Improved Connectivity Between the Shop Floor and the Enterprise with SAP xApp Manufacturing Integration and Intelligence (SAP xMII)

Stephen Cloughley
SAP Labs
Lighthammer’s Origin

Lighthammer was the recognized leader in enterprise manufacturing intelligence
- Founded in 1998
- Over 100 customers and 500 installations
- Annual growth in excess of 250% per year
Recognized leader in the emerging Enterprise Manufacturing Intelligence space (Manufacturing Intelligence)
Recognized leader in the emerging Enterprise Manufacturing Intelligence space (Manufacturing Intelligence)

The announcement by SAP that it acquired Lighthammer will gain big points with SAP users who’ve bought into the Adaptive Manufacturing vision. It’s a signal to the market that SAP clearly gets what’s needed to meet customers’ strategic goals for manufacturing.

**The Bottom Line:** This is a strategic acquisition that moves SAP one step further along the path toward its Adaptive Manufacturing vision by adding a much-needed conduit for the delivery of real-time, shop-floor information to SAP’s Manufacturing Dashboard for Plant Managers.”

- Alison Smith

“Lighthammer – SAP gets it,” June 23, 2005

The acquisition of Lighthammer exemplifies SAP’s commitment to helping customers increase business performance and reduce Total Cost of Information (TCO)
Global competitiveness is here, placing tremendous pressure on cost, quality, and responsiveness

- Production personnel lack the decision support information to meet their targets
- Manufacturing nodes are being pushed out to distant locations, leading to a loss of visibility and control
- Business and financial impact of production exceptions cannot be monitored or controlled at the enterprise level
- Plants use copies of master data, creating compliance and quality issues

Connecting the Factory to the Enterprise and Supply Chain is critical to deliver on customer expectations cost-effectively
Adaptive Manufacturing is the ability of a factory ...

- To profitably replenish a supply chain,
- While dynamically responding to unpredictable change

To become an Adaptive Manufacturer requires companies to achieve **Manufacturing Excellence and Manufacturing Synchronization**
Manufacturing Excellence — the ability to reliably produce to target with year-over-year improvements in cost, quality, and efficiency

Manufacturing Synchronization — electronically linking enterprise business processes with plant manufacturing processes and people to run from a “single version of the truth”

Manufacturing excellence and synchronization are the foundations of Adaptive Manufacturing
Adaptive Manufacturing Challenge — Synchronization

Disparate plant systems

- A typical manufacturing plant will have between 10 and 50 Shop Floor Automation (SFA) systems
- A multi-site manufacturer will have between 40 and 700 SFA systems across its enterprise
Adaptive Manufacturing Challenge — Systems

- Hundreds of unique systems
- Old (5-25 years)
- Frequently proprietary APIs
- Unstructured data
- Unusual data type
Adaptive Manufacturing Challenge — Data

- Unusual data types
- Unstructured
- Distributed context
- Alternate taxonomies
- High volume
What’s Needed to Achieve Adaptive Manufacturing?

**Manufacturing Integration:**
A manufacturing integration platform to synchronize manufacturing processes with enterprise and supply chain processes.

**Manufacturing Intelligence:**
Real-time actionable analytics and decision support for production personnel so they can deliver manufacturing excellence.

Manufacturing integration and intelligence functionality enable manufacturing synchronization and excellence.
Current State

Manufacturing Integration

“Less than 1% of respondents indicated that manufacturing data is automatically integrated with ERP with no manual intervention.”

Managing Automation and AMR Research September 2005, Customer Survey

Manufacturing Intelligence

“There are gaps in providing adequate visibility into manufacturing KPIs, Financial performance, and multi-site performance analysis.”

Managing Automation and AMR Research September 2005, Customer Survey
Why is Manufacturing Synchronization Critical?

Enterprise
ERp, SCM, PLM, SRM, CRM

DIRECTOR of CUSTOMER SERVICE
- Customer calls and cancels order!
- Investigates exception
- Learns re: M/C Issue 48 hrs. later!

