

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



Copyright 2005 MIMOSA and SAP

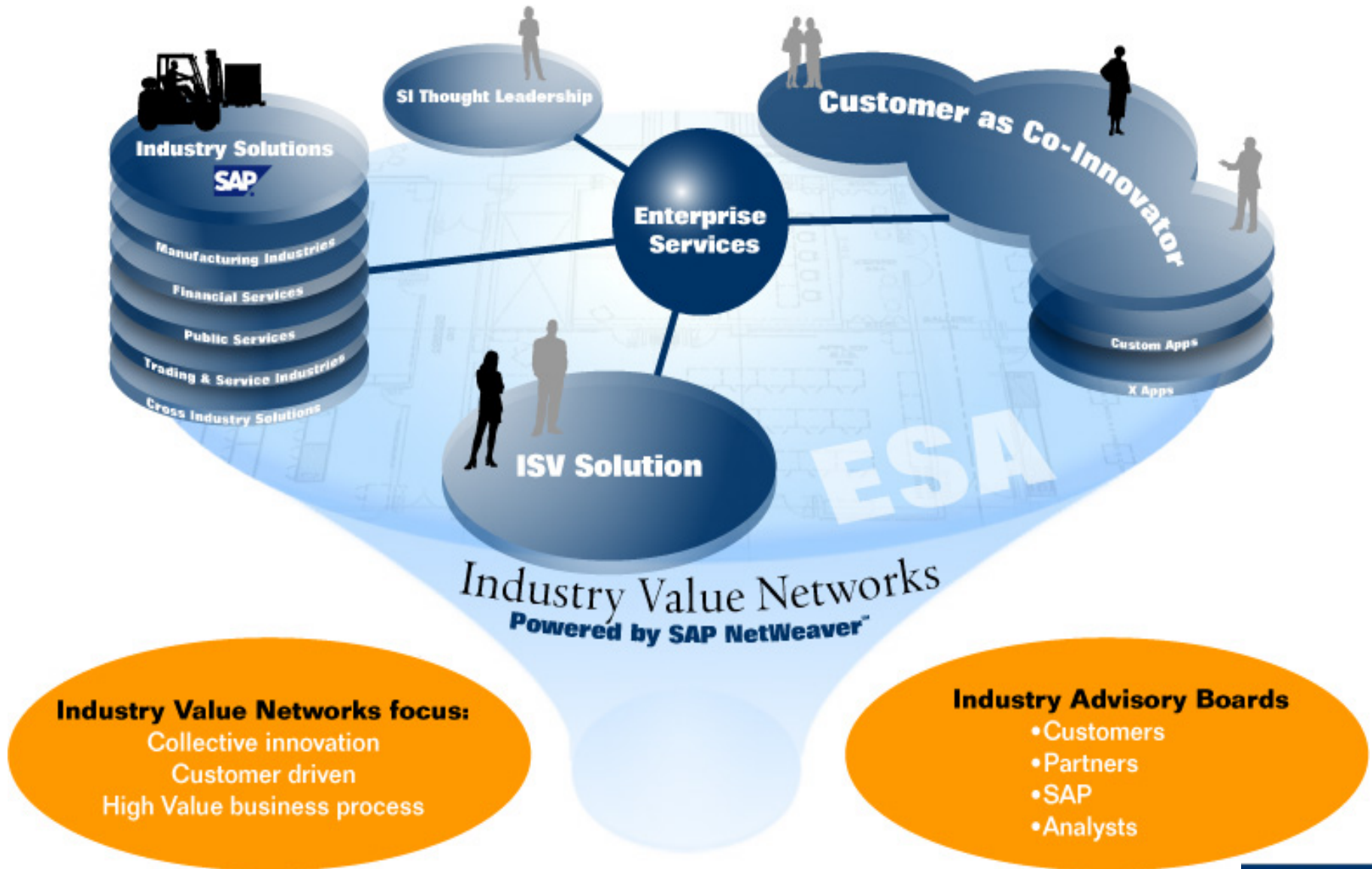


Agenda

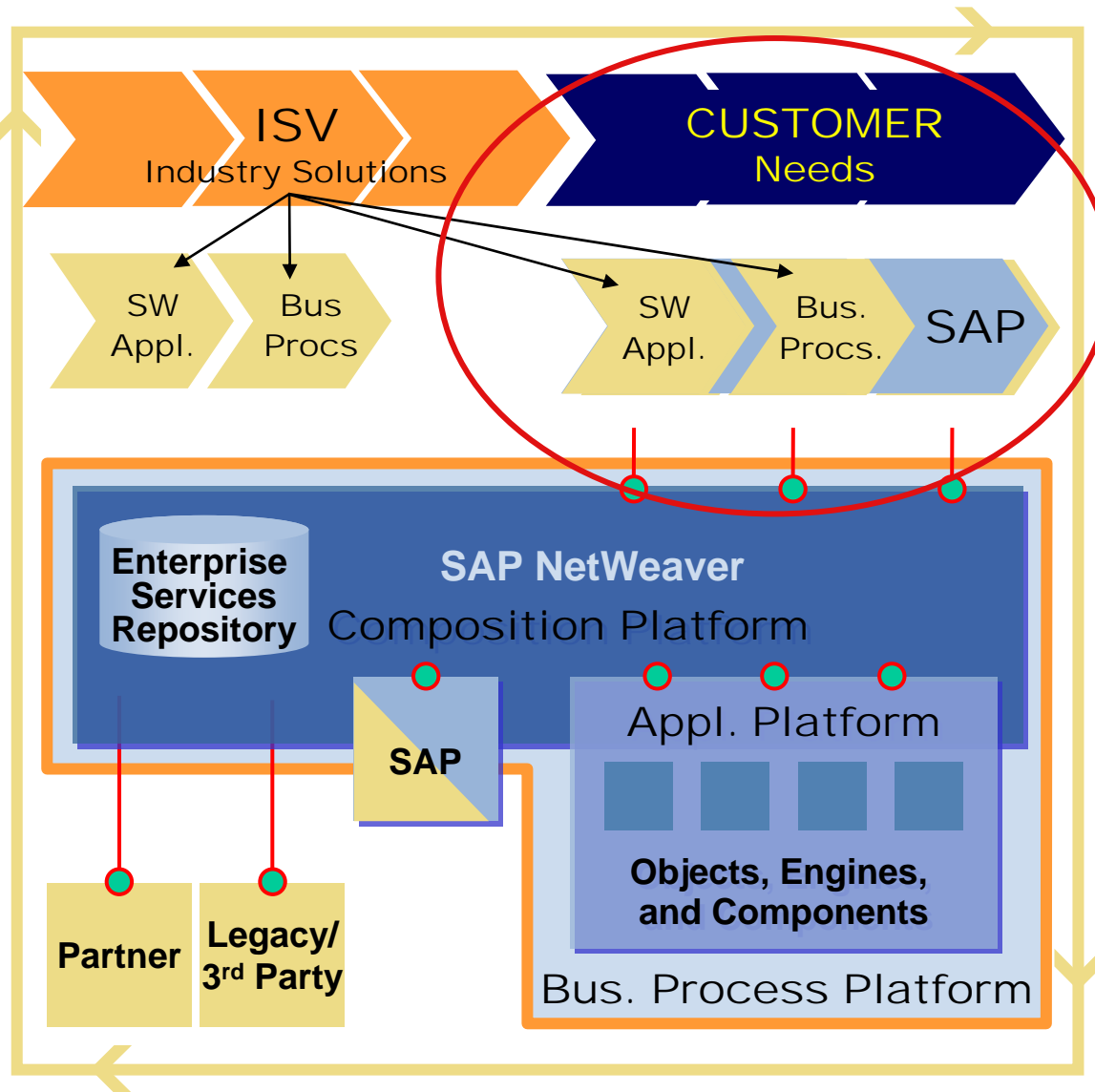
- Introductory Remarks – Alan Johnston
- Introduction of SAP Standards-Based Interoperability Model and Business Plan – Mark Pyatt
- Industry Situation Analysis – Alan Johnston
- OpenO&M™ Initiative Summary – Alan Johnston
- The industry need for standards-based interoperability – Alan Johnston
- SAP's 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



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



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)



