asset intelligence’ is a single, comprehensive view of that asset, supported by historical facts recorded through the life of the asset.

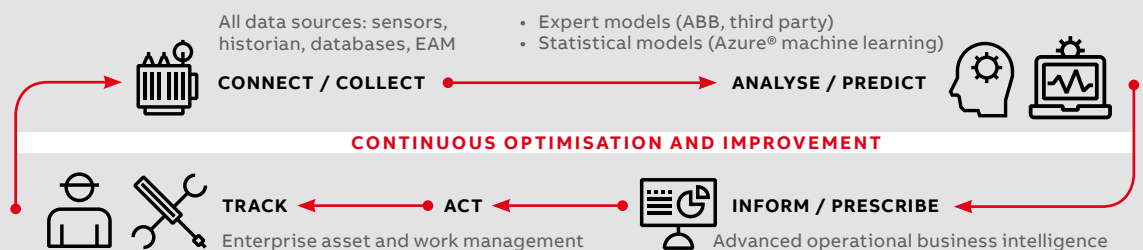
Teaching old assets new tricks.

‘Dumb’ assets don’t have to stay that way – edge computing now offers a path to higher intelligence. Monitoring and diagnostic capabilities can be provided on site, as an integral part of the asset itself, making self-diagnosis possible. A user may assess the health and associated risk of failure of an asset in a given fleet by querying the asset directly. Many T&D electric utilities are embarking on this journey by retrofitting existing assets to develop asset intelligence. These utilities have also modified their sourcing requirements to make monitoring capabilities standard on new assets.

Given the exponential growth of IoT (Internet of Things) devices and communications capability, it is likely that most critical assets will communicate their health status along with other essential lifecycle data to a central station where remedial actions will be prioritised and actioned at a fleet level. Until we get to this future state though, it’s very likely that asset owners will continue to collect copious amounts of data from each asset in the fleet and do an offline analysis, presumably in a central location, and develop asset intelligence at the fleet level. In other words, today’s users are like doctors building the patient profile (of the asset) using a proverbial stethoscope.

Data, data everywhere; who can stop and think?

A common question that arises is, ‘How do you make sense of all the data?’ It’s not a task for mere mortals, although they lend a hand: It takes proprietary performance models, built by subject matter experts, to ingest the wealth of data and provide insights into risk trends, remedial actions and their timing, and remaining life. The main goal of asset intelligence is to inform enterprise asset management (EAM) functions such as work management, planning and sourcing, as shown in the image below, so that the enterprise may serve its customers reliably and economically whilst making a healthy profit in compliance with regulatory mandates.



Putting intelligence to work.

Depending on the needs of the user, asset intelligence comes in several forms. A user may want to know not only how an asset performs on its own but also how it performs in comparison with its peers (within its family). The same user may also want to know the precise total cost of ownership of the asset to date and what further costs and benefits to expect as the asset ages, is decommissioned and salvaged. A few examples of use cases and their associated benefits are shown in the following table.

| USE CASE DESCRIPTION | BENEFIT |
|---|---|
| Comparison of health, risk of failure and performance trends | Establish health, risk of failure and performance benchmarks by asset class, type, age, etc. |
| Comparison of one or more like, user-selected parameters (online or offline) | <ul style="list-style-type: none"> • Accumulation of statistics pertaining to the selected parameter for establishing thresholds • Detection of anomalies based on statistical criteria • Identification of failure causes |
| Comparison of impact, cost and timeliness of remedial actions | Knowledge of effectiveness of remedial actions to fine-tune maintenance strategies |
| Comparison of financial metrics: total cost of ownership (TCO), annual cost of ownership, O&M costs, capital expenses, etc. | Accurate knowledge of cost of asset ownership to help facilitate EAM functions such as planning and sourcing |
| Compare key KPIs throughout the system based on user-defined grouping of assets | Benchmarking of various KPIs for system planning activities including O&M spending, capital budgets, etc. |

It's all about the data – all of the data, of course!