PLANT MANAGER
- Learns about issue too late!
- No visibility into alternatives
- Decides to drive overtime next day
- Misses delivery due date!

PRODUCTION SUPERVISOR
- Is spare capacity available?
- Is overtime in the next shift needed? 5 hours go by

OPERATOR shuts down the M/C
- Calls maintenance
- Informs Production Supervisor 30 minutes later

DIRECTOR of CUSTOMER SERVICE

PLANT MANAGER

PRODUCTION SUPERVISOR

OPERATOR

Heterogeneous Plant Floor IT Infrastructure

Machine breaks down in the Production Line

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Why is Manufacturing Synchronization Critical? (cont.)

The disconnect between Manufacturing and Enterprise business processes inhibits LOB Managers and Production Personnel from a “Single Version of the Truth” and results in lower visibility and responsiveness.
Challenges to Delivering Manufacturing Excellence

Enterprise
ERP, SCM, PLM, CRM

VP of Supply Chain or Operations
- Can I fulfill an order profitably against current inventory?
- Which assets are currently available for a rush order?
- Which is the most efficient plant to produce this product?
- Which underperforming assets can we rationalize?

Plant Manager
- What is my actual cost of production vs. budget?
- What are my best and worst performing assets?
- What is my Overall Equipment Effectiveness (OEE)?
- How can I analyze, isolate, and improve on OEE variances?

Production Supervisor
- Which orders have been impacted by the asset failure?
- Which lines are currently available?
- Which line is the most efficient for this order?

Line or Machine Operator
- How am I performing against my production targets?
- How am I performing against my peers?
- How can I make more given pay-for-performance model?
Challenges to Delivering Manufacturing Excellence (cont.)

Can you afford anything less than the highest levels of performance from your production personnel, assets, and plants in today’s competitive environment?

Enterprise
ERP, SCM, PLM, CRM

• Which orders have been impacted by the asset failure?
• Which lines are currently available?
• Which line is the most efficient for this order?

DISCONNECT

Production Supervisor
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• Which lines are currently available?
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• Which underperforming assets can we rationalize?

Line or Machine Operator
• How am I performing against my production targets?

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What Capabilities Do Manufacturers Need to Be Adaptive?

To be adaptive, companies need capabilities for:

- **Manufacturing Operations:** An integrated ERP solution for managing manufacturing with workflows that enable closed-loop operations.

- **Manufacturing Integration:** A manufacturing integration platform to connect manufacturing processes with enterprise and supply chain processes.

- **Manufacturing Intelligence:** Real-time actionable analytics and decision support for production personnel so they can deliver on their performance goals.
To be adaptive, companies need capabilities for:

- **Manufacturing Operations**: An integrated ERP solution for managing manufacturing with workflows that enable closed-loop operations.

- **Manufacturing Integration**: A manufacturing integration platform to connect manufacturing processes with enterprise and supply chain processes.

- **Manufacturing Intelligence**: Real-time actionable analytics and decision support for production personnel so they can deliver on their performance goals.
The SAP xApp Manufacturing Integration and Intelligence (xMII) is a packaged composite application that delivers:

**Manufacturing Intelligence:** Real-time analytics engine that aggregates and delivers unified visualization of events, alerts, KPIs, and decision support to production personnel through role-based dashboards.

**Manufacturing Integration:** A single ISA-95-compliant layer enabling SAP ERP connectivity into real-time plant floor apps. (MES, SFA, legacy apps.) to drive plant-to-enterprise business process inter-operability.

