From CMMS To EAM and Beyond
With OpenO&M™ Information Standards and SAP

Bridging The Vision Gap With Standards-Based Interoperability
August 23, 2005

Alan T, Johnston
MIMOSA
President

Mark Pyatt
SAP
Director, Strategy & Cross-Industry Solutions
Agenda

• Introductory Remarks – Alan Johnston
• Introduction of SAP Standards-Based Interoperability Model and Business Plan – Mark Pyatt
• Industry Situation Analysis – Alan Johnston
• OpenO&M™ Initiative Summary – Alan Johnston
• The industry need for standards-based interoperability – Alan Johnston
• SAP’s new collaborative approach to EAM and Condition Based Operations (CBO) – Mark Pyatt
• Plan for joint support of standards-based interoperability using SAP infrastructure tools – Joint
  – Integration Scenarios
  – Collaborative effort between SAP and OpenO&M Initiative
  – Follow-up presentation in late September or early October
  – Maintenance and Reliability Industry Focused Joint Rollout Planned for International Maintenance Conference December 6-9 Tampa, Florida
SAP’s New Ecosystem: Industry Value Networks

Industry Value Networks focus:
- Collective innovation
- Customer driven
- High Value business process

Industry Advisory Boards
- Customers
- Partners
- SAP
- Analysts

Enterprise Services

Customer as Co-Innovator

SI Thought Leadership

Industry Solutions
- SAP
- Manufacturing Industries
- Financial Services
- Public Services
- Trading & Service Industries
- Cross Industry Solutions

ISV Solution

Ecosystem Services Application (ESA)

Powered by SAP NetWeaver™
SAP Establishing Industry Value Networks

- **High Value Customer**
  - Needs shared by SAP
  - Partners and customers "compose" innovative business solutions

- **Collective Innovation**
  - Develop business packages complementary to SAP
  - Align with SAP Industry Value Network and solutions
  - Leverage industry knowledge and core competencies

- **Business Development**
  - Participation in SAP’s Industry Value Network and other events
    - SAP helps create market momentum
  - ISV partner solutions are critical to success of Business Process Platform

Copyright 2005 SAP
Industry Standards Enable Business Change

Industry Standards and Enterprise Services Architecture (ESA) support the company’s ability to change and grow.

- Enhances productivity through standardization and keeping control of business processes, while performing non-strategic tasks
- Drives differentiation by designing new business processes based upon standards using existing infrastructure and leveraging existing functionality
- Provides high flexibility for managing and adapting processes in time, to keep up with the pace of business change

Industry Standards drive process automation and management by exception.....one step closer to real-time business
SAP Supports Industry Standards

- Industries SAP is involved in standards development and pilots:
  - High Tech
  - Chemical
  - Agrichemical
  - Oil and Gas
  - Automotive
  - Aerospace and Defense
  - Consumer Products
  - Mill Products
  - Financial
  - Banking
  - Insurance
  - United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)

Copyright 2005 SAP
Situation Analysis

• We have a major vision gap between the original vision of EAM and most currently available maintenance and reliability information systems.
  – We are still selling, buying and implementing CMMS and calling it EAM
  – Most organizations are still not fully utilizing CMMS capabilities delivered in the 1980s
• Most senior executives are focused on improving overall operations performance, not maintenance & reliability
• By endorsing and leveraging the industry-driven OpenO&M™ information standards in their new standards-based interoperability initiative, SAP is now in a much better position to address industry needs in a win/win/win fashion for themselves, collaborative partners and end-users.
• The objective is to create standard industry-driven reference models based on the appropriate use of open information standards provided by organizations that are participating in the OpenO&M™ Initiative
What Is The OpenO&M™ Initiative?

• An initiative of multiple industry standards organizations collaborating to provide a harmonized set of information standards for the exchange of Operations & Maintenance (O&M) information

• The OpenO&M Initiative is an open, collaborative, effort - Other interested organizations are encouraged to participate

• Industry-focused Joint Working Groups (JWG) provide a common face for multiple standards applicable within an industry or industry facet
  ✓ OpenO&M Manufacturing Joint Working Group
  ❖ OpenO&M Military Joint Working Group
    – OpenO&M Facilities Joint Working Group

• The industry focused JWGs gain key synergies with each other by supporting a common set of harmonized standards for core asset and functional segment modeling and tracing
Participating Standards Organizational Model

