Production Process Management

10 Business Reasons For A Production Process Management Strategy Using Workflow

Production Process Management is NOT a technology. Rather, it is a workflow-oriented approach to organizing, managing and supporting the processes that your company uses to accomplish production activities. This paper outlines the use of Digital Process Automation (DPA)concepts including Business Process Management to orchestrate the movement and aggregation of data to support your specific actions across any step within your value chain.

Collaboration Synergies Inc.

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10 Business Reasons for a Production Process Management Strategy

In 2003 there was a hotly debated article by Nicholas Carr in the *Harvard Business Review* titled, *"IT Doesn't Matter."* He argued that once all companies have an Enterprise Resource Planning (ERP) system there will be no advantage to having one as every company will have the same toolset. Peter Fingar, a leading professor and business advisor, argued strenuously in his responding book, *IT Doesn't Matter: Business Processes Do*, that it never was the IT tools but instead the processes within the company that provided differentiation. That argument seems even truer today. So why are most manufacturing companies still deploying rigid, data-centric, licensed software silos on the manufacturing plant floor instead of unique, distinctive, strategic and changeable business processes?
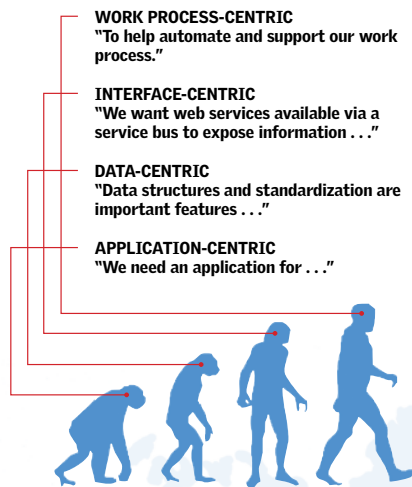
It is time to reevaluate how we look at our information management toolset and examine our businesses from a process-centric perspective. Information silos cannot be accepted and information can no longer be departmentally owned. We need to orchestrate information into strategic and sustainable competitive advantage processes that support the extended enterprise and include a wide range of stakeholders across the value chain.

Most manufacturing facilities have an intensely complex set of applications to manage the information necessary to accomplish production objectives. It is likely that this tool set includes many specific departmental applications, ranging in age and technologies. We want operational harmony but we see dozens of disparate data sources and applications.

There is a new way—think process instead of application. A recent paper describes a new information management approach called Production Process Management (PPM), a process-centric framework (not a technology) based on business process management tools and concepts. In the world of PPM, information technology is used to identify and support a process-centric environment based on the chronological steps necessary to operate your business as you see your needs today, and to provide an easy revision path as you adjust to changing conditions in the future. In the world of PPM you own **your** processes – they are not the property of a software vendor. You can easily make changes to **your** processes using process modeling concepts, not software code. This is a new way to deploy enterprise and/or individual plant production processes quickly and incrementally, either on a plant-by-plant basis or across multiple plants, by providing the tools to establish/define the global process and then allow granular input/output changes at the plant or production line.

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Illustration 1

WORK PROCESS-CENTRIC
"To help automate and support our work process."

INTERFACE-CENTRIC
"We want web services available via a service bus to expose information . . ."

DATA-CENTRIC
"Data structures and standardization are important features . . ."

APPLICATION-CENTRIC
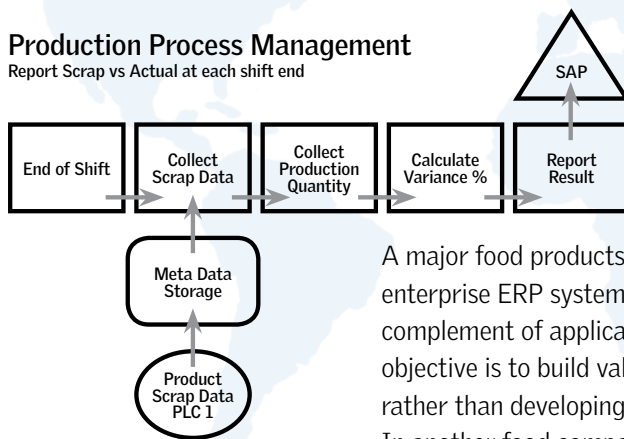**"We need an application for . . ."**

Evolving to a Process Centric View

Plant applications have steadily progressed from their inception in the late 1980s. Originally designed to serve departmental supervision, these legacy applications can number more than 100 in major manufacturing facilities with many forms of technology ranging in age from recent installations to decades-old software applications long since outdated. The maturity model outlined in Illustration 1 shows how these systems have evolved to our current process-centric requirement.