MES – Manufacturing Execution Systems, EMI – Enterprise Manufacturing Intelligence, BW – Business Warehouse (from SAP), SFAC – Shop Floor Automation and Control
Typical xMII Applications

Adaptive Manufacturing

SAP Manufacturing Integration and Intelligence
“Enabling Excellence & Synchronization for Manufacturers”

- Performance Management
  - Dashboards
  - Metrics/OEE
- Continuous Improvement
  - Six sigma
  - Lean

SAP xMII

- Plant worker-to-Enterprise
  - S95/MFG Standards
  - Service-enable Plant Systems

Manufacturing Intelligence

Manufacturing Integration

SCADA/HMI Systems
DCS Systems
MES Systems
Custom Database
Plant Historians
SPC/QC Systems
Laboratory Systems
Maintenance Systems
Data Warehouses
SCM Systems
ERP Systems
Typical xMII Applications (cont.)

Adaptive Manufacturing

SAP Manufacturing Integration and Intelligence
“Enabling Excellence & Synchronization for Manufacturers”

Manufacturing Excellence

Manufacturing Synchronization
Core SAP xMII Functions/Services

MANUFACTURING INTELLIGENCE
- Visualization Services
  - Charts, grids, tickers, UI controls
  - Dashboard components
- Metrics/Alerts
  - KPIs and Alerts
- Analytic Services
  - SPC/SQC (Six Sigma) analyses
  - Statistical and other mathematical analyses

MANUFACTURING INTEGRATION
- Data Services
  - Bi-directional data access
  - Metadata browsing
  - XML-based data abstraction
  - Connectors to external systems
- Business Logic Services
  - Logic
  - Integration services
  - Notification services
  - Calculation and data transformation
  - MFG Standards implementations (S95)

Web Service Composition
- Service Enable Existing plant applications
- All functionality exposed as Web services
- Includes user-defined composite services
SAP xMII

Company

Plant

R/3, mySAP ERP, SAP NetWeaver®

SAP xMII

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SAP xMII (cont.)

Plants

Company

R/3, mySAP ERP, SAP NetWeaver®
SAP xMII

SAP xMII

SAP xMII

SAP xMII

SAP xMII

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Customer successes

What is xMII?

Manufacturing challenges

Wrap-up
Manufacturing Integration is the enabling technology for Manufacturing Synchronization.

It is the electronic linking of enterprise business processes and master data with plant personnel and processes to run from a “single version of the truth”
Manufacturing Integration Scenarios

Enterprise

SAP ERP, mySAP BusinessSuite

Other Enterprise Applications

Plant

H2A
Human-to-ERP Integration

AH2A
ERP-to-Human-to-Machine Integration

A2A
Legacy System Integration

A2A
Standards-based Transactional Integration

Enterprise

SCADA/HMI
Services

DCS
Systems

MES
Systems

Custom
Database

Plant
Historians

SPC/SQC
Systems

Laboratory
Systems

Maintenance
Systems
Manufacturing Integration

**Required functionality:**

- Plant system connectivity
- Data transformation and aggregation
- *Near* real-time performance
- Synchronous and asynchronous communication
- Small footprint, distributed, plant deployment
- Composite application
- Plant worker UI for customized delivery
H2A: Human-to-ERP
H2A: Confirm Operation (Replace CO11)
### Operations Overview

#### Daily Production Totals

<table>
<thead>
<tr>
<th>SKU</th>
<th>Product</th>
<th>Machine</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>704H2</td>
<td>Strawberry Kiwi</td>
<td>L1 Casepacker</td>
<td>157,080</td>
</tr>
<tr>
<td>704H2</td>
<td>Strawberry Kiwi</td>
<td>L1 Filler</td>
<td>212,514</td>
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<tr>
<td>704H2</td>
<td>Strawberry Kiwi</td>
<td>L1 Labeler</td>
<td>259,560</td>
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#### Production Totals By Shift

<table>
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<tr>
<th>Shift</th>
<th>SKU</th>
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<th>Output</th>
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<tr>
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<td>586</td>
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<td>704H2</td>
<td>L1 Casepacker</td>
<td>-29424</td>
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<tr>
<td>2</td>
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<td>3</td>
<td>704H2</td>
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#### In Production

<table>
<thead>
<tr>
<th>SKU</th>
<th>Product</th>
<th>Size</th>
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<tbody>
<tr>
<td>704H2</td>
<td>Strawberry Kiwi</td>
<td>70Km</td>
</tr>
</tbody>
</table>

