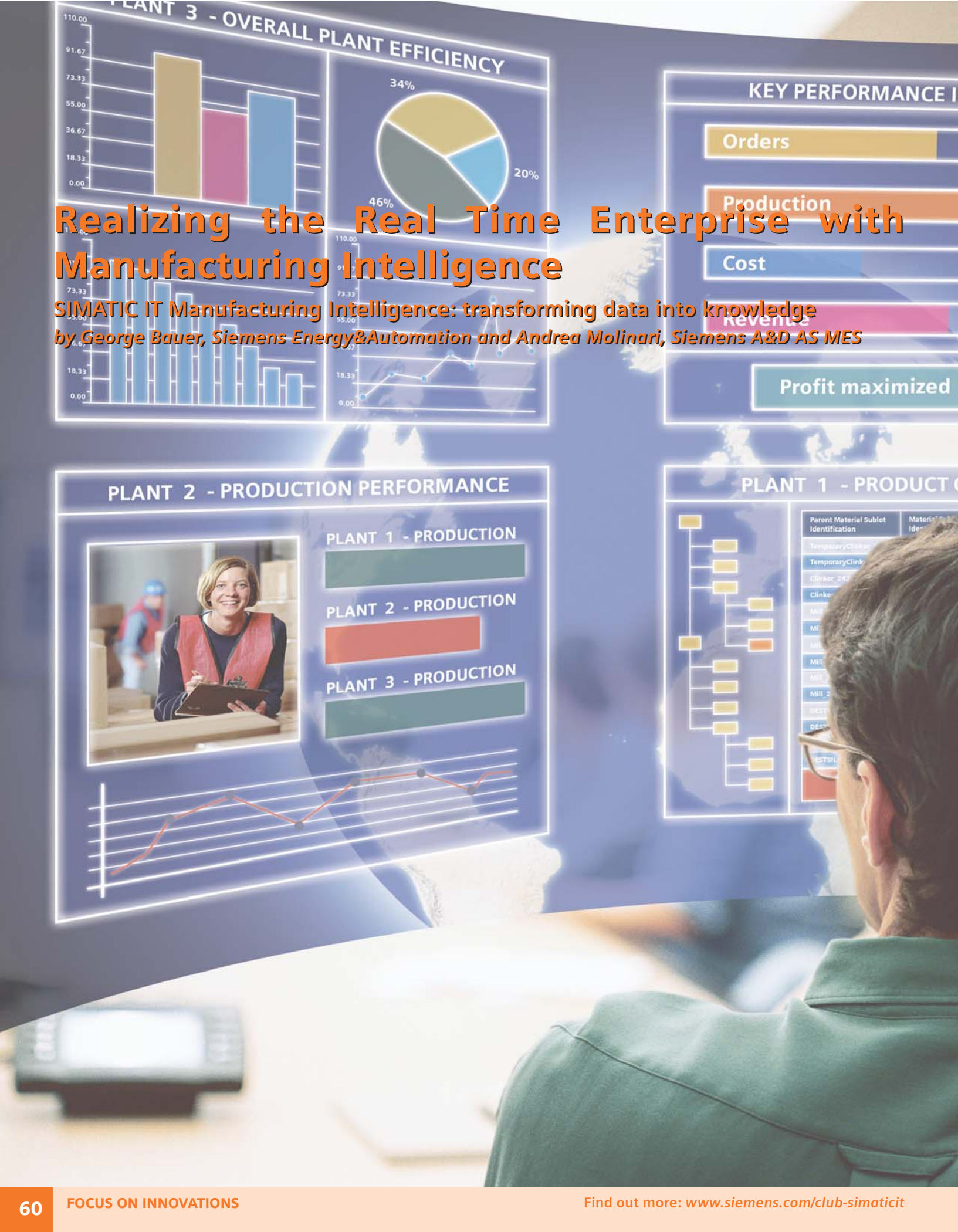
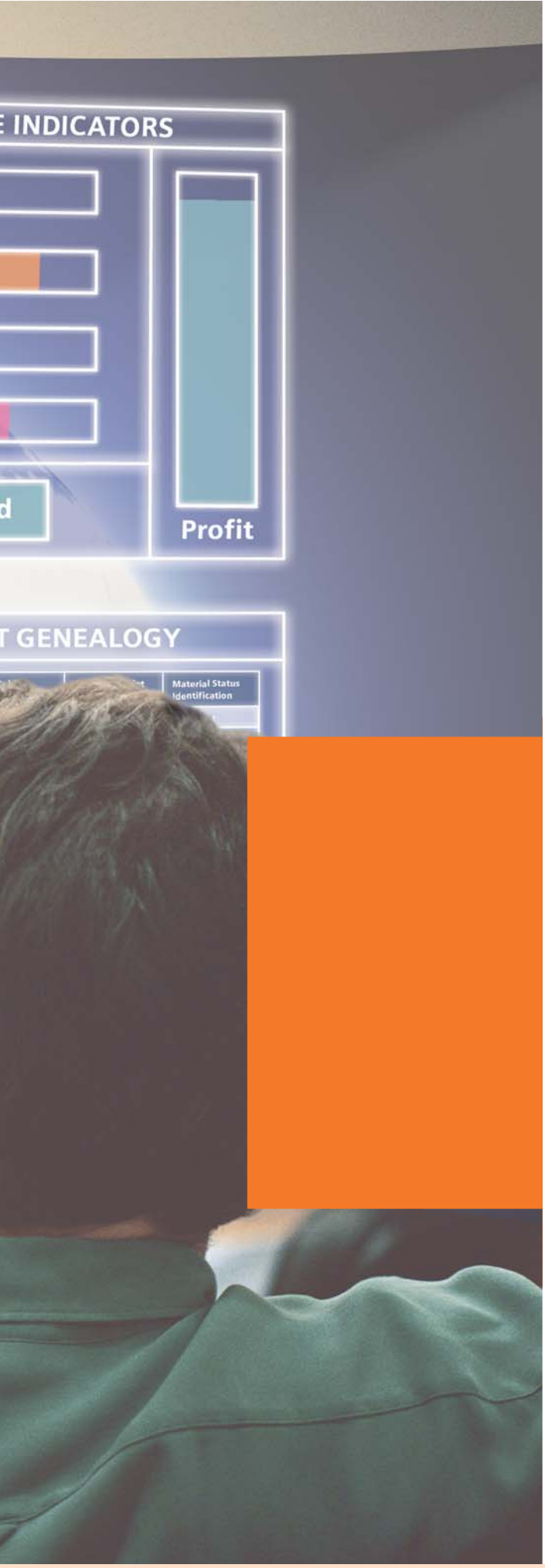
# Realizing the Real Time Enterprise with Manufacturing Intelligence

## SIMATIC IT Manufacturing Intelligence: transforming data into knowledge

*by George Bauer, Siemens Energy&Automation and Andrea Molinari, Siemens A&D AS MES*






*Today manufacturers of all kinds are struggling to make sense of a torrent of data flowing from their automation and information technology systems. While the instrumentation and archiving of critical process or production measures is the first step, this alone is not sufficient.*

*In order to realize the full value that can be gained from the capture of this raw data, manufacturers need to have an understanding of the greater significance of the data. For example, knowing that a temperature is 250 °C is little value if you don't know the history of the reading, the acceptable range, what were the other conditions at the time, and ultimately the impact on the overall objectives of the business. In order to achieve this deeper understanding, this basic piece of data must be placed within a broader context. A broader context can be obtained by relating the basic data to other information in the enterprise, helping to frame the data and determine its relevance to the business. Therefore, if it is known that a temperature of 250 °C has been sustained over the last 45 minutes, and if it continues, it will lead to the change in the specifications of the current batch, or cause an environmental violation, or result in the reduction in the life of an asset, this basic piece data has now become important information for the business. SIMATIC IT manufacturing intelligence provides the mechanisms for constructing these relationships and placing manufacturing data within the wider context of the business.*

## The Real Time Enterprise and Manufacturing Intelligence

The dynamic and fast moving business environment in which manufacturers are currently trying to survive is very challenging. Volatility in markets for raw materials and manufactured products, as well as transportation, environmental, and capacity constraints are placing new stresses on manufacturers. More than ever before, industrial companies have the need to make better informed decisions, as well as provide a faster response to situations as they arise. However, the reality is that the IT environment in most facilities makes these objectives quite difficult to obtain. Years of investment in a myriad of IT and automation systems have left a mix of specialized systems scattered throughout the enterprise. Functional boundaries in the organization further contribute to the isolation and division among these systems. One of the deepest and widest divides in the manufacturing enterprise is the separation between business and operational systems. As a result of this gap, senior management and operations personnel find themselves managing against completely different sets of data and correspondingly different objectives and goals, often poorly aligned with each other. Reconciling the various systems into a single, consolidated picture of the business is a time consuming and sometimes manually intensive task, generally limited to being performed on a weekly or monthly basis. However, manufacturing intelligence is providing solutions that cross these boundaries and overcome these barriers. Through manufacturing intelligence solutions, users throughout the enterprise can be served with business actionable, real-time views that enable a well-informed, rapid response to business challenges.

The information within successful manufacturing intelligence solutions is found to possess eight key attributes:

- **Timely -** Information must be delivered in the right time frame for decisions. In the fast moving world of manufacturing operations, this often means within several seconds or minutes of the event. It isn't useful to find out a month later there was a great opportunity at a time which has since passed. This key requirement for "operations time" updates of information has made many traditional ERP based solutions unacceptable.

- **Trusted -** Users must be able to trust the information they are provided. This means information should be accompanied by confidence levels and timestamps to eliminate uncertainty.

- **In context -** In order for the content to be business actionable, it has to be placed in business context. Context provides the 'big picture' that frames information and puts it in its proper place for the overall business. This context can also be used to bring users together around common corporate objectives or best practices.

- **Integrated/Related -** Often the greatest opportunities for new efficiencies occur when silos of previously independent information are integrated or related in a new and meaningful way. Doing this effectively requires spanning many disparate sources of information from tag-based systems to relational data sources to enterprise applications. Information from these diverse systems should be capable of being combined in expressions or calculations and related through structures, filtering and navigation.

- **Intuitive -** A wide range of people in the organization with widely varying business and technical expertise must be able to easily assimilate the information presented. This applies not only to the presentation of information, but also the navigation and overall accessibility of the information. Because a variety of roles within the enterprise will have a need for information, this information needs to be presented in a role based form. Making the content relevant and intuitive for every role that requires it.

- **Aggregated/Disaggregated -** Information needs to be easily summarized and rolled-up for top level overviews, yet just as easily drilled into and disaggregated to show supporting details or to aid in the exploration of root issues.

- **Normalized -** Normalized information makes comparisons across areas with heterogeneous sets of data possible. If different sets of data can't be placed on a common basis, it is impossible to make judgments or draw conclusions about performance.

- **Event driven -** Users can't always watch key information. Critical information needs to be monitored by the system and proactively notify a user when an event of interest has occurred. This notification should allow a remote user to always be kept informed of issues as they occur.

## SIMATIC IT Intelligence concept

SIMATIC IT manufacturing intelligence transforms and unifies real-time, historical and business data collected during production activities from single or multi-plant environments. This diverse set of data can be integrated and related through a configurable data model and optionally used to populate a data store that collects and retains historical data. Manufacturing intelligence provides a ready source for further analysis of information captured from remote locations. These sets of data, prepared in advance, can be accessed for high level analysis using techniques such as OLAP (On Line Analytical Process).

## The Benefits of SIMATIC IT Manufacturing Intelligence

Companies are finding that empowered employees, armed with information, are providing the agility and responsiveness needed for today's challenging business environment. By getting the right information to the right people at the right time, an organization can mount an effective response to an unfolding, dynamic event. Operations personnel who have the ability to take action on the production process use SIMATIC IT manufacturing intelligence to understand the business impact of their actions. Through manufacturing intelligence, these personnel are provided guidance that aligns them with the business goals of the organization as a whole.

Manufacturing intelligence solutions also enable companies to leverage the knowledge and expertise of the most skilled persons within the enterprise. For example, imagine a chemical company with multiple plants. The quality labs in every plant may be specially staffed and equipped for the majority of the production performed in that plant. Of course, if there is a "first rate" quality lab for a particular product in a certain plant, it is desirable to leverage this expertise in all of the other plants. By using a web-based common interface that integrates the critical manufacturing data at a site, remote experts can easily support local personnel at any of the other facilities. This shared services approach prevents the need for traveling or duplicate investment in specialized resources at every site.


By integrating a mix of data from across the enterprise, manufacturing intelligence solutions can serve a variety meaningful content to a wide range of users. Users at all levels of the organization can be more productive and better align with the objectives of the organization by seeing how their actions contribute to the 'bigger picture' of the business. One example in which this is particularly true is where manufacturing intelligence bridges the gap between MES and ERP systems. For example, shop floor data can be integrated with content from ERP systems and transformed into real-time performance indicators reflecting key business objectives. In this way, manufacturing intelligence can be employed to improve the management of the supply chain, realize lower costs, and improve customer service.

## SIMATIC IT Manufacturing Intelligence

The benefits of manufacturing intelligence are even stronger if its relationship to MES functionality is very tight. SIMATIC IT provides the perfect environment for realizing this synergy between intelligence and execution. Users that collaborate on solutions using manufacturing intelligence tools can immediately take action and initiate production workflows through SIMATIC IT. As the central mechanism for orchestrating manufacturing workflows, the SIMATIC IT Production Suite transforms and coordinates events with actions, providing a framing context for the entire manufacturing cycle. SIMATIC IT provides integrated manufacturing intelligence enabling a seamless mechanism for incorporating manufacturing data into intelligence solutions. As SIMATIC IT is the source of the majority of manufacturing information, manufacturing intelligence solutions can be incorporated with minimal effort. With built-in S-95 structures and a set of pre-defined industry specific KPI applications, SIMATIC IT manufacturing solutions can be rapidly deployed.

SIMATIC IT manufacturing intelligence allows customers to improve overall profitability and effectiveness in manufacturing operations by focusing on several critical, interrelated areas of production. These areas include the ability to better utilize plant assets (such as people, equipment and materials) through a single or multi-site view of overall equipment efficiency. Through the capability of connecting to existing third party manufacturing installations as well as to legacy systems, SIMATIC IT manufacturing intelligence allows customers to safeguard their previous investments. Furthermore, the modular architecture of the SIMATIC IT enables the customer to pick only those components he really needs to optimize his daily manufacturing and business challenges. This modular application approach allows for incremental installations and affords users the opportunity to pick and choose what functionality they need without the need for "all or nothing" implementations.

The responsiveness and agility that organizations can realize through the application of manufacturing intelligence is proving to be vital attributes for succeeding in the new economy of today. Through SIMATIC IT manufacturing intelligence, manufacturers are revealing new insights into their business and realizing efficiencies in their operations never previously achieved.