Production Processes come in many forms and range from simple to extensive. Illustration 2 shows an example of a simple production process where the task is to retrieve the amount of scrap produced from each plant at the end of each shift and calculate the scrap percentage of the finished product produced on that shift. The plant is required to weigh each item of scrap and collect the shift total in a scale-mounted PLC. The PPM platform will initiate this process automatically at shift end by collecting the scrap and finished goods data and making the calculation. The information is then sent to the ERP system as part of the financial and metrics measurement administrative processes.

Illustration 2

Production Process Management
Report Scrap vs Actual at each shift end

SAP

| End of Shift | Collect Scrap Data | Collect Production Quantity | Calculate Variance % | Report Result |

Meta Data Storage

Product Scrap Data PLC 1

A major food products company has recently launched a PPM initiative to connect the enterprise ERP system to 80-plus manufacturing facilities. Each facility has the usual complement of application silos (OEE, scheduling, MES, maintenance, etc.) but the PPM objective is to build value through processes that can be deployed to a number of plants rather than developing integration code and one-off information tools for each facility. In another food company PPM is planned to build a recipe management package that retrieves data from four enterprise system sources. The ERP system begins the process by assigning a production order to a plant. Based on the product and the plant location, the PPM is to retrieve the correct production information specific to that instance of production from four enterprise systems, and download the recipe package to the plant. Later PPM versions will see production parameters (i.e. oven temperature, conveyor speed) directly loaded to devices and production manager's devices.

A broader and more complex set of processes are planned by a major aircraft manufacturer to link its enterprise level applications such as PLM and ERP, and suppliers' enterprise information systems, to the airplane assemblers using process technology. The most obvious advantages include enterprise-wide incremental process deployment and process revision with minimum disruption to the user; the Gartner described build-to-change strategy rather than a build-to-last.

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Ten Business Reasons for Production Process Management

1. Build Your Enterprise Competitive Advantage. The production process layer is proprietary to the user company, providing the basis for building a sustainable competitive advantage through production process design and execution.

- You **own** the process layer. This is your proprietary intellectual property.
- Allows building your competitive advantage through information technology.
- Processes are the essence of your company.

Information technology is arguably the most cost effective investment to build your competitive advantage. This seems especially applicable on the plant floor where we have only begun effective strategic enhancement. If you still have dozens of disparate and disconnected software applications (as exists in most plants) that do not represent a fully connected process-centric environment, you probably have opportunities for improvement. In place of another software application, think in terms of holistic objectives supported by sequential and chronological processes that are aimed at company-wide goals while supporting individual steps in the work space. Begin by assessing where you are and how technology might affect your company over the next few years. Examine your ability to make changes to processes or to even understand how the existing processes work or were developed. Think in terms of cross functional requirements that begin with the customer and conclude as a satisfying financial return. If the vision is adequately holistic and seen from the highest level, the lower level processes and their intersection with departments will be self-evident.

2. Information system management through a process layer environment is less disruptive for system users.

- Eliminates Rip and Replace. Ripping out the old and starting the new has been the usual disruptive, difficult and expensive method to upgrade plant systems.
- **Incremental migration** is the new term—accomplish the move from the "as is" to the "to be" in business supportive steps.
- Processes can evolve and grow with the business. Evolutionary—not revolutionary.
- The new process view can be precise to each role-based position or specific user.
- Plant-by-plant roll out plans are replaced with tailored enterprise deployment to specific users using existing data elements.
- The PPM environment is focused on the user, not a data-centric application.
- Upgrading manufacturing enterprise information management systems just got a lot easier—an alternative to Rip and Replace has arrived. The path to success has become incremental and the focus has changed from the data-centric application to the process and the process-supported user interface.

