



Big Data in manufacturing: A compass for growth

Data has long been the essential lifeblood of manufacturing, driving efficiency improvements, reductions in waste, and incremental profit gains. But today, a new breed of Big Data analytics is taking over manufacturing and providing a totally new dimension to the value of research and trend analysis. Now, data is no longer being used for reporting past activities; it's helping manufacturers predict future events, foresee risk, understand their extended value chain, and enhance the customer experience they deliver. Data is all grown up, with new multi-dimensional capabilities and broader horizons. It's like a compass, pointing the way for manufacturing growth.

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What's driving Big Data?

Big Data is quickly becoming an important element of the fourth generation of ERP technology. Today, fourth-gen ERPs are transforming outdated manufacturing facilities into highly automated, efficient powerhouses. Big Data's ability to engage data, people, and processes is helping to create a new era for manufacturing. Whether you call this new era the "factory of the future" or the "connected enterprise," there are two elements driving the transformation: innovative mindsets and data.

In "[5 Big Data Technology Predictions for 2015](#)," Thor Olavsrud, senior technology writer for *CIO* magazine wrote, "In just a few short years, Big Data technologies have gone from the realm of hype to one of the core disruptors of the new digital age. 2014 saw Big Data initiatives inside the enterprise increasingly move from test to production. In 2015, Big Data will push further into the enterprise with even more use cases—specifically real-time use cases."

Manufacturers now have access to more resources for data capture and tracking than ever before. Data is coming from traditional sources, like the classic customer survey, as well as more innovative applications, like smart sensors and the use of the Internet of Things (IoT) to capture machine readings. Managers throughout an organization can access real-time data for every aspect of the products being manufactured, from warranty claims to cycle times and inventory counts. In fact, the volume of data available is so vast that it can quickly become overwhelming and cause data paralysis.

In spite of this, manufacturers are beginning to realize the value of Big Data. According to a recent report by Pierfrancesco Manenti, "[The Digital Factory: Game-Changing Technologies That Will Transform Manufacturing Industry](#)," 47% of manufacturers expect Big Data analytics to have a major impact on company performance, making it core to the future of digital factories. 49% expect advanced analytics to reduce operational costs and utilize assets efficiently.

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And manufacturers are putting their investment dollars on the line for Big Data, too. According to the [Tech Target 2015 IT Priorities Survey](#), 31% of the 2,212 respondents worldwide said their organizations plan deployments of BI, analytics, or data warehousing tools in 2015. A quarter of respondents expect to invest in Big Data analytics, and 21% expect to invest in Big Data processing and management.

Where is all the data coming from?

Today's manufacturers have more resources for data capture and tracking than ever before. The overabundance of data can be intimidating and cause manufacturers to struggle to understand how to harness the power of this data.

Data can come from external sources, internal sources, or be generated by machine-to-machine interaction. Together, these sources can provide manufacturers with the information that they need about their customers, products, processes, people, and equipment.

External sources—Manufacturers can turn to external sources, such as user groups, social media, focus groups, or surveys to build customer data. Third-party surveys, portals, and call centers add an impartial layer to the data collection that is often less threatening to the customer. The promise of anonymity can also generate higher response rates. This fact-finding can be used to build accurate profiles of customers and prospects, including subjective or “soft” characteristics, like color and design preferences, common buying triggers, or evaluation criteria.

Internal sources—Manufacturers can also turn to their own systems for data capture and analysis. A modern, integrated ERP system can provide data on products, processes, and people at all levels and departments in the organization. Data collected through an ERP system offers benefits, such as:

- Real-time reporting with up-to-the-minute accuracy
- A common database that provides one version of the truth
- The ability to drill down into details for historical depth
- Relational data with context and relevance

Machine-to-machine—Smart sensors and the Internet of Things (IoT) can now collect data directly from machines and equipment, and send it on to an ERP system, EAM system, or other enterprise applications. Built-in, low-cost sensors can detect a wide range of attributes, including location, weight, temperature, vibration, flow rate, humidity, and balance. These conditions can then be monitored in order to identify and predict performance issues that require service, repair, or replacement. This allows manufacturers to get early warning of impending issues, and hopefully intervene before there's a catastrophic interruption to processes and performance.



Machine data provides valuable insights about how equipment functions in use, whether on the factory floor or in the consumer's home. Detailed product lifecycle analysis can point engineers to future design improvements and performance enhancements. This data also gives manufacturers the ability to predict opportunities to sell replacements and upgrades. Predicting future needs can also help with sales forecasting and inventory management, so the organization can prepare for changing demands.

What can manufacturers do with all this data?

In this new paradigm, where manufacturers are capturing and using manufacturing data, their primary focus is no longer on reporting on past events—data is now being used to predict trends and anticipate needs. In this way, Big Data is acting as the gateway to the future.