### Production Metrics

- **OEE**: 69.38%
- **Stops**: 107.00
- **Breakdowns**: 16.00
- **MTBF**: 198.30
- **MTTR**: 5202.60
- **Scrap**: NA

### Equipment Status

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<tr>
<th>EquipmentName</th>
<th>StateName</th>
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<tr>
<td>L1 Labeler</td>
<td>Running</td>
</tr>
<tr>
<td>L1 Casepacker</td>
<td>ChangeOver</td>
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<tr>
<td>L1 Filler</td>
<td>Blocked</td>
</tr>
<tr>
<td>L1 Labeler</td>
<td>Clickable</td>
</tr>
</tbody>
</table>

#### OEE By Day - Last 10

- OEE Target
- OEE Avg
- OEE Actual

- Dates from 04/26/04 to 05/05/04
From Plant System
Record Measurement Points

Read Operating Hours:
- Read Operating Hours
- Hours: [blank]

Record Hours

Transaction Responses: Measurement Document 00000001007183

From Plant System

[Screenshot of SAP xMII Portal with a focus on the Record Measurement Points section]
A2A: SFA to ERP (Label Verification)
1. Look up customer PO from SAP and return SAP production order.

2. Find Batch(es) created to satisfy production order.

3. Get Historian and Laboratory Information Management System (LIMS) data for batches, run xMII Analytics.

4. If there is a Statistical Process Control (SPC) Alarm, it is a Batch production problem — provide aggregate view of LOTS and CUSTOMERS.

5. Email report to product manager, disposition to SAP QM, close record in QN System.
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xMII Customer Success Stories

- Whirlpool
- Dow Corning
Customer Success Story

Whirlpool

Driving Process Improvements Across Global Manufacturing Operations

Rui Fonseca
Director – Global Development – Manufacturing
Whirlpool Corporation

Presented at the SAP xMII User Group Conference,
October 2005
Overview:

- Founded in 1911
- World’s leading manufacturer and marketer of major home appliances
- Whirlpool, KitchenAid, Brastemp, Bauknecht, Consul, and other brands marketed in more than 170 countries
- Annual sales of US$13 billion
- 520 manufacturers and technology centers worldwide; 68,000 employees
- Standardized on SAP’s ERP
- SAP xMII in 15 plants worldwide

Key Challenges:

- Transactional integration of multiple MES, legacy, and shop floor systems on the plant floor with SAP’s ERP
- Extend SAP to production personnel and improve productivity/performance
- Improve information delivery and reporting to plant floor
- Drive continuous improvement programs
- Reduce defect/rework
Manufacturing Metrics

First Pass Yield — Data collected in real time at various points in the assembly process.

Downtime Tracking — Captured by category and used for OEE calculation.
Global Metrics — Captured manually across all regions and summarized at a global level. Metric above the chart drives the chart view.

OEE — Waterfall chart of performance losses for a particular machine against 100% OEE
Real-Time Data

Connected to Foam Chemical Tanks PLC — Used by Materials and Procurement as an alert for order points. Shop Floor technicians use it to know when mix is ready and when to unload rail tankers — replaced Excel spreadsheets, manually reading gauges, and many phone calls.
PM — Selecting SAP Inventory

Search for Material — List Display by Number or Description

Result Screen — Displays information from Material Master in addition to the current balance. This use of the xMII tools provides a more controlled user experience in a Web browser instead of having people log into SAP and go to multiple screens for the same information.
PM — SAP Work Order View

Work Order (WO) View — SAP ERP display of work order created through the SAP xMII interface!