Upgrading plant floor information systems such as MES has been a painful path mostly based on Rip and Replace strategies with few, if any, alternatives. Historically, a requirements document was written to provide an overview and a route from the "as is" to the "to be" environment. A pilot project was developed and implemented to determine if

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any design changes were necessary and then the global rollout was planned. During this planning stage the specific differences between plants were identified and modifications to the standard software were planned and made to fit the global deployment. In nearly all cases the focus was first on the functions within the application and then the necessary differences within each plant. Role-based information was important but typically seen as secondary to the functionality. Deployment was expected to cause temporary disruption. Although the disruption can be mitigated through training programs, the learning curve is likely to be steep, arduous and contentious.

The migration path using PPM is easier on everyone, especially the user, and dramatically changes how we improve/revise the information infrastructure. Migration is not a one-time event but a series of roadmaps to support initiatives such as continuous improvement and business agility.

3. PPM is an enterprise level business system. Applied processes are typically enterprise standards with granular changes at the business unit and/or plant level.

- A process can be deployed across the extended enterprise or company with revisions at the local level.
- A process standard can apply to the enterprise, a plant, a single user, a supplier, a customer, or any other defined user or users.
- Processes are defined to support the assigned entity.
- This is enterprise supporting—not plant centered.

Global processes can come in nearly any form to fit how you want to run your business. It is easy to build into a process the variables that are then managed through process modeling, process execution tools and business rules. Model the process, identify data elements and sources, simulate the process, revise as necessary and then deploy (execute) the process. Especially in a multi-plant enterprise, executing global processes will provide improved clarity and provide a significant step on the road toward operational harmony.

4. A less costly method to accomplish information exchange and easy couple/decouple information sharing without direct systems integration.

- Coding is expensive, difficult to visualize and is hard to revise.
- The focus is on the best way to support the user and avoid data centric structures.
- Easy couple/decouple information sources is the new norm.
- The three layer architecture is easier and less expensive to manage.

Global processes can come in nearly any form to fit how you want to run your business. It is easy to build into a process the variables that are then managed through process modeling, process execution tools and business rules. Model the process, identify data elements and sources, simulate the process, revise as necessary and then deploy (execute) the process. Especially in a multi-plant enterprise, executing global processes will provide improved clarity and provide a significant step on the road toward operational harmony.

5. New generic operations information systems, including MES, maintenance, LIMs, quality, SPC, scheduling, and others can be purchased at lower cost or eliminated altogether.

- Rationalize existing application overlap.
- The simplest tools for data creation or data management are sufficient.
- Most of the processes within existing applications can be modeled and deployed as global processes.
- Migrates to a data model supported process environment.

Typically the most expensive part of any plant software package is the customized programming cost to make it fit in your company. Another issue is the necessity to get users to conform to a new data presentation or data input requirement. PPM allows the deployment of generic applications with the customizing done in the process layer. Process changes and upgrades are easier to define and track over the period of use.

6. Supports easier global visibility to business information and production processes.

- Processes can be visible and readable. The user can more easily understand the information objectives.
- Near English modeling tools with annotation are used instead of C Sharp coding.
- People can more easily understand their role in the process.
- Management can relate with and identify process specifics.

Most of what occurs in plant information systems is built into the software applications. Have you ever tried to read an application or the integration code to understand the functional details? Business processes defined in English and modeled using modern modeling concepts make it easier for everyone to see and under-stand how processes work and how they relate to the business objective. Removing the mystery and making it easier for users to understand is fundamental to process-oriented management.

7. Provides the ability to manipulate live business practices and make changes quickly.

- Processes can be revised by anyone with the authority at any time.
- Even in-flight processes can be revised.
- Provides true agility as the business conditions change.
- Deploy processes that build in flexibility, responding to changes via current events.

A key improvement in the process-centric approach is the ability to try new things or revise existing processes quickly. Have you ever wanted to just try a revision to an existing method? In PPM you have the ability to either simulate a new process or actually deploy a new process in production within minutes. Yes, there are issues of governance and change authority but they are part of any PPM platform. Even in-flight processes can be upgraded by simple changes in the model.

