Real-Time KPI Performance Management
Of Plant Performance Information

An Executive White Paper

Dr. Darrel R. Suderman
President

FOOD TECHNICAL CONSULTING
76 Sylvester Place
Highlands Ranch, CO 80129
(303) 471-1443  Fax : (303) 470-3806
Email : docfood@aol.com
www.foodbevbiz.com
www.foodmanufacturingsystems.com
I. EXECUTIVE SUMMARY .................................................................................................................2

II. THE NEED: REAL-TIME KPI PERFORMANCE MANAGEMENT OF PLANT MANUFACTURING DATA .........................................................................................................................3

III. TOP-DOWN KPI APPROACH .................................................................................................4

IV. BOTTOM-UP DATA INTEGRATION TO KPIs .........................................................................4

V. COLLABORATIVE INTEGRATION OF BUSINESS PROCESS REQUIREMENTS AND TECHNOLOGY REQUIREMENTS ..............................................................................................................5

VI. REQUIREMENTS FOR REAL-TIME KPI PERFORMANCE MANAGEMENT ...............7

VI. THE SOLUTION: ENTERPRISE MANUFACTURING INTELLIGENCE™ (EMI) PORTAL .................................................................................................................................7

VII. TANGIBLE VALUE AND PROPRIETARY CUSTOM SOLUTIONS ...............................8

IX. A TO Z PROJECT IMPLEMENTATION APPROACH .........................................................9

X. SUMMARY ..................................................................................................................................9

Executive Summary

Enterprise Manufacturing Intelligence™ Portals are proving to be the most powerful, cost-effective alternatives to more expensive comprehensive MES solutions. These web-based applications have the ability to extract data from plant floor systems, aggregate it at a web server, transform it into business information, and distribute it to appropriate users through a standard web browser (e.g. Netscape Navigator or Internet explorer). In the process, EMI™ portals allow enterprise executives the ability to track real-time performance management against measurable, pre-established KPIs. This real-time KPI business performance tracking also becomes the #1 business case justification for the associated consulting, software, hardware, and implementation costs. The #2 business case justification results from the lower cost requirements of implementing this system versus less powerful, and more expensive comprehensive traditional MES solution implementations.
II. The Need: Real-Time KPI Performance Management of Plant Manufacturing Data

The “information gap” between plant manufacturing data and enterprise ERP systems and interdependent data warehouses has been well documented. The following diagrams illustrate two different ways to view the existing data connectivity void between manufacturing and ERP systems:

**Current Void Between Manufacturing and ERP**

Fillling the void left by ERP and APS solutions’ lack of coverage for specific manufacturing functionality creates a basic need for companies to build links to manufacturing systems.

However, software applications providers and manufacturers alike have struggled unsuccessfully to directly link plant manufacturing data with back office systems, then link that information to some type of performance indicator (i.e. a KPI or Key Performance Indicator). By linking real-time plant performance data directly to an enterprise level KPI, an executive has now identified the primary business justification for implementing this solution.
III. Top-Down KPI Approach

Roddy Martin, AMR Research, wrote on the importance of integrating plant performance with KPI measurement in a recent article, KPIs: Customer Service Rules, June 2000. He wrote, “KPIs in the plant, currently focus on islands of cost and efficiency, must support new business goals such as customer responsiveness and service and enterprise-wide quality management. Fragmented IT architectures, complex point-to-point integration, and isolated manufacturing information make it hard to access the performance management information that enables Capability-to-Promise (CTP), Available-to-Promise (ATP), and Profitable-to-Promise (PTP) KPI processes.” He further stated that “KPIs must provide the means for manufacturing to align, monitor, and sustain performance by driving practices that improve overall business performance.” And, the only approach to align manufacturing performance with enterprise monitoring is through Top-Down KPI business process alignment.

IV. Bottom-Up Data Integration to KPIs

Once an enterprise has identified and aligned Top-down KPIs, the next step is to identify specific data points or aggregate manual “data reports” at the manufacturing level that support specific KPIs. The following diagram illustrates this point:
V. Collaborative Integration of Business Process Requirements and Technology Requirements

Strategic KPI approaches require business-driven architectures. AMR Research, June 2000, stated that companies must designate strategic business goals, combined with business process and event analysis, while they identify top-down, business driven KPIs. A few leading manufacturers have already succeeded in implementing integrated architectures with KPI capabilities, including South African Breweries, another major United States brewery. Food Technical Consulting is working with another leading U.S. food processor that is taking this business methodology one step further by linking plant data with real-time KPI performance management through the use of an Enterprise Manufacturing Intelligence™ (EMI) portal. (This concept will be discussed further in this white paper).

The following diagram describes in detail enterprise architecture planning process used to integrate business and manufacturing processes with IT application strategy and standards:

![Enterprise Architecture Planning Process Diagram]

Source: AMR Research 2000

The Enterprise Architecture Modeling Process uses a meta-model comprised of an integrated set of model types, object types, attribute types and relationship types that are carefully selected from the wide range available within the ARIS software toolset. The meta-model also specifies process modeling levels and selected process modeling techniques, and forms the basis for other deliverables such as process modeling standards, modeling filter, QA check rules and process training material.