UN/CEFACT



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

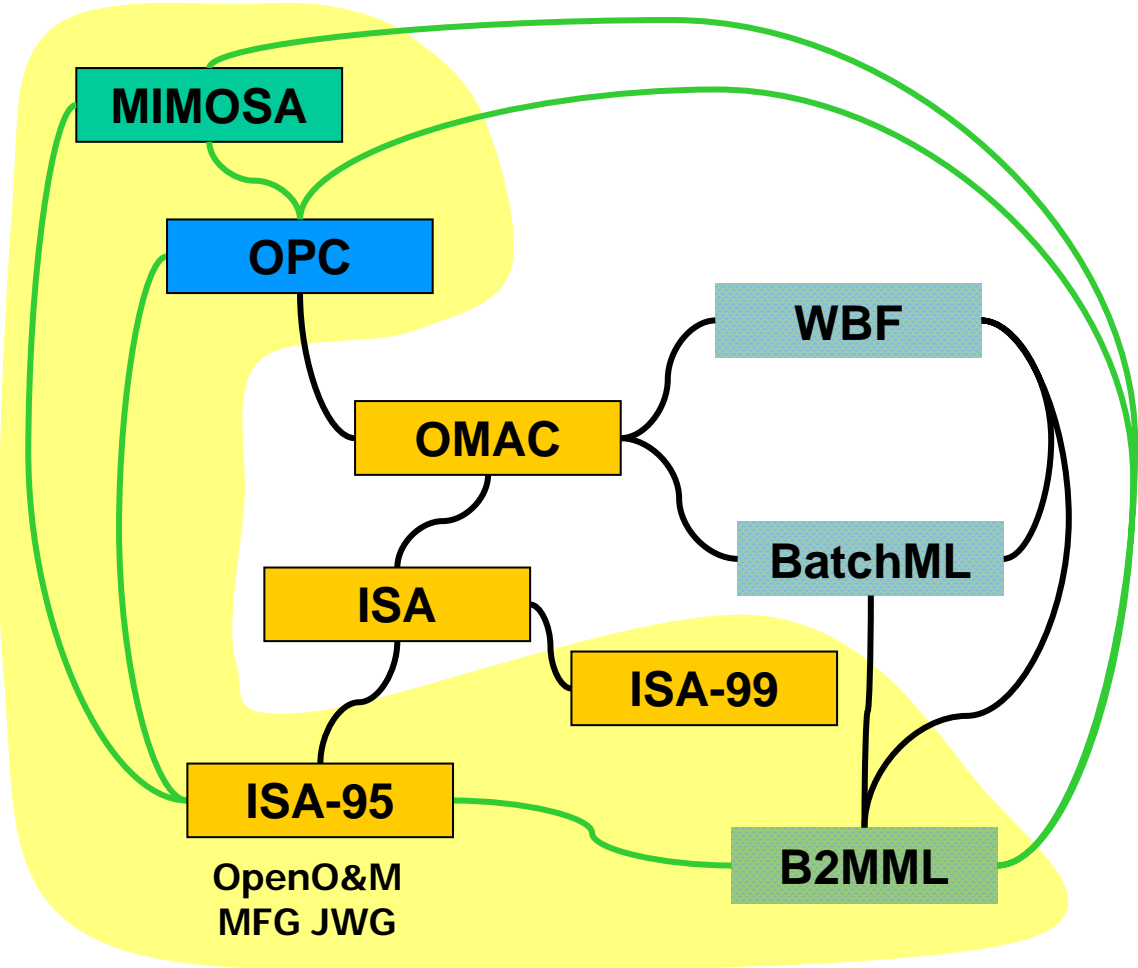
Life-cycle
MGT
NIBS

OpenO&M™
Facilities JWG
NIBS FMOC

OpenO&M™
Military JWG
US Army
US Navy



Manufacturing JWG Standards Map



— Relationship
 — OpenO&M Relationship

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

WBFB

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



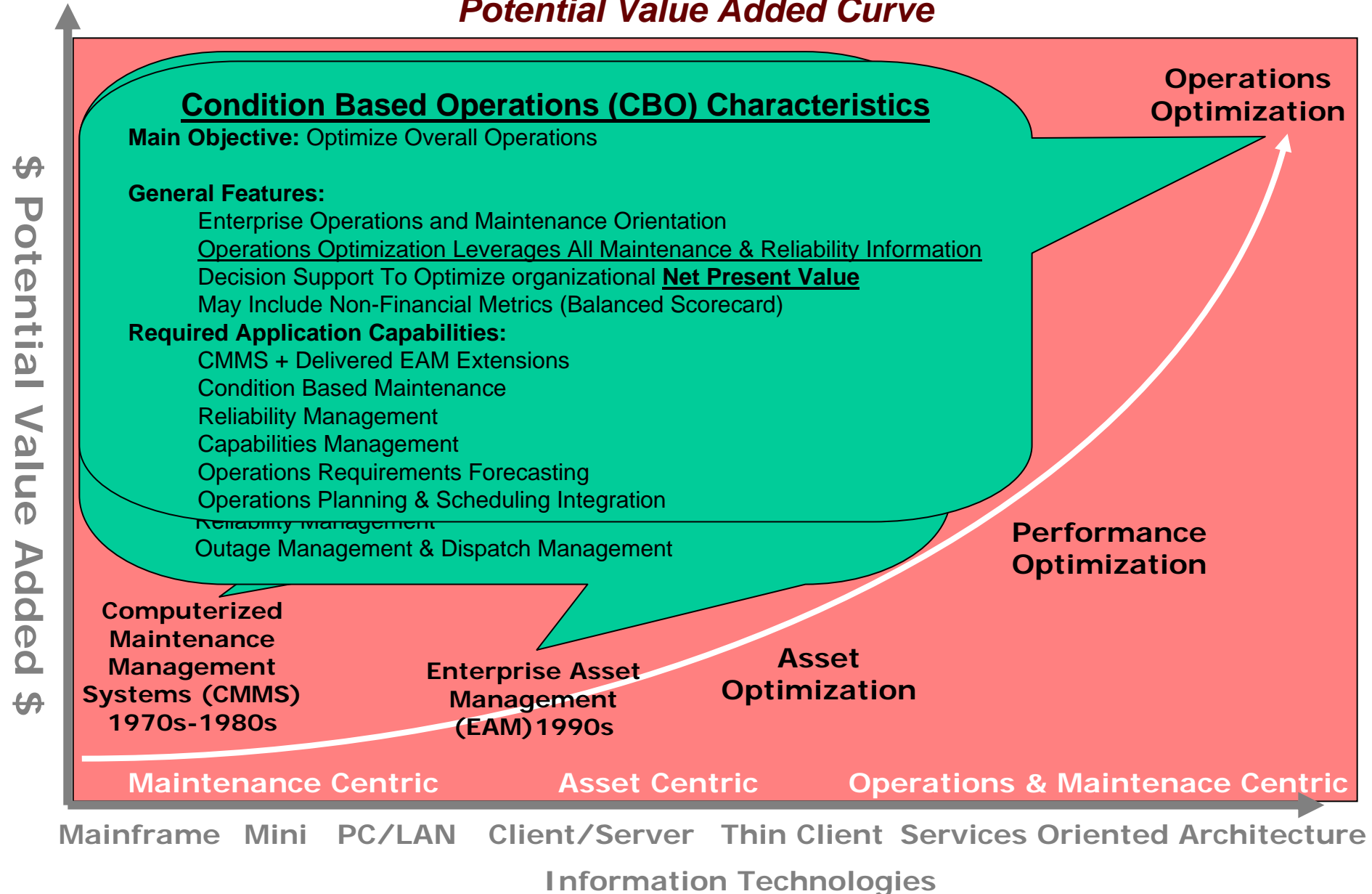
OpenO&M™ Operation

- 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)