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8. Systems layer customization cost and time will be dramatically reduced immediately.

- Deployment is likely to reduce cost by 30 percent or more.
- It is possible to design, deploy and execute a process within a day.
- Revisions are less costly and faster.
- The three layer architecture is easier and less expensive to manage.

Illustration 3

PRESENTATION LAYER
User interface, data views, charts, graphs, reports, etc.

BUSINESS PROCESS LAYER
With specialized knowledge domains

RESOURCE LAYER
Data and infrastructure to support process solutions
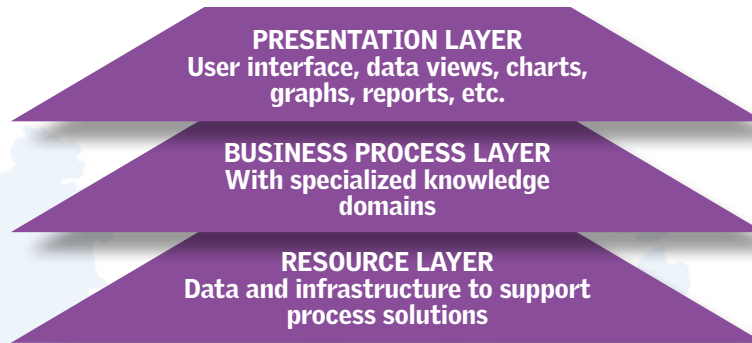
With the three-layer architecture as shown in illustration 3, companies are significantly less dependent on any software vendor and making connections with other data source applications is much simpler.

9. PPM will allow dramatically reduced implementation time for system connections.

- System designer identifies data element, locates best appropriate source, makes the connection, and tests or simulates the process.
- Easy couple/decouple information sources is the new norm.

Being process centric is not focused on integration or complicated software packages. Processes are built through the use of modeling tools that have the ability to connect with most of your existing applications. If the connection is not in the library the tie-in will take a little longer but it is not an integration project. As you build your connection library through web-based methods and modeling tools, the availability of information and data elements continues to become easier.

10. Provides a path to zero latency and a full real-time enterprise.

- Process execution is real time based on events.
- Processes can provide immediate data and feedback.
- PPM is not a report or data-centric approach.

The era of the digital enterprise is here but it is unlikely any manufacturer will replace their legacy applications just to meet this new level of business responsiveness. Using a process instead of application integration can be a quick and less expensive way to reinvent your business model to respond to changing business issues. PPM is not simply about data but a method to convert how you want your business to run into a reality with the least amount of pain.

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The Existing Environment and the "To Be"

These illustrations provide an overview of the typical application hierarchy in most manufacturing companies today. Illustration 4 shows the usual enterprise level applications, including Enterprise Resource Planning (ERP), Product Lifecycle Management (PLM), Supply Chain Management (SCM), etc. Beneath that is the integration layer made up of mostly custom software intended to bridge the gap between the plant application activities and the needs of the enterprise systems. The next lower level is a symbolic display of plant applications used in manufacturing. These are typically stand-alone, departmental data-centric systems. Beneath that are the machine level programmable controllers, other control systems and sensors. The bottom layer suggests the specific operational requirements of the local plant, which could be based on things like product, tradition or labor agreement.
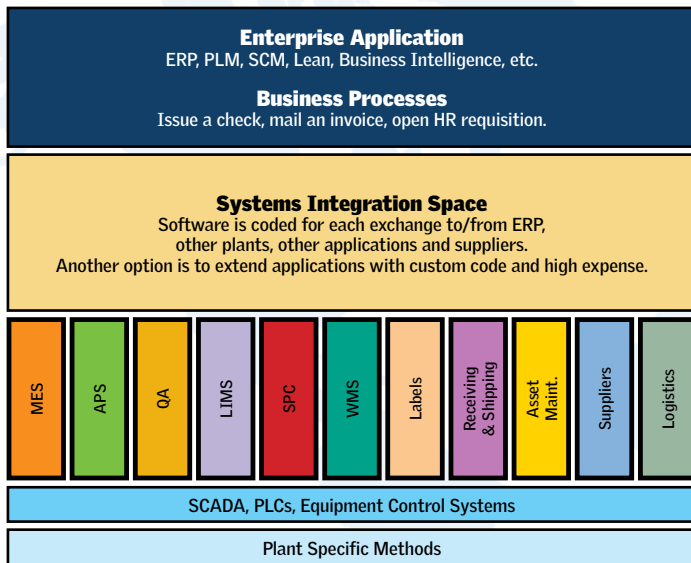
Illustration 4

Enterprise Application
ERP, PLM, SCM, Lean, Business Intelligence, etc.
Business Processes
Issue a check, mail an invoice, open HR requisition.

