SIGHT MACHINE WHITE PAPER

7 Steps for Launching a Successful Manufacturing Big Data Project

Quick Take

- Manufacturers are coming up to speed on Big Data technologies and trends, but often have trouble figuring out how and where to start using the new technology.
- Some companies suffer setbacks after using generic Big Data tools, instead of relying on manufacturing-specific technology.
- The first step toward success is selecting a project with a specific goal in mind, along with a project leader with responsibility for the manufacturing operations being analyzed.
- This paper provides an outline for a clear and simple path to unlock the insight and value in a company's "big data" store of operational transactions.

SightMachine.com | 888.461.5739 | info@SightMachine.com

White Paper

SIGHT MACHINE
Manufacturing Analytics

Manufacturing and Big Data

The era of Big Data has arrived. Discussion of terabytes, petabytes, and even yottabytes - that's a million terabytes - that were reserved to supercomputing facilities just a few years ago are common in today's boardrooms. Companies recognize that there is enormous value in the data they create, and they're making plans to capitalize on that value as quickly as they can. Manufacturing is leading the way, both as one of the largest producers of data from factory systems, machines, and sensors, and as one of the leading adopters of the new technologies that make up Big Data.

However, the rapid evolution of Big Data technologies, coupled with an incredible level of hype surrounding these technologies, has led to "analytics paralytics" at some manufacturers. Questions of where to start and how to apply these new technologies, along with trepidation at the potential scale of deployments, are preventing some companies from moving forward, especially with specific use cases seemingly so rare at this point in time.

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This practical, "how to get started" guide gives manufacturers a much-needed blueprint for evaluating and implementing Big Data technologies.

Avoid These Recipes for Disaster

Caution when considering massive technology deployments is well justified. We have already seen stories circulating about multi-million dollar projects that have been canceled for lack of results. At Sight Machine, we've seen a few approaches that should have had warning signs posted all over them; avoid these approaches at all costs.

"Deploy and Pray"
There is a naive belief that "Big Data is magic!" This leads to the deployment of generic Big Data tools and a business intelligence software package for reporting, with hoped-for results that will appear as if by magic. Those hoped-for results end up as generic as the tools deployed. No insights into manufacturing parts, processes, or plants are available from generic data models and data tools. Manufacturers must choose technologies that are built on manufacturing-specific data models - data tagged and sorted with part numbers, batches, cycles, downtimes or other important manufacturing data as the organizing principle behind the data structures.

IT vs Ops As Project Leaders
While Big Data is a fundamentally new technology approach, Big Data implementations should not be thought of as technology projects. Instead, the project should be focused on operational data and results,

and the project should be led by the person responsible for those operations. This internal project leader must have deep experience and knowledge about the operations, and the ability to differentiate between important analysis and spurious correlations. In other words, a results-oriented project must be led by the person responsible for the results. In our experience, it is crucial to have IT as a key team member, but not in a leadership role.

Technology Selection
There are a handful of technologies in the Big Data world that have become brand names, most notably Hadoop. Vendors of these brand-name technologies often position their product as being a one-size-fits-all solution for any big data problem. In reality, Big Data technologies are an ecosystem, with many purpose built tools and platforms. Look for a platform built to solve problems in the manufacturing domain, and avoid "everything and the kitchen sink" solutions -- platforms that were built to solve problems in online advertising, wearables, and internet search may not be optimal in a real-time factory environment. Ultimately, we recommend you look for:

- A scalable platform, with an application built on top of APIs, not just a single instance application.
- A system capable of locating computation in the cloud and/or on the plant floor, depending on the data volume and desired speed.
- A solution with a service-based architecture, so it can scale up as the amount of data increases.
- Storage technology that can be performant with large data sets, and process transactions in real-time.

This type of Big Data solution may be prohibitively costly to build and maintain in-house, so finding a solution provider who can provide this infrastructure on a Software as a Service license will mean you can start generating ROI quickly.

Planning Big: Project Overreach
If there is one mistake with Big Data that leads to massive headaches, it's overreach. Going too big is an easy mistake to make, given the excitement around Big Data technologies. An executive sponsor or an IT team leader may push for an enterprise-wide rollout of these technologies; however, the risk inherent in these projects, as well as the financial and resource costs and the lack of proven ROI, means that enterprise projects are invariably delayed, rescheduled, replanned, and in the end are often canceled.

7 Steps for a Successful Manufacturing Big Data Project

Big data projects are like any other process or technology implementation at a manufacturer: they must follow standards for good project management that are applicable to any project:

- Executive or director level sponsorship
- Clearly defined goals and scope
- Well documented project plans with specific milestones along a timeline

Additionally, we have observed the following best practices during successful implementations of Big Data strategies at manufacturing companies.