Add to Cart — Once a WO exists, the material can be added to a shopping cart for that WO
## Plant to ERP — Production Operations

### Interactive Work Center

Schedule: Production Schedule updated every 30 minutes

### Production & Repetitive Manufacturing Orders

<table>
<thead>
<tr>
<th>Order Number</th>
<th>Order Type</th>
<th>Material Number</th>
<th>All BOM</th>
<th>Production Type</th>
<th>Line</th>
<th>Start Date</th>
<th>Remaining Quantity</th>
<th>Confirmed Qty</th>
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</table>

Double-clicking on a production order provides the confirmation screen to enter new production.
Administration and Startup — the backup solution uses a standalone database along with SAP xMII to perform and capture transaction data. Once SAP ERP is up and running, SAP xMII performs all transactions based on the database entries.
Whirlpool — Driving Improvement Across Global Manufacturing Operations

Value from the SAP (ERP and SAP xMII) Solution:

- Manufacturing Performance applications delivered with SAP xMII across North America in weeks

- Quality improvements recognized immediately through reduced defects and rework

- Plant-to-plant comparisons via SAP xMII available for management in consistent format

- Accelerated containment of quality issues before shipping

- Value of SAP’s ERP extended with SAP xMII, without incremental training of plant floor personnel
Whirlpool — Driving Improvement Across Global Manufacturing Operations (cont.)

Value from the SAP (ERP and SAP xMII) Solution:

■ Manufacturing Performance applications delivered with SAP xMII across North America in weeks

■ Quality improvements recognized immediately through reduced defects and rework

"Lighthammer (now SAP xMII) is the only solution we have found that is robust enough to address manufacturing performance applications driving operational excellence across our 30+ plants worldwide, as well as provide the transactional integration with SAP ERP."

- Jim Shimp, Senior Director, Global Apps. Development, Whirlpool

■ Value of SAP’s ERP extended with SAP xMII, without incremental training of plant floor personnel
Customer Success Story

Dow Corning

Realizing the Adaptive Manufacturing Vision at Dow Corning

Keith Carey
Enterprise Architect, Dow Corning

Presented at the SAP xMII User Group Conference, October 2005
Dow Corning — Adapting Manufacturing Vision

Business Overview
- Joint venture between Corning and the Dow Chemical company
- Serving the diverse needs of more than 25,000 customers worldwide
- Offering more than 7,000 products and services
- 8,200 employees across 33 manufacturing sites

Strategic and Tactical Goals
- Increase revenues and customer satisfaction with better responsiveness and delivery performance
- Reduce response time to customer enquiries from days to hours

Key Challenges
- Customer demand for superior delivery and responsiveness
- Right-time information delivery to employees
- Shop floor-to-enterprise process integration

SAP Solution
- SAP R/3 4.7
- SAP NetWeaver
- SAP Manufacturing Intelligence dashboards
- SAP xMII (Lighthammer)
Quick Glimpse: HSC xMII Projects
Information Navigation at HSC: A Step Change in Productivity

“The two-fold purpose for information delivery is to:

1) Provide a step change in our ability to monitor and improve work and manufacturing processes
2) Improve stability and root cause analysis, and provide step change improvements in quality and cost reduction.”

– Arv Arvidson, Technology Consultant/Project Leader
## Current Breadth of HSC SAP xMII Applications

<table>
<thead>
<tr>
<th>Decomp</th>
<th>Finishing</th>
<th>Testing</th>
</tr>
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<tbody>
<tr>
<td>■ Production Summary</td>
<td>■ Production Summary</td>
<td>■ Acid Blank Comparison</td>
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<tr>
<td>■ Bulk Purity SPC</td>
<td>■ S-22 FRS Batch Report</td>
<td>■ Acid Blank SPC</td>
</tr>
<tr>
<td>■ Reactor/Site Dashboards</td>
<td>■ Fluid Sample List and SPC</td>
<td>■ Sample Search/Results</td>
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<tr>
<td>■ Batch Report</td>
<td>■ Surface Metals List and SPC</td>
<td>■ Electrical Purity by Zoner</td>
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<td>■ Run Parameter SPC</td>
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<td>■ Reactor PI Trends</td>
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<tr>
<td>■ SAP Material Tracking</td>
<td>■ Carbon End Loss</td>
<td></td>
</tr>
<tr>
<td>■ SAP Process Order Display</td>
<td>■ Etch Depth Entry and SPC</td>
<td></td>
</tr>
<tr>
<td>■ Batch Sales</td>
<td>■ Particle Count Entry and SPC</td>
<td></td>
</tr>
</tbody>
</table>