Potential Value Added Curve

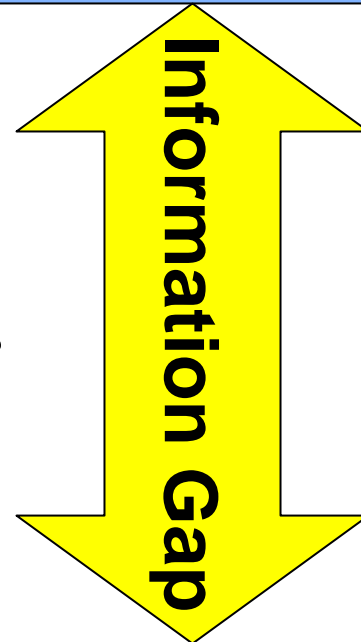


Problem

The Information Gap Between Platforms and ERP

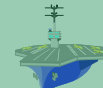
Enterprise Business Systems- Transaction Processing
Enterprise Resource Planning (ERP)

Computerized Maintenance Management System



Technical Information
Management Applications
Near Real-time

Condition Management



Physical Asset Control-Real-time Systems

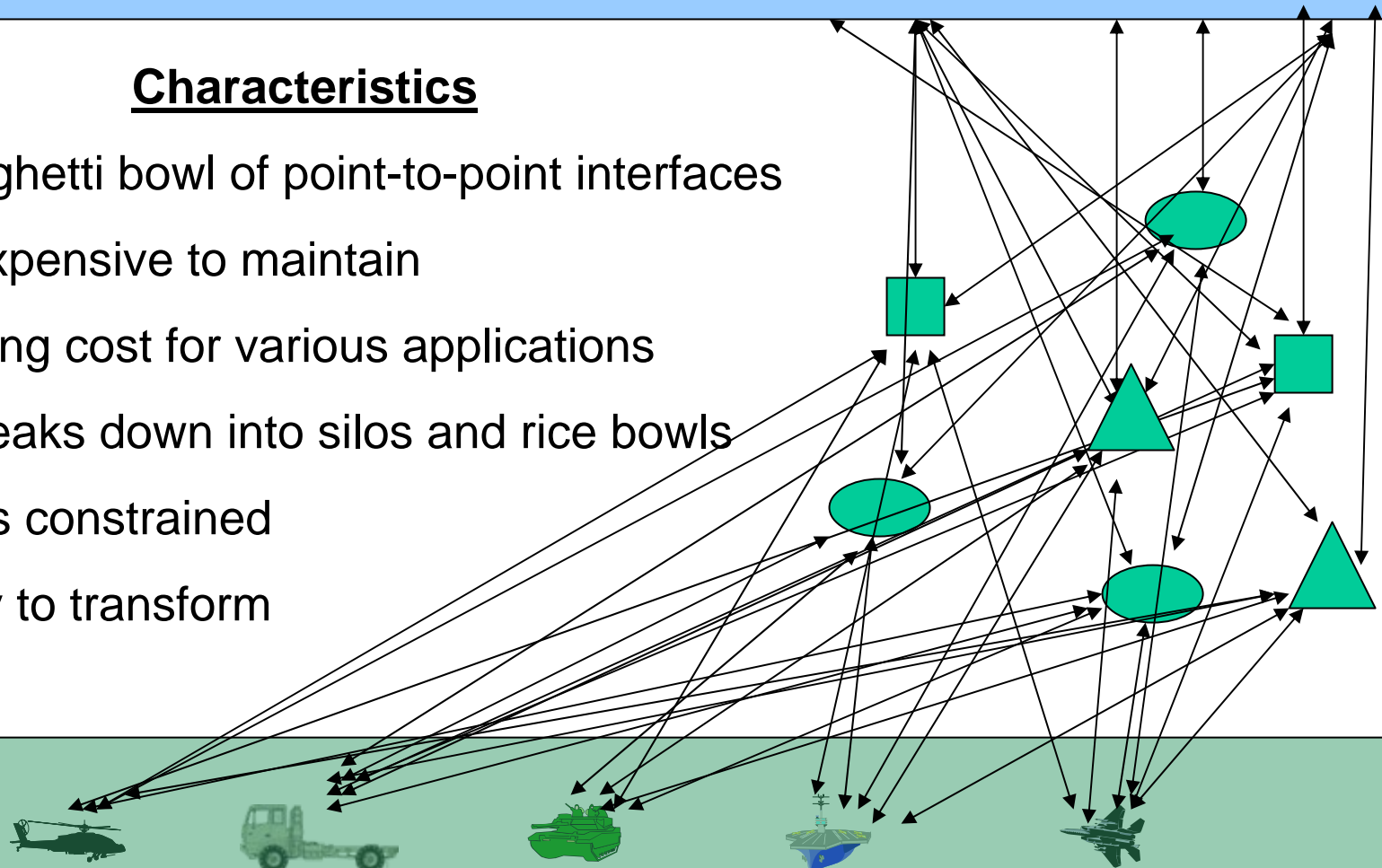
Potential Solution 1 (The Old Way)