1. Assign an Ops Manager as Project leader:
As discussed above, the best project leader for manufacturing-driven Big Data projects is someone in manufacturing engineering or operations management with authority over the operations being analyzed. Their expertise in the operational and quality challenges, their pragmatic view of the goals of continuous improvement, and their focus on solving a specific manufacturing challenge facing the company is invaluable in driving the project to success.

2. Target a specific challenge to address:
Where to start is often the most difficult challenge a company faces when considering a Big Data rollout. In successful projects, a clear trend emerges: focus on a well-known quality issue, throughput issue, or process issue (e.g., machine downtime) in a particular place among your operations. Solving a specific problem offers multiple advantages: clearly defined data sources, easily measured success, and easily calculable ROI. A common scenario is to focus on a machine or line that is experiencing high scrap rates or low output, and use Big Data to find the root cause. Once the problem is corrected and the process is improved, it's easier to find support from other groups within manufacturing for a wider rollout.

3. Define the required analytics:
In some ways, manufacturers looking at Big Data are lucky. The advanced statistical modeling that manufacturers have used for many years puts them far ahead of other industries. Using Big Data to analyze overall equipment effectiveness (OEE), or to calculate statistical process controls (SPC) for quality defects, for example, is an application of new technology to bolster time-proven techniques for analysis and problem solving; rather than just providing after-the-fact calculations like legacy solutions, a Big Data implementation enables real-time analysis and comparisons among OEE numbers machine by machine, shift by shift, or factory by factory. Additionally, Big Data systems such as Sight Machine enable companies to combine data from parts, processes, and even plants for analysis and problem solving at a level never before seen.

4. Determine the required data sources:
Companies require a change in outlook when considering a Big Data project. In the past, teams have been limited as to what data they can look at based on cost of acquisition, storage, and computing power, as well as the complexity of tying all of this data together. With Big Data (and inexpensive cloud storage systems), the attitude should be, What data can we add to the mix? Data directly from sensors and PLCs, product data such as serial codes pulled from legacy MES/FIS and ERP solutions, images from cameras, worker IDs and shift codes from scheduling systems, supplier data - all of it should be considered if it in some way contributes to the process being analyzed. In most cases, manufacturing owns or controls the data sources, though in many cases IT or other organizations will need to be consulted. Be wary of any solution that requires a rip-and-replace approach, or requires major upgrades for existing systems. The best products and services today can take both structured and unstructured data from a myriad of sources and in a myriad of formats.

5. Identify internal data/process experts:
A common surprise in these projects, especially when working with external consultants, is that your company knows a lot more about its data than you think it does. In fact, identifying the internal experts on data and process is one of the key factors in determining the success of your project. As many agree: it's easier to take your process experts and teach them about Big Data than it is to teach Big Data experts about your business. So be sure to have the right product or process people involved from the very

beginning – the people who OWN the problem and understand how analytics can contribute to solving the problem.

6. Trust the data:
After a project gets up and running, it's not unusual for teams to be surprised by the results. In fact, we've heard questions about whether management should trust the analysis, because it's saying something different than they've been hearing for the last several months. Mistrusting the data is a mistake, and unfortunately a common one: Fortune Knowledge Group found that 62% of business leaders said they tend to trust their gut, and 61% said real-world insight tops hard analytics when making decisions. For a Big Data project to pay dividends, the team must be ready to trust the data, even when it disagrees with their previous assumptions.

7. Be ready to take action:
In the end, data analytics can take you to the cause of a problem, but it cannot solve the problem on its own. Project teams must be ready to take action based on the output from the system, and to correct the root cause of a problem once it has been identified. The analytics system can then be used to confirm the problem has been resolved.

Additional Considerations

As much as the focus is on data, people get in the way - the beliefs, prejudices and entrenched beliefs they bring to a project are often a bigger hurdle than getting budget or personnel assigned to a project. And as much as we might want to be ruled by data, people ultimately rule the big data process. This typically includes making the initial decisions as to which data to collect and keep, which questions to ask of it, and which actions to take in the end.

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About Sight Machine

The Sight Machine Manufacturing Analytics Platform analyzes existing manufacturing data for trends and important statistics, presenting real-time information to manufacturers in an easily digestible cloud-based format. Integrated into existing manufacturing operations, Sight Machine applies best manufacturing practices, such as standardized adapters for legacy MES, ERP and SCADA systems, along with advanced data management such as signal processing of sensors and images to higher-level data structures.

Sight Machine's web and mobile-based applications are available on demand, at any time, from virtually any connected device – from across the plant or across the globe.