Systems Integration Space
Software is coded for each exchange to/from ERP, other plants, other applications and suppliers.
Another option is to extend applications with custom code and high expense.

MES | APS | QA | LIMS | SPC | WMS | Labels | Receiving & Shipping | Asset Maint. | Suppliers | Logistics

SCADA, PLCs, Equipment Control Systems

Plant Specific Methods

Illustration 5

Enterprise Application
ERP, PLM, SCM, Lean, Business Intelligence, etc.
Business Processes
Issue a check, mail an invoice, open HR requisition.

Production Process Management
Production Process A series of steps to accomplish a business process within operations and the supply chain side of the enterprise.

Common or near common processes across business units.
Substantially reduce systems deployment cost.
Visible and interchangeable processes.
Sharply reduced time for process changes.

MES | APS | QA | LIMS | SPC | WMS | Labels | Receiving & Shipping | Asset Maint. | Suppliers | Logistics

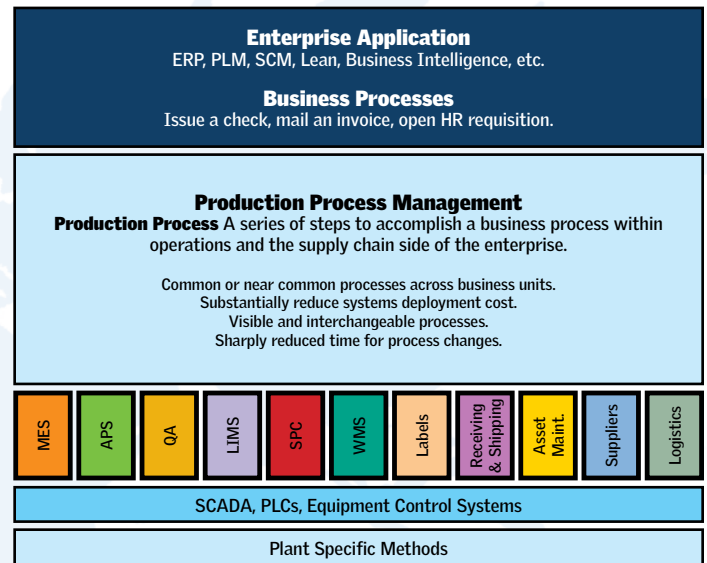SCADA, PLCs, Equipment Control Systems

Plant Specific Methods

Illustration 5 shows the same hierarchy except the integration layer has been replaced with a process layer. Instead of using software development tools to create and deploy new functions, process development modeling tools are used to collaboratively develop the process using standard modeling language BPMN 2.0. The modeled processes will be supported by data retrieved from the existing applications as part of the process execution functions.

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This brief overview of PPM is just a starting point. Call or visit our website to get more information and specifics on how processes can support your plant information technology objectives. Our website also has whitepapers on this and other process management subjects relating to manufacturing.

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Michael has over 30 years of experience serving and managing manufacturing enterprises. He has held a number of positions in general management, marketing, and engineering, including President and CEO for companies supplying capital equipment and material management systems. In addition to numerous articles and white papers on manufacturing systems, he has written two books: Applying Manufacturing Execution Systems, which defines and explains manufacturing execution systems and Collaborative Manufacturing: Using Real-time Information to Support the Supply Chain, the first definitive examination of collaborative manufacturing concepts. He is also a major contributor to a new book on business process management titled, In Search of BPM Excellence. Mr. McClellan has served over six years on the Manufacturing Enterprise Solutions Association (MESA) Board of Directors. He can be reached at mm@cosyninc.com.