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

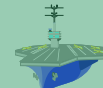
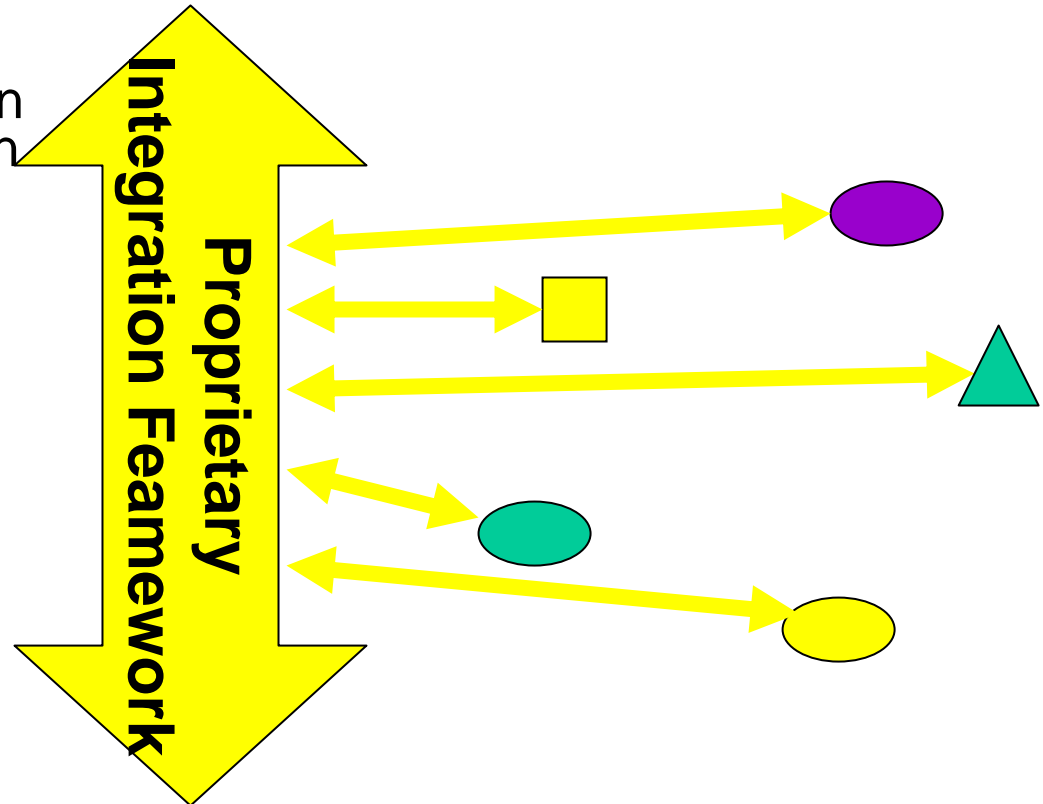
Potential Solution 2

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



Physical Asset Control—Real-time Systems

Solution 3

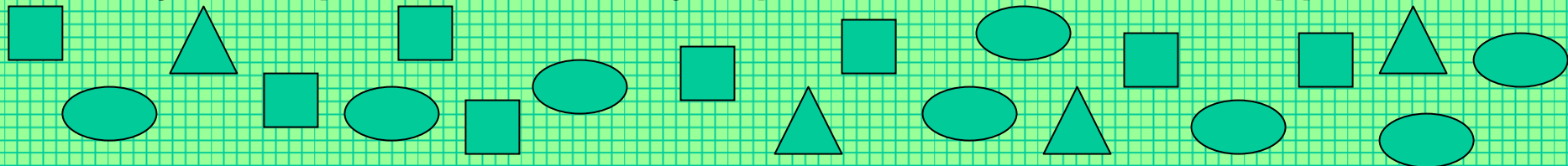
Open Standards-based Interoperability Fills The Gap

Enterprise Business Systems- Transaction Processing ERP
SAP ERP

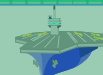
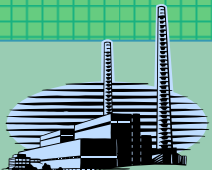
Enterprise Infrastructure Toolset (s)
SAP NetWeaver
XI

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

MIMOSA Collaboration For OpenO&M™



+



= OpenO&M™ Initiative

- 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 Draft STD 18435: TC 184/SC 5/WG 7 – Diagnostics & Maintenance Application Integration Working Group – D-Liaison
- ISO STD 13374: TC108/SC 5 - Condition Monitoring & Diagnostics- **MIMOSA is the Informative Reference**