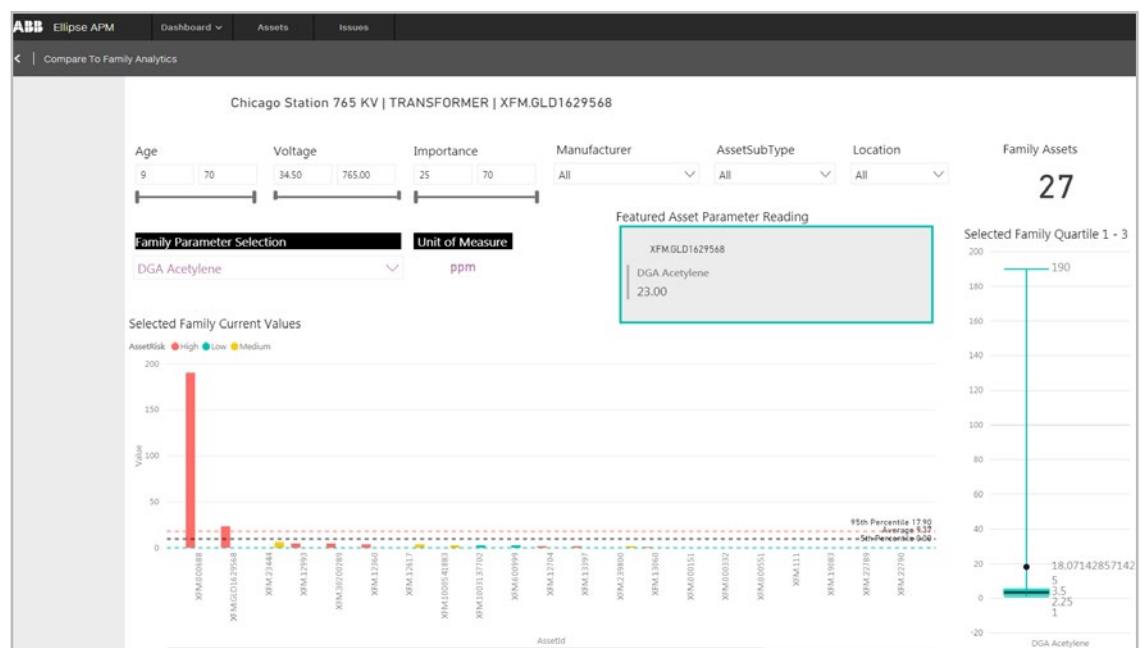
The ultimate goal of developing asset intelligence is to attain optimality in asset management. Making the right decisions and acting on them in a timely and coordinated manner in alignment with corporate risk management goals is the 'holy grail' as envisioned by ISO 55000 standards.

Data, as always, plays a critical role in asset management. Data completeness and accuracy are key qualifiers when it comes to making holistic decisions. When data are lacking in quality, quantity, timeliness and/or relevance, the consequence is sub-optimal decisions.

ABB Asset Performance Management (APM) is a leading industry solution that focuses on delivering asset intelligence to the user's fingertips. APM captures decades of subject matter expertise in electrical assets (manufacturing, operational and repair/re-engineering) and relays this to the user in the form of embedded software models that can quickly and thoroughly assess an asset's condition. In other words, APM serves as the consolidated source of all asset data, enabling a 'single' view of the asset. And since it's integrated with internal processes such as planning, inspections, work management and EAM functions, APM has been proven to deliver significant value to customers.

An example of asset intelligence in operation is shown in the APM dashboard below. Users may make ad hoc selections on myriad variables to explore and enhance their asset understanding.

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ABB APM was ranked #1
in the Navigant Research
Leaderboard Report:
Asset Performance
Management, 2017



Be smart about intelligence.

Getting back to the original question: Intelligent asset vs. asset intelligence – can one exist without the other? The better question is: Would you want them to? Why have an asset that can self-diagnose if no one is going to act on it? And on the other side, why spend all your time manually cobbling together scraps of information (leaving no time to actually analyse or act on it) when edge computing can bring the data to you, and performance models can tell you what it all means and what to do next?

Asset intelligence is an indispensable tool for users who want to develop a single view of an asset, and intelligent assets make it easier than ever before. The logical extension to the single asset view is to then develop a unified system view so that enterprise decisions may be engendered holistically. Remember, intelligence is not a means to an end – it's a means to continuous improvement through a better understanding of the fleet.

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