### Intermediates
- ■ Chemical Sample SPC
- ■ EPI SPC
- ■ Susceptor Tracking
- ■ Online GC Analyzers
- ■ DCS/TCS Sales SPC
Dow Corning Realizing the Adaptive Manufacturing Vision with SAP xMII

**Value from the Solution:**

- Response time to customer enquiries slashed from *days to one to two hours*

- Better product quality and delivery performance

- **Higher Employee Productivity** from more accurate, right-time information accessibility to needed content and applications
  - *Hours/month impact for employees equates to millions of dollars*

- Higher customer satisfaction and higher sales conversion rates on the Web

- Estimated development costs *(TCO)* reduced by three to four times using SAP NetWeaver®
Value from the Solution:

- Response time to customer enquiries slashed from days to one to two hours

- Better product quality and delivery performance

SAP’s xApp MII and the dashboards provide the top-level KPI data and the drill downs to the production data for alerts and workflows.

Accountability has become much more realistic. Individuals with objectives to improve performance are now aware of and sensitized to that performance on a day-in and day-out basis.”

Kirk Royster, Global Enterprise Architecture Manager
Quoted in “Dashboards Drive Improved Performance at Dow Corning,” Automation World, January 2005

- Estimated development costs (TCO) reduced by three to four times using SAP NetWeaver
Manufacturing challenges

What is xMII?

Customer successes

Wrap-up
## The Business Case for Manufacturing Intelligence

### Tangible Benefits*

<table>
<thead>
<tr>
<th>Impact</th>
<th>Revenue</th>
<th>Operating cost</th>
<th>Working capital</th>
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</thead>
<tbody>
<tr>
<td>2-3%</td>
<td>Chemical MFG – Increased Revenue through enhanced customer service</td>
<td>Chemical MFG – Improved Material Conversion Rates $2.5M/site</td>
<td>CP MFG – Increased Asset Utilization $80M</td>
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<tr>
<td>$3M/site</td>
<td>CP MFG – Reduced material costs</td>
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<tr>
<td>$1M/site</td>
<td>Discrete MFG – Increased First Pass Yield</td>
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</table>

*Examples from survey of existing xMII Customers*
EMI is the rare low-risk, high-reward project. It can be installed without risk to your existing operational systems like Enterprise Resource Planning (ERP), Manufacturing Execution System (MES), and Controls, but generates short-term payback and sets the stage for long-term benefits.

Large-scale producers showed payback in six months on the average, with benefits cascading over time to result in larger accrued returns.

One manufacturer projected an accrued three-year return of $20M, based on the performance improvement achieved in its pilot project from a $1M investment in EMI software.”

December 31, 2003
Bill Swanton and Alison Smith

* Examples from survey of existing xMII Customers
Quantifiable Value of Integration

Potential cost savings

<table>
<thead>
<tr>
<th>Comprehensive enterprise-wide manufacturing solution requirements</th>
<th>With SAP solution</th>
<th>With a non-integrated competitor solution</th>
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<tbody>
<tr>
<td>Number of interfaces to SAP components*</td>
<td>None</td>
<td>50–100</td>
</tr>
<tr>
<td>Estimated cost ($16-32k per interface)</td>
<td>$ 0</td>
<td>$2.2M – $4.4M</td>
</tr>
<tr>
<td>Estimated on-going support costs ($4K-$8K per interface per year)</td>
<td>$ 0</td>
<td>$.56M – $1.12M</td>
</tr>
<tr>
<td>Five years cumulative integration costs</td>
<td>$ 0</td>
<td>$5M – $10M</td>
</tr>
</tbody>
</table>

* Recognizing that each instance of a component will be a separate, yet similar interface

Based on customer experience and benchmarking estimates, the five-year cost is typically $5 million (above estimate is therefore conservative and achievable)
Quantifiable Value of Integration (cont.)