Technical Committee 108
Sub-Committee 5



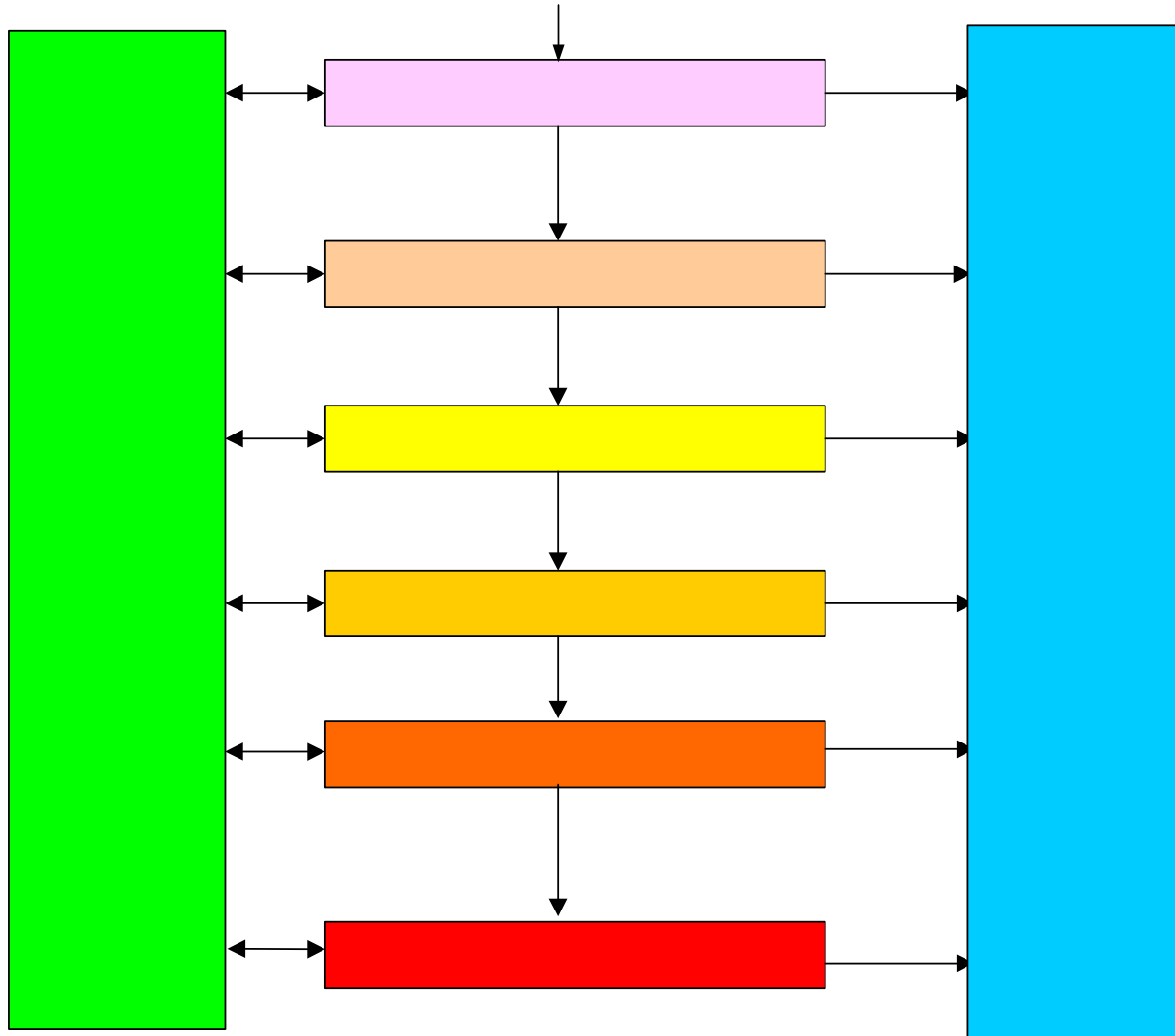
Accredited Standards
Committee S2



ISO 13374 Standard



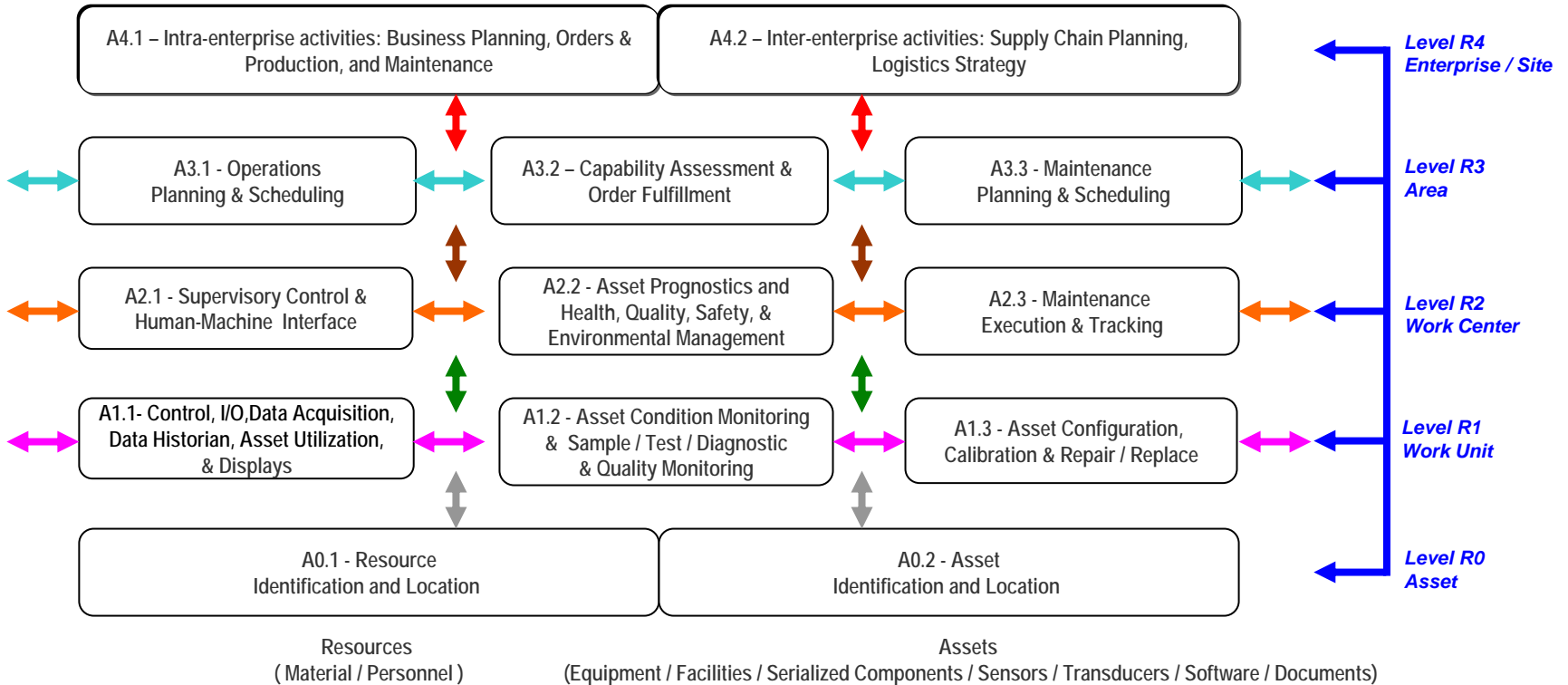
Machine Condition Assessment Data Processing & Information Flow Blocks