Anticipating consumer trends, stocking necessary inventory, and maintaining adequate resources to meet customer orders have been high priorities for manufactures for decades. As speed of delivery and just-in-time inventory (JIT) strategies gained importance, the ability to accurately forecast needs also grew. Manufacturers learned—sometimes the hard way—the importance of choosing the right influencing factors or the right combination of factors. When attempting to predict the future, one data source is seldom sufficient.

Today, predictive analytics has become a valuable science and tool for manufacturers. It turns data collected from numerous sources into a blueprint for future actions. Modern business intelligence solutions now have the ability to project trends with a high degree of accuracy. As in any data initiative, though, the output is only as good as the input. Manufacturers must take care to choose reliable data sources and to continue to refine which influencing factors provide the best signposts for future activities.

Big Data should be a compass

that provides a guide. Data is not going to magically generate sales and customers. Data collected from machines and customers must be translated into action.

Predictive capabilities offer many benefits to manufacturers, including:

- **Staffing readiness**—When manufacturers have a reliable forecast of product sales, departments throughout the organization can plan personnel staffing accordingly, hiring personnel as needed and allowing adequate time for team training.
- **Raw resources in stock**—Procurement teams can use accurate predictive forecasts to better plan just-in-time inventory levels of raw materials, preventing delays due to stock outs.
- **Spare parts inventory**—An accurate understanding of the product lifecycle translates to being better prepared for necessary maintenance, including having the consumables and parts that require regular replacement in stock.

Anticipating consumer trends also provides a much-needed competitive head start, allowing the timely manufacturer to be first to market with a product innovation or first to introduce a breakthrough concept to an emerging niche market. Companies that are early arrivers often maintain valuable ownership of the market.

Successful product innovation largely relies on an accurate reading of the market's preferences and needs. Design engineers need to understand the consumer's pains in order to determine the potential value of new products and help prioritize allocation of R&D dollars. Big Data makes this possible.

How can Big Data foster growth opportunities?

How can Big Data provide significant return on investment (ROI) and lead to manufacturing growth? These are the questions manufacturers must answer, if they want to take advantage of Big Data's potential.

Big Data acts as a compass—it provides a guide, but it's not magically going to start generating greater sales and more customers. Collecting data—whether from machines through the Internet of Things (IoT) or from customers through online portals—is not the end. Data must be translated into action. This step requires careful attention and a thorough understanding of the relevance of the data. This is also where many manufacturers fall short in their Big Data initiatives.

But with careful analysis, data can be used to identify, analyze, and foster growth opportunities by helping manufacturers:

- **Identify new geographic regions to target**—Manufacturers can match demographics of current customers with profiles of prospects in other regions or countries. Global expansion becomes easier when manufacturers know what prospect characteristics to target.



- **Expand into niche/micro-markets**—Manufacturers can use data to spot pools of untapped opportunity. They can identify micro-markets that are currently under-served or that need specialized make-to-order (MTO) products. By being the first to reach a new market, manufacturers can become trusted advisors and build a market.
- **Tap into a customer base**—Data can help manufacturers identify opportunities to upsell, cross-sell, and re-sell to their current customers. They can predict their customers' needs and the performance gaps in their current products. Data from successful customers can help manufacturers reinforce their message and demonstrate the value of upsell and cross-sell products.
- **Foster customer intimacy**—When manufacturers understand their customer pains, they can provide better out-of-the box solutions. Data is the common language between manufacturers and customers; it helps manufacturers better understand and serve their customers, and forge strong bonds with them.
- **Innovate**—Manufacturers can use data to accurately predict the impact of design and engineering refinements, and speed product innovations and launches of breakthrough solutions. With the right data and analysis tools, they can accurately forecast the sales impact of a new product—as well as its risks.
- **Improve product lifecycle**—Data can help manufacturers identify design flaws and weak elements of mechanical design. They can use this data to refine product features. Plus, this data can help identify suppliers and sub-contractors that are meeting expectations, and eliminate sub-contractors who are performing poorly.
- **Increase value-add**—Data can help manufacturers extend their offerings to enhance the customer experience and the value-add. Services like consulting, installation, aftermarket service, extended warranties, and ongoing maintenance contracts offer possible new sources of revenue. Data can help manufacturers manage these service-related offerings with greater efficiency.
- **Improve profit margins**—Manufacturers can use data to optimize their lean initiatives to reduce waste, improve productivity, and stretch already thin margins.

In “**Manufacturers Stand on the Cusp of a Big Data Boom**,” Joanna Schloss explains how manufacturers can benefit from Big Data: “Given the vast amounts of customer usage data they collect, manufacturers are optimally suited to leverage cross-sell and upsell opportunities. This is really a fancy, less frightening way of saying manufacturers have a ton of data they can sell as a means to creating new revenue.”

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It's time for Big Data

To remain competitive, manufacturers must embrace Big Data. Manufacturers that make the most of the customer, product, and equipment data they capture stand to improve their ability to innovate, please their customers, and bring more profitable products and services to market more quickly.

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