

Preface

As the Chair and Chief Editor of the ISA-95/MESA Best Practices Working Group, a small number of dedicated standards contributors specifically formed the group more than 6 years ago to accelerate the Age of Intelligent Manufacturing. Our objective is to develop a public set of best practices methods to enable continuous improvement using standards-based manufacturing operations management (MOM) systems. Our group focuses on applying the ISA-95 standards and the sister standards from the Open Operations and Maintenance (Open O&M) Initiative to build manufacturing system architectures for adaptive manufacturing.

When Worlds Collide in Manufacturing Operations: ISA-95 Best Practices Book 2.0 presents a collection of best practices for transforming a manufacturing company and its manufacturing systems into a structured form to compete globally in the 21st century. Book 2.0's chapters are individual white papers on a specific component of the manufacturing transformation. These white papers have been authored by experts from 14 countries and then peer-reviewed by expert reviewers from 13 countries.

Chapter 1: SOA for Manufacturing Overview

Chapter 2: Building a Manufacturing Transformation Strategy with ISA-95 Methods

Chapter 3: Data Architecture for MOM: The Manufacturing Master Data Approach

Chapter 4: Work Process Management for Adaptive Manufacturing

Chapter 5: B2MML, Integration Patterns, and Data Mapping

Chapter 6: Integration of Manufacturing Intelligence with MOM

Chapter 7: Lifecycle of Service Creation using the ISA-95 MOM

We all know the world economy is in serious trouble. That's old news. The question now is "What do we do about it?" Solution: Highly optimized manufacturing through knowledge-based workflow management systems aligning manufacturing operations and supply chain demands.

Politicians and economists of all shades and stripes have their pet solutions, but in the end, they must look to a new Age of Intelligent Manufacturing to dig the world out of the economic hole. We must think beyond the old box.

The Bottom Line: In order to help drive a global economic recovery, manufacturing plants must dramatically improve productivity and profitability by 30–100%

while increasing plant workers' compensation to maintain a middle class in G7 nations while growing one in developing nations.

According to *Control* magazine December 2008, 85%+ of manufacturing plants are currently operated with paper-based processes using a limited mix of disparate, stand-alone plant IT solutions for production, quality, maintenance, and inventory management. We must cross Moore's Chasm and mature manufacturing IT technologies and transformation methods NOW!

Most manufacturing managers and executives are overly obsessed with their organization's efficiency and cost of their isolated paper-based department processes. Their focus must shift to the actual *effectiveness* and *profitability* of the plant workflows and capabilities in their specific role in demand-driven supply networks. Manufacturers manage by department metrics, not by end-to-end process metrics. Current manufacturing operations management (MOM) systems unfortunately are too departmentalized and based on dissimilar information models with custom interfaces, reports, and misaligned metrics. Adaptive intelligent manufacturing is simply impossible if departments speak different languages in their processes, systems, and metrics. The resulting communication breakdowns not only reduce the efficiency of the make-to-stock (MTS) plant, but make the effectiveness and profitability of changeover for make-to-order (MTO) job orders financially unjustifiable by traditional labor-intensive methods.

The global manufacturing base is currently far too linear, manual, and monolithic to support sustainable global economic growth. Manufacturing methods have not truly been modernized since the buildup for the Cold War with the exception of some improvement during a few short regional booms in oil, semiconductor, electronics, telecom, and home building. Unfortunately, these sectors all have moved their linear MTS manufacturing overseas to simply lower the labor costs while operating the same monolithic product lines with limited progress in operations excellence.

Old-fashioned equipment retooling and disparate plant systems are not the answer. The investment should NOT be in just smart robotic equipment, as many monolithic thinkers believe! Large investments must be in knowledge-based, intelligent manufacturing architectures and their systems. Adaptive intelligence in manufacturing operations for make-to-order product lines must evolve to actually create Artificial Intelligence (AI) for manufacturing. This age is coming sometime in the 21st century. It can come in the next 10 years to solve the world's economic and energy problems, or it can be delayed for 80 years after much suffering has occurred.

The MOM system price tag is currently the major constraint to this new age in-plant productivity and supply chain effectiveness. Book 2.0 explains how this constraint is addressed with the emerging standards-based Manufacturing 2.0 architectures using highly characterized operations workflow configurations for

all modes of operations in a plant (see Chapter 1). The MOM system price tag must come down so these solutions are available to the mid-market suppliers; the big guys will then stop moving their operations and their suppliers overseas. Without enabling the typical \$100-200M revenue plant with MOM systems tied into supply networks, the global economic recovery is simply not possible. Without some real leadership, vision, cooperation, and courage from manufacturing executives and large investors, economic recovery is not possible.

Next Bottom Line: Systems do not make plants more efficient or even effective; flexible knowledgeable workers in effective operations workflow processes do.

The individual plant worker must dramatically (not incrementally) increase his or her productivity and value to the business (again)—and must be rewarded or not rewarded according to daily performance. The 21st century plant worker must become a true knowledge worker that seamlessly interacts with the adaptive manufacturing systems optimizing operations workflows based on available resources within a demand-driven supply network. Intelligent plants must become highly orchestrated in the global supply chain where metrics and resources are reconfigured to match changing market demand. The 21st-century intelligent plant and its knowledge worker must become a profit center, not the cost center of the last century, to actually drive the creation of global markets. The profit margin and compensation must be tied together and determined based on the maturity of the product, customer, and market, NOT on some Wall Street hypothetical that currently starve plants with short-term metrics and force managers into destructive short-term decisions.

Achieving this intelligent plant requires leaving the old beaten paths of the last century. Manufacturing companies must finally invest in intelligent plant systems. These next-generation operations workflow systems must create the adaptable knowledge workers who explicitly know their supply chain roles in plant operations AND are compensated (or not) based on their performance metrics to the demand. Looking at the plant worker in isolation is no longer possible if the world economy is to grow. The compensation of the 21st-century knowledge worker has to be based on performance to the plant's profit contribution margin of the company on a daily basis level.

The requirements for intelligent plant operations and workflow systems are aligned to the metrics from the real-time market potential, supply chain capabilities, plant capabilities, and financial expectations. This is currently a black art, but must be demystified immediately for large productivity gains to occur.

For this manufacturing transformation to actually work, manufacturing organizations must consolidate all manufacturing IT systems into an autonomous single manufacturing operations management (MOM) architecture and manufacturing systems technology organization. The MOM organization must be exclusively responsible for controlling and optimizing manufacturing operations

workflow, metrics construction, and supply chain connections, as well as oversee design, implementation, ownership, and governance of the MOM life cycle. We need manufacturing leaders, not politicians and accountants, with real courage who are NOT afraid of taking risks and who understand that small failures with analysis are part of the path to success. Effectiveness, not efficiency, is the key to 21st-century manufacturing. The process control engineers, plant managers, business managers, and CXOs need to protect their jobs by finding the courage to make a brave decision to drive adaptive intelligence in manufacturing operations processes, including organizational change, skill set upgrades, and manufacturing systems proactively into your companies.

Your challenge, should you choose to accept it, is to become an agent of manufacturing change and transformation.

I hope these best practices methods help your manufacturing transformation through standards-based system architectures to create your knowledge worker. Transform Manufacturing for a better world!

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