DRAFT ISO 18435 Diagram



Activity Domain Integration Diagram



← Part 1: Overview and General Requirements

↕ Part 2: Enterprise / Site and Area Levels [Level 4 to Level 3]

↔ Part 3: Area Level [Within Level 3]

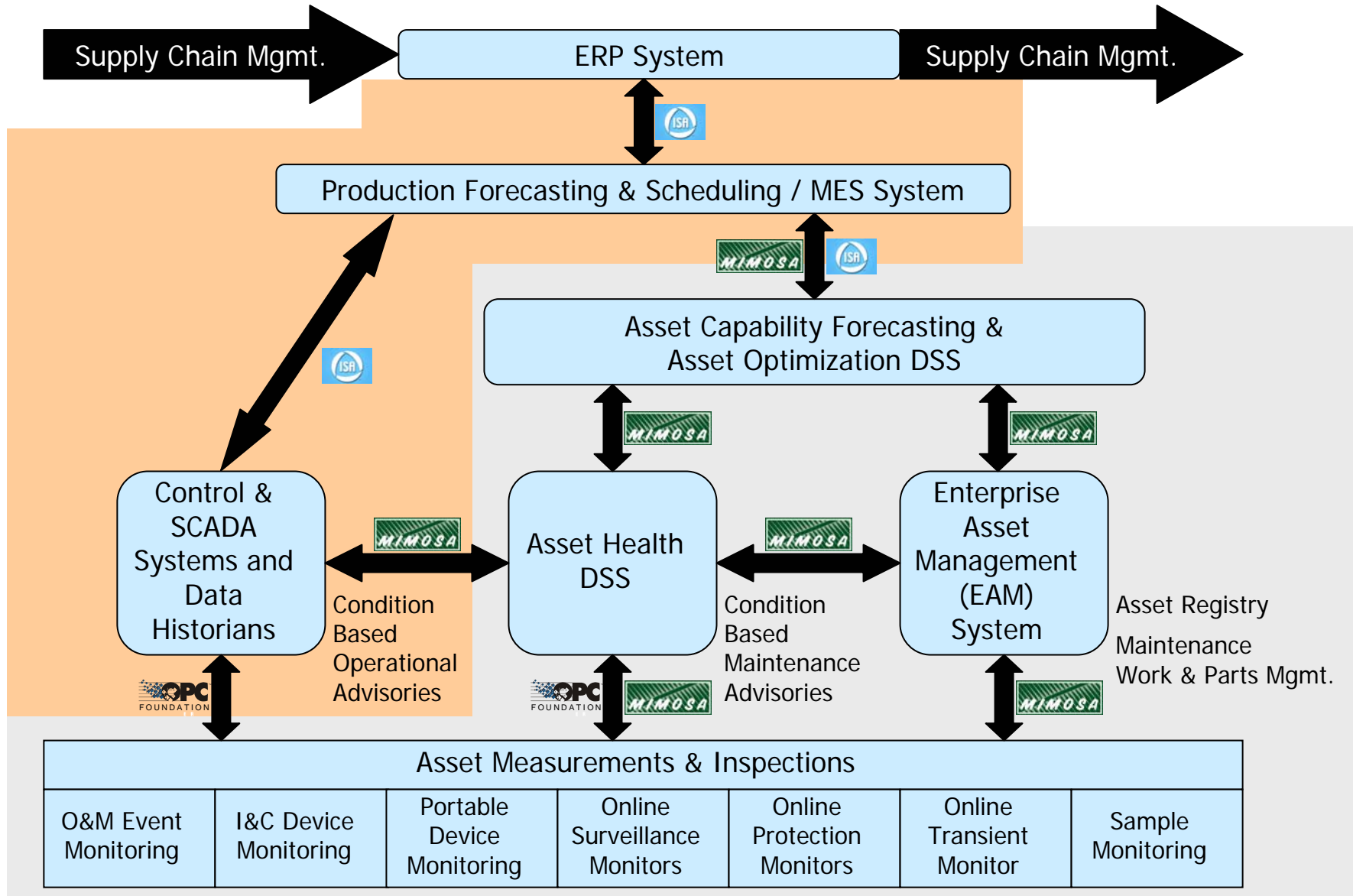
↕ Part 4: Area and Work Center Levels [Level 3 to Level 2 & below]