OpenO&M™ Initiative
Joint Working Groups

OpenO&M™ MFG JWG
ISA-95, ISA-99 WBF

Life-cycle
MGT
NIBS

OpenO&M™ Facilities JWG
NIBS FMOC

OpenO&M™ Military JWG
US Army
US Navy

Copyright 2005 MIMOSA
Manufacturing JWG Standards Map

**OpenO&M** – Joint work by MIMOSA, OPC & ISA-95 to integrate operations and maintenance information

**ISA Standards**
- **ISA-95** – Enterprise/Control System Interface Standard, Parts 3 & 4 define MES Functions
- **ISA-99** – Control System Cyber-Security Standard
- **OMAC** – Open Modular Architecture Controls group standardizing packaging machinery interfaces

**WBF**
- **BatchML** – XML Schemas based on ISA-88
- **B2MML** – XML Schemas based on ISA-95

**OPC** – DCOM and XML interfaces. New Web Services Unified Architecture (UA) under development

**MIMOSA** – Asset Mgt and Maintenance Mgt Schema, Meta Data and Interfaces

---

Copyright 2005 MIMOSA
OpenO&M™ Operation

• A virtual organization
  – Maintained by MIMOSA
  – No dues, participants volunteer from member groups

• Umbrella organization
  – Forum for collaboration

• OpenO&M does not dictate work or content of member groups standards

• OpenO&M issues whitepapers addressing standards related benefits of industry interest
**Computerized Asset Management Information Systems**  
(Maintenance, Reliability & Condition-based Operations)

**Condition Based Operations (CBO) Characteristics**

**Main Objective:** Optimize Overall Operations

**General Features:**
- Enterprise Operations and Maintenance Orientation
- Operations Optimization Leverages All Maintenance & Reliability Information
- Decision Support To Optimize organizational **Net Present Value**
- May Include Non-Financial Metrics (Balanced Scorecard)

**Required Application Capabilities:**
- CMMS + Delivered EAM Extensions
- Reliability Management
- Condition Based Maintenance
- Capabilities Management
- Operations Requirements Forecasting
- Operations Planning & Scheduling Integration
- Outage Management & Dispatch Management

---

Copyright 2005 MIMOSA
Problem
The Information Gap Between Platforms and ERP

Enterprise Business Systems - Transaction Processing
Enterprise Resource Planning (ERP)

Computerized Maintenance Management System

Technical Information Management Applications
Near Real-time

Information Gap

Condition Management

Physical Asset Control - Real-time Systems
Potential Solution 1 (The Old Way) Proprietary Point-To-Point Integration

Enterprise Business Systems- Transaction Processing ERP

Characteristics

• Classic spaghetti bowl of point-to-point interfaces
• Difficult & expensive to maintain
• High switching cost for various applications
• Typically breaks down into silos and rice bowls
• Innovation is constrained
• Limits ability to transform

Physical Asset Control- Real-time Systems
Potential Solution 2
Use A Proprietary All-To-All Integration Framework

Enterprise Business Systems - Transaction Processing
Enterprise Resource Planning (ERP)

Characteristics
• Difficult & expensive to maintain (somebody must pay to maintain all of the proprietary interfaces)
• May still have high switching cost based on limited interfaces
• Integration Framework Vendor constrains your choice of complementary applications
• Innovation is constrained
• Limits ability to transform
Solution 3
Open Standards-based Interoperability Fills The Gap

Enterprise Business Systems- Transaction Processing ERP
   SAP ERP

Enterprise Infrastructure Toolset (s)
   SAP NetWeaver
   XI

Infrastructure Toolset Implementing Open Standards (XML, OpenO&M™)

Many Interoperable, 3rd Party, Open Standards- Based Applications

Control Systems & Platforms Implementing Open Standards
   (XML, OpenO&M™)

Physical Asset Control- Real-time Systems

Copyright 2005 MIMOSA
MIMOSA Collaboration For OpenO&M™

+ OpenO&M™ Manufacturing JWG: OPC, ISA-95, WBF/B2MML …
+ OpenO&M™ Facilities JWG: NIBS FMOC
+ OpenO&M™ Military JWG: U.S. Army and U.S. Navy
+ MIMOSA Center of Excellence: U.S. Army SED
+ SMRP: Mapping MIMOSA Stds To SMRP Body of Knowledge
+ ISO STD 13374: TC108/SC 5 - Condition Monitoring & Diagnostics- MIMOSA is the Informative Reference

Technical Committee 108 Sub-Committee 5

Accredited Standards Committee S2

Copyright 2005 MIMOSA and SAP
ISO 13374 Standard

Machine Condition Assessment Data Processing & Information Flow Blocks
1. Capital Projects
   - Investments in new facilities and large capital projects.
   - Large Shutdown and Turnaround Projects.

