



Analytics - Beyond the Value of Information

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For some time, we said that “data is the new oil” to indicate how much value and power there is in having data available. Having data means having knowledge of what’s happening and being able to objectively evaluate phenomena that otherwise could only be guessed. Then we started to say that having the data wasn’t enough—it’s more important to apply context to data so that it can be transformed into information. Data is important, but providing context makes it much more meaningful, and the information can then be used to make better informed decisions.

This is even more significant when we are talking about the high volumes of data collected from manufacturing operations. These huge amounts of data—process and production data—can be difficult to interpret if you look at it without context. You can, for example, collect the temperature of an oven every second in several areas of the equipment, and have a very detailed dynamic view of what’s happening in it. But it doesn’t mean a whole lot if you don’t know which SKU was being produced, what the setpoint was, and maybe what the humidity was

of the semi-finished good that you were cooking or drying. So context transforms data in information; context is the refinery of data.

But today, even information is not enough.

Transforming Big Data into Big Information is powerful, but it can still be difficult to interpret and understand.

Moreover, when you apply context to data, you are basically applying a model that combines variables you know are correlated in some way. But is that the only existing correlation? Or are some variables correlated to others in way you do not know and maybe are not so evident? The exponential growth of available data and information makes it difficult, if not impossible, to evaluate all the possible relationships, especially when you start to consider data coming from different domains (e.g. process and business data) or data coming from different stages of the value chain.

This is when analytics becomes important and can transform information in the same way context transforms data. Analytics is a generic word to identify a set of different activities or applications of statistical analysis or business intelligence, sometimes related to a specific domain, others to a specific type of content. Frequently, it indicates the capability to apply statistical models or mathematical algorithms to a data set, distilling information that otherwise couldn't be retrieved and that can be used to predict possible situations or to support manual decisions or even to implement automatic decision processes.

In manufacturing, analytics often refers to a system that can analyze a set of data and automatically identify relationships between variables. In this way, the system builds a mathematical model that can be used to predict the state or value of a single variable based on the behavior of the others. One of the most used

examples is predictive maintenance where, based on the data collected from several sensors installed on an asset, the system can predict if the asset will fail in the near future—optimizing the maintenance process, and minimizing the maintenance costs and possible impact of a failure on production at the same time.

But this is just a very simple case to understand. Even within manufacturing operations that are considered best in class, the use of advanced analytics could reveal further opportunities to increase yield. This was the case at one established European maker of functional and specialty chemicals. It boasted a strong history of process improvements since the 1960s, and its average yield was consistently higher than industry benchmarks, so they were skeptical that there was much room for improvement. However, several unexpected insights emerged when the company used neural-network techniques (a form of advanced analytics available in many products) to measure and compare the relative impact of different production inputs on yield. By adjusting the process parameters based on the evidence, the chemical company was able to reduce its waste of raw materials by 20 percent and its energy costs by about 15 percent, thereby improving overall yield.

More and more opportunities become available by mixing data coming from different contexts. In this case, not only can analytics apply a mathematical model to very large volumes of data, but it can identify patterns and correlations that otherwise would be extremely difficult to identify, since nobody has full knowledge of the data set.

Analytics can really change the way a company is run, providing insights with a much larger value than information and data. Analytics is the third level of knowledge that promises to transform dramatically how people will manage factories, both at the operations level and at the business level.