Big data: what's in it for you?

Big data is one of the most well-used industry buzzwords today. *Suzanne Gill* spoke to industry vendors to find out what benefits it could offer their manufacturing industry customers.

In 2014, an international survey conducted by MESA and LNS Research asked how industry felt that big data could improve manufacturing performance. Results of 'The Metrics Matter' survey highlighted some of the areas where big data is expected to have an impact on manufacturing performance improvement. A total of 46% of respondents believe that big data will allow for better forecasting and increased productivity, while 45% expected it to offer greater insight into plant performance across multiple metrics and 39% believe it will allow them to offer better service support to customers.

According to Dave Sutton, product marketing manager at Schneider Electric, these results mirror what Schneider Electric's manufacturing customers are looking to develop. "To better understand what impact big data will have, and when, on augmenting manufacturing efficiency, it helps to consider the interests of the different business areas," he said.

Business management – This requires a view of correlated data to improve overall business performance and drive down costs. It includes the analytics of overall production efficiencies and effectiveness as well as the collaboration of data between different business areas. Here big data can be used to benchmark key production metrics, which, if presented in a meaningful and clear way, can enable data analysis, mining, querying and reporting – showing trends and performance against KPIs.

"Joining up data from different business silos has the greatest potential to improve overall business performance, and is a clear goal of smart manufacturing, IIoT and Industry 4.0. However, in this domain there is still work to do with regards to industry standards for linking between business silos and the divide between IT and OT. Devices and software platforms require structured semantics, and standardised methods of data exchange to interoperate and discover each other in a transparent way," said Sutton.

Production management – to help with overall operational efficiency, data can be compared between different plants, machines and even shifts. Abnormalities can identify efficiency patterns (which may be replicated elsewhere), but also wastages and their root causes, and consumption of both raw material and energy. Ultimately, this will provide greater visibility to opportunities for productivity improvements.

Maintenance management – In order to minimise plant downtime, and therefore maximise plant availability, asset management programmes require easy access to data from the growing plethora of intelligent IIoT connected devices. This can identify asset fatigue, and enable management of scheduled maintenance programs while minimising non-essential routine maintenance.

Comparing data outputs from different shifts can also identify the need for personnel training programmes, which will help companies to navigate the ageing workforce dilemma.

System providers – Access to real-time operating data can improve remote support and services for system providers, and allows for the timely supply of spare parts.

"Big data also presents bigger business opportunities for system providers to create new revenue streams," continues Sutton. "For example, as opposed to selling a machine or system, selling guaranteed up-time. System suppliers and integrators can collaborate as industry trusted advisors on big data analytics and surrounding IIoT technologies including cybersecurity, cloud, mobile, Wi-Fi and smart manufacturing."

Already delivering benefits

David Nicholl, UK and Ireland country director for Rockwell Automation says that big data is already delivering operational benefits across industry. He stresses the importance of understanding what is meant by the term to really comprehend how and where it can deliver to enterprises, and how it might continue to offer operational benefits.

"In a sense, the term is self-explanatory," said Nicholl. "Big data

means getting a lot of data back from the operational technology (OT) of an enterprise via its information technology (IT). It requires a high level of connectivity and increasingly information-enabled operational machinery. Big data is a driving force for the Industrial Internet of Things (IIoT). Rockwell Automation often talks about the 'Connected Enterprise' because the advantages of big data and readiness

based purchasing decision. Big data can help offer personalisation and customer visibility into the production process and supply chain; which may drive customer decisions, even at a raised price point. The opportunities are endless and the companies who move from the mass production model introduced by Ford in the early 20th century to the 'batch of one' production model, with a direct connection between production and

parameters that were previously unmonitored," continued Boudreaux. "It is this emphasis on increased sensor coverage that puts the data into big data. It is enabling long-standing problems to be solved with quick ROI and cash flow payback."

Combining data from multiple sources can add context to measurements or offer additional insights. However, it is a tedious and complex task without the right tools. The datasets needed for effective analytics can also be difficult to access because they are distributed across multiple storage platforms and trapped in proprietary systems. "Big data technologies simplify the process of collecting, aggregating, and cleansing the data from disparate sources. This enriched dataset feeds analytical models that can more accurately predict process upsets or degrading performance such as heat exchanger fouling and pump cavitation," said Bordreaux. "Additionally, layering business intelligence tools on top of cleansed, aggregated datasets results in better visualisations for subject matter experts."

According to Boudreaux, to date, Emerson customer experiences have varied depending on the problem being addressed, the approach being taken, and the amount of investment in time and resources. "Big data technologies are generally the domain of data scientists and software developers, and they are not ready for the generalist process experts just yet," he said. "The learning curve is steep, with a diverse set of new tools to learn. More complex solutions require custom analytics and expertise to make them work. In some cases, new and improved algorithms based on big data are embedded in Emerson's application solutions."

Tools are continuing to be developed to make it easier to get value out of existing data. It is certainly worth taking a look at what is available. The data already exists and the more knowledge that you can gain from this the more you will be able to improve process safety, reliability, security and sustainability, ensuring that you stay competitive.

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to take the benefits of IIoT relies upon securely connecting your enterprise OT and IT systems to collect, collate and analyse the big data that is now coming from the plant floor."

However, big data is not the objective. It is simply a tool. "Improving operational performance, efficiency and agility are the business drivers," said Nicholl. "Better connectivity allows data to be retrieved and to undergo the advanced analytics that offers operations managers the insight to make more informed decisions." Advanced analytics use mathematical modelling and statistics to identify patterns and relationships from real-time and/or historical data about the performance of equipment and systems.

Once analysed, almost infinite fine-tuning adjustments can be made to improve production and efficiency. In many cases planned improvements can also be subjected to software modelling to understand the potential effect of changes to the processes involved and to predict the benefits or 'see' any knock-on effects of the changes before applying them to the system.

"There is also an important customer driven aspect to big data that is worth mentioning," continued Nicholl. "The investment in connectivity will also allow manufacturers to differentiate from a price driven market towards a value-

consumer, will surely see the added value of big data in terms of efficiency and productivity but also customer loyalty.

"Other implications of this level of visibility will play out through track and trace technology that allows customers to see, and trust the product they are buying. This is all possible through the power of big data applied in a connected enterprise environment," concluded Nicholl.

Solving problems

Emerson Process Management is expecting big data to deliver value by solving problems related to process performance, product quality, energy, reliability, environment, safety, and security. "Rather than implementing large scale initiatives that attempt to `boil the ocean' or to discover needles in a haystack of data, focused application solutions are being developed to address unsolved industry problems," said Mike Boudreaux, director, performance and reliability monitoring at Emerson Process Management.

This is made possible through the use of pervasive sensing technologies which combine innovative sensing and analytics to deliver actionable information. "Wireless sensing technologies have lowered the cost and complexity of adding new measurements, making it possible to continuously measure