2. Maintenance Management
   - Request tracking and approval
   - Effective work order management
   - Planning and Scheduling

3. Inventory and Spare Parts Management
   - Materials Requirements planning
   - Scheduling and kitting of spare parts.
   - Refurbishment of spares
   - E-Procurement and web-based catalogs
   - Strong integration with procurement

4. Reliability
   - Preventive and Predictive Maintenance
   - Support RCM
   - Communication with Process Control Systems

5. Asset Performance Management
   - Operational and Financial analytics.
   - Detailed structure of assets
   - Documentation and content management
   - Business intelligence
How does SAP xMII synchronize Manufacturing Operations with the Enterprise thru Manufacturing Integration?

- SAP xMII enables real-time transactional integration between plant floor and enterprise (SAP ERP) systems out-of-the-box thru:
  - Universal Connectivity to the data, functionality and processes of existing plant floor systems
  - Business Logic for creating automated events, KPIs and alerts
  - Workflow to synchronize plant and Enterprise business processes
  - Built in OpenO&M™ messages and schema to make legacy systems interoperable

• Key Customer Benefits:
  - Automated synchronization of orders, materials, maintenance and quality between plant and ERP – *a “single version of the truth”*
  - Real-time detection and automated resolution of manufacturing exceptions

• Bottom Line: Faster time-to-value and lower TCO
Typical Integration Scenario A

3rd Party Condition Monitoring SAP Integration

Enterprise Business Systems - Transaction Processing ERP

SAP ERP

SAP
NetWeaver & XI
Infrastructure

Integration Repository

OpenO&M™ (MIMOSA)

PM  PLM  SM

Business Process Engine
Integration Server
Integration Engine
Adapter Engine

MIMOSA XML Messages

CM

Control Systems & Platforms Implementing

Open Standards (XML, OpenO&M™)

Physical Asset Control - Real-time Systems

Copyright 2005 MIMOSA and SAP
Typical Integration Scenario B
3rd Party Condition Monitoring & Reliability Management SAP Integration

Enterprise Business Systems- Transaction Processing ERP

SAP ERP

SAP
NetWeaver & XI
Infrastructure

Integration Repository

OpenO&M™ (MIMOSA)

Control Systems & Platforms Implementing
Open Standards (XML, OpenO&M™)

Physical Asset Control- Real-time Systems

Copyright 2005 MIMOSA and SAP
OpenO&M™ Interoperability Demonstration
IMC 2004

Open Operations

Operations

Human Machine Interface

HMI

OpenO&M™

ODH

Operational Data Historian

ICDM

Instrumentation & Control Device Management

Motor-driven Pump

Open Maintenance

Enterprise Resource Planning

Asset Lifecycle Information

EAM

Enterprise Asset Management

Maintenance & Reliability Browser

MRB

DSS

Integrated Asset Health Decision Support System

Copyright 2005 MIMOSA
OpenO&M™ Interoperability Demonstration Participants
International Maintenance Conference – 12/3/04

ALM
Asset Lifecycle Mgmt & Universal ID

CM
Condition Monitoring

ODH
Operational Data Historian

HMI
Human-Machine Interface

ICDM
Instrumentation & Control Device Management

DSS
Decision Support System

EAM
Enterprise Asset Management / CMMS

MRB
Maintenance & Reliability Browser

OpenO&M MFG JWG

ALM
Indus, IFS, Synergen

CM
3eTI

ICDM
Iconics, Rockwell, Yokogawa

HMI
Aspen Tech, Matrikon, Yokogawa

ODH
DEI, Ivara, PdMA

DSS
DEI, Ivara, PdMA

MRB
ESRG, DEI

Copyright 2005 MIMOSA
OpenO&M™ Key Future Opportunities To Participate

✓ MIMOSA Technical Committee Meeting
  ✓ Vancouver, BC
  ✓ August 22-24

❖ Collaboration between OpenO&M Initiative Participants and SAP
  ❖ Ongoing
    ❖ Teaming effort to further define exact integration process
    ❖ Institutionally supported by OpenO&M Initiative participating standards organizations
    ❖ Other participants are welcomed

• 2005 ISA EXPO – October 25-27, Chicago
• 2005 IMC – Dec 6-9 - Tampa, Florida
  – Industry focused joint rollout of standards-based interoperability - OpenO&M and SAP
  – 2005 OpenO&M Interoperability Demo
  – Extended with NIBS Life-Cycle Management

• 2006 ARC Winter Forum
• 2006 National Manufacturing Week – March 20-24
• 2006 MARTS – May 22-25, Chicago (Rosemount)
  – OpenO&M Week Co-location
Property Rights

• All marks are the property of their respective owners