↔ Part 5: Work Center Level [Within Level 2]

↕ Part 6: Work Center and Work Unit Levels [Level 2 to Level 1]

↔ Part 7: Work Unit Levels [Within Level 1]

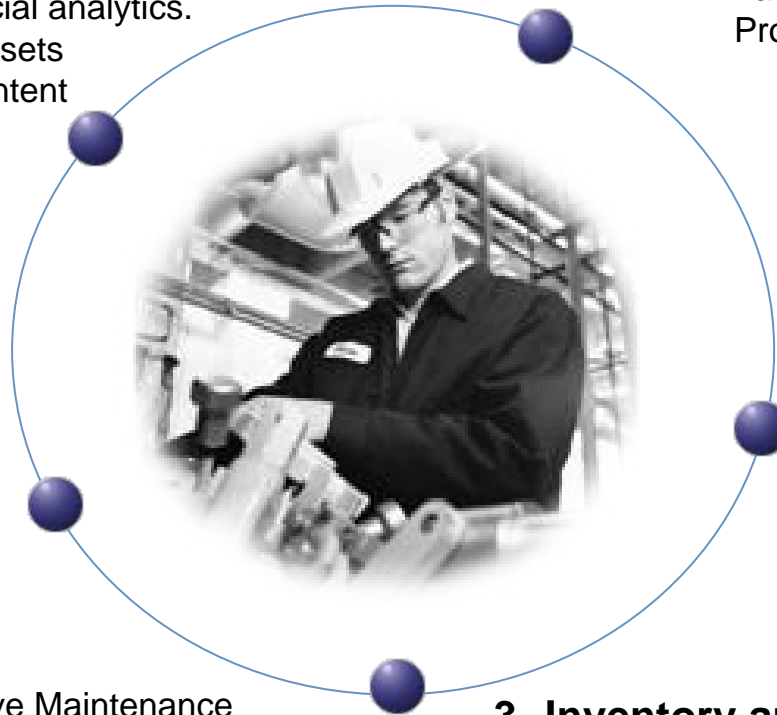
CBO Information Exchanges



SAP Enterprise Asset Mgt. Scenario

5. Asset Performance Management

- Operational and Financial analytics.
- Detailed structure of assets
- Documentation and content management
- Business intelligence



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



How does SAP xMII synchronize Manufacturing Operations with the Enterprise thru Manufacturing Integration?

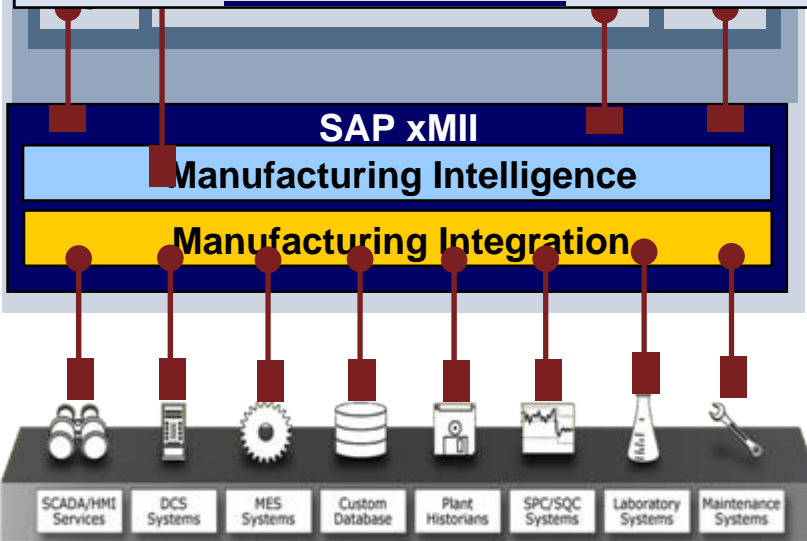


- SAP xMII enables **real-time transactional integration between**

• 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



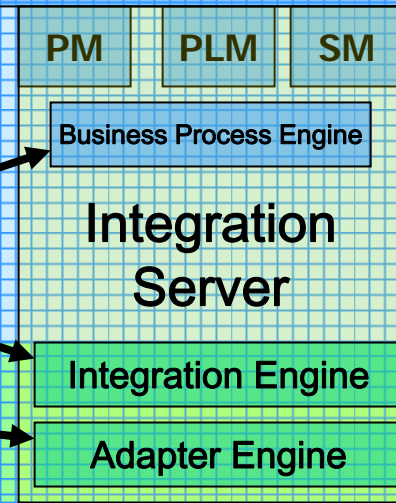