Potential cost savings

<table>
<thead>
<tr>
<th>Comprehensive enterprise-wide manufacturing solution requirements</th>
<th>With SAP solution</th>
<th>With a non-integrated competitor solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of interfaces to SAP components*</td>
<td>None</td>
<td>50-100</td>
</tr>
<tr>
<td>Estimated five years cumulative integration costs</td>
<td>$560 M - $1,120M</td>
<td></td>
</tr>
<tr>
<td>Estimated full cost ($4K-$8K per interface per year)</td>
<td>$2,200 M - $4,400M</td>
<td></td>
</tr>
<tr>
<td>Five-year TCO</td>
<td>$150 M - $300M</td>
<td></td>
</tr>
</tbody>
</table>

Typical Customer Benefits delivered:
- Five-year TCO reduced by $200K-$500K/Plant
- Time-to-value typically between 60-120 days

* Recognizing that each instance of a component will be a separate, yet similar interface

Based on customer experience and benchmarking estimates, the five-year cost is typically $5 million (above estimate is therefore conservative and achievable)
Key Takeaways

- **Whirlpool**
  - Rapid deployment model
  - Undisturbed ERP landscape that is tightly integrated to the manufacturing environment
  - 20 times the ROI in the first two years

- **Dow Corning**
  - Significant breadth of applications deployed
  - Deep integration of manufacturing and business data delivered directly to users at all levels
  - Significant direct business value driven by visibility
Identify one that can deliver:

- **Manufacturing Synchronization**: A single-layer of pre-built connectivity to multiple manufacturing applications to synchronize real-time manufacturing and enterprise business processes at a lower Total Cost of Ownership (TCO)

- **Manufacturing Excellence**: Unified, real-time analytics and decision support to enable production personnel to monitor, measure, analyze, and control KPIs for higher productivity and performance
True Manufacturing Performance Management (MPM) delivers:

- **Manufacturing Integration** — A single-layer of pre-built connectivity to multiple manufacturing applications to integrate real-time manufacturing and enterprise business processes for exception-based management.

- **Manufacturing Intelligence** — Unified, real-time analytics and decision support for production personnel to enable them to monitor, measure, analyze, and control KPIs for higher productivity and performance.

The right choice enables manufacturers to become adaptive and to deliver superior manufacturing performance.
SAP xMII Resources

SAP xMII Web page on sap.com:
- www.sap.com/solutions/xApps/xMII/index.epx

SAP xMII Web seminar archived on Managing Automation Web site for access on demand:
- www.managingautomation.com/maonline/research/webcast/view/5111809
7 Key Points to Take Home

Become adaptive or become extinct
- Profitability in the Supply Chain – develop a true end-to-end strategy
- Dynamic Response to Unpredictable Demand – you can’t improve what you can’t see

Leverage your existing data
- Most organizations have all the Shop Floor Data they need to get started
- Rip-and-Replace creates significant risk, and can be costly in time and dollars

Leverage your existing systems
- Data replication is unnecessary and compounds accuracy and synchronization problems
- It’s difficult to be adaptive when you have to wait for the next Batch Update

Plants function differently than the enterprise
- Business Processes need to be targeted and simplified for use by Front-Line Personnel
- The granularity of Enterprise Data is insufficient to support the needs of the Manufacturing Improvement Teams
It’s hard to provide all the answers until you know all the questions
  - Be careful not to implement technologies that cement bad behavior
  - Ensure composites can evolve as your organization becomes adaptive and identifies new opportunities

Time-to-value is critical!
  - Rapid Prototyping and Speed in Deployment are critical to Maintaining Momentum
  - While ROI this year is good, ROI this Quarter is better

Get started
  - When you understand the impact of becoming an Adaptive Manufacturer, you will understand why delay can be so costly!