

Preface

Today's manufacturing enterprises cater to multiple customers with necessary competencies—capabilities and capacity. These enterprises must adhere to low volume and high mix production schedules, i.e., mixed model production, especially to fulfill the objectives of Just-in-Time (JIT), and kanban, among others. These enterprises are facing ever-increasing pressure from internal and external environments to maintain their competitive advantage. For instance, enterprises are internally facing increasing pressure to manufacture complex products with high quality, reduced lead times, low cost, and low quantity, and at the same time, increased shareholders' profitability. Likewise, the enterprises' external business environment is highly competitive, volatile, and driven by uncertainties.

To overcome these concerns, manufacturing enterprises need to reinforce their existing monitoring and control of manufacturing processes with the aspirations to achieve a higher degree of transparency, flexibility, and adaptability. In this regard, manufacturing enterprises initiate continual improvement programs. Additionally, decision making is a complex task requiring the right information, at the right time, and in the right context.

Numerous performance measurement systems have been elaborated, especially from a strategic perspective, to satisfy the aforesaid requirements. These systems highlight the importance of non-financial or operational metrics, and linking the financial and operational metrics, among others. However, enterprise members have varying requirements related to performance metrics depending on their roles and responsibilities. The financial reports are generated according to the enterprise reporting cycle, and contain financial jargon, which is difficult to interpret by plant managers. Likewise, accountants have a challenging task to consolidate the real-time operational metrics into financial reports.

The financial and operational metrics are two sides of the same coin—both are essential for monitoring and control of manufacturing processes. In contrast to operational metrics, research to compute the financial metrics in real-time has not garnered the required attention, which has resulted in inadequate linkage of financial and operational metrics in real-time. Subsequently, enterprises will have issues in measuring the effectiveness of process improvement programs, and the decision making will not be based on facts.

The book presents a reference architecture that has been developed at the Business and Information Systems Engineering (BISE), University of Siegen to

enable enterprise integration. An integrated enterprise can be considered a building block toward partially realizing the above stated aspirations. The building block shall be fostered to accomplish the computation of financial and operational metrics in real-time. The financial metrics considered are more meaningful from the shop floor perspective. Furthermore, the concept of linking financial and operational metrics in real-time is elaborated with an aim to provide a comprehensive view of an enterprise. The reference architecture and the concepts of metric computation and their linkage are based on interdisciplinary fundamentals, technologies, and standards.

A Reference Architecture for Real-Time Performance
Measurement

An Approach to Monitor and Control Manufacturing
Processes

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