This template also attempts at gathering as much information as possible in preparation for the creation of the ARIS database.
By using this template-approach for the analysis phase, the need for on-site work and traveling costs can be substantially reduced.

This template is based on the Enterprise Architecture framework of John Zachman¹.

**The Zachman Framework for Enterprise Architecture is the keystone of the Enterprise Architecture Planning Process.**

Using a framework to structure business modeling efforts ensure that:

- Documentation can be generated to suit the perspective/organizational level
- Model content are structured logically
- Models are integrated through proper model relationship management

The ARIS models will be used to document the answers to the following fundamental questions from various perspectives:

- **What** information is important to the organization?
- **How** are processes performed?
- **Where** are processes performed?
- **Who** performs the processes and **what** is their role?
- **When** do major business events occur?
- **Why** are these processes performed?

It is critically important for every company to not only know the answers to these questions but also holistically understand the relationship between the answers to these questions. The ARIS meta-model is structured to enable this.

---

¹ For more information visit the website [www.zifa.com](http://www.zifa.com)
The framework analysis of an enterprise architecture model can be performed with different frames of reference, e.g. enterprise framework, business framework, product framework. In addition, the framework may also contain information that can be used to develop long-range "As-Is" and "To-Be" IT roadmaps. It is also extremely important to note this Enterprise Architecture Modeling can be focused on specific enterprise functions, such as: the supply chain, the MES business layer, plant maintenance, etc.

VI. Requirements for Real-Time KPI Performance Management

Implementation of a successful Real-Time KPI Performance Management System has several bare-essential requirements:

I. All enterprise and functional KPIs must be clearly identified with measurements and accountable personnel. For example, many companies use The Balanced Scorecard organization to identify executive KPIs. But these high-level KPIs need to be broken down into supporting KPIs at the manufacturing or processing level. Throughout the interview process of determining these KPIs, the consultant will seek answers the Who, What, When, Where, How, and Why questions discussed previously.

II. All business processes need to be mapped with specific data collection points and/or reports identified throughout the business segment of an enterprise – such as the supply chain, or the MES slice throughout the supply chain, etc.

III. Definition of data collection requirements

IV. Generation of “To-Be” business function vs. technology matrix for the real-time production management system

V. Development of a technology gap analysis required to transition from an “As-Is” state to support “To-Be” requirements

VI. Development of a master plan that identifies the technology, implementation plan, implementation approach, and master schedule for specifically identified pilot or full-scale implementation projects.

VII. The Solution: Enterprise Manufacturing Intelligence™ (EMI) Portal

We believe that an Enterprise Manufacturing Intelligence™ Portal represents the most cost-effective, and powerful emerging technology to finally integrate plant production information with real-time KPI performance management or monitoring. EMI™ (as shown below) provides companies the ability to extract data from plant floor systems, aggregate it at a web browser, transform it into business information, and compare it against pre-existing enterprise KPIs on a real-time basis, and distribute it to appropriate users.
VIII. Tangible Value and Proprietary Custom Solutions

Real-Time KPI Performance Management solutions can be tailored to specific enterprise business requirements on both small, focused business areas, or across an entire supply chain. For whatever scope is determined, implementation of these solutions can be easily justified by the following “Business Drivers” examples that address the following “Needs”:

1. The need for a “Real-time Performance Management System” that provides an enterprise with the ability to collect/measure production and quality data, report the data, and react to performance data on a real-time basis against established KPI standards.
2. The need to reduce production costs, improve production yields, improve production process efficiencies, and improve product quality and safety, etc.
3. The need to continuously update production and product performance, yield, and costs standards.
4. The need to improve customer service and responsiveness through improved demand and supply planning, forecasting, and production scheduling.
5. The need to integrate diverse information system gaps in such areas as:
   - First production and second processing plants
   - Integration of field data with plant processing data
   - Corporate and plant level information transfer
IX. A to Z Project Implementation Approach

Our organization starts with a high-level view of your organization by using a top-down analysis of KPIs linked to specific business processes, then identifying specific data collection points supporting all levels of KPIs. Then we conduct “As-Is” and “To-Be” architecture mapping so that data can be flawlessly managed on a real-time basis through the Enterprise Manufacturing Intelligence™ Portal. Please contact us for further specifics on our “A to Z” implementation plan.

X. Summary

The primary purpose of this “White Paper” was to introduce corporate executives to a proven cost-effective technology that enables them to monitor and respond to real-time KPI performance management based on real-time plant manufacturing data. A second purpose was to describe the supporting technology and the steps required to implement this real-time performance management solution. Finally, enterprises now have a powerful, cost-effective solution to bridge the data gap between the plant floor and existing ERP/data warehouse systems.

Contact Information:

Dr. Darrel R. Suderman
President 303-471-1443 Office
Food Technical Consulting 303-522-9648 Cell

Food Technical Consulting Business Scope based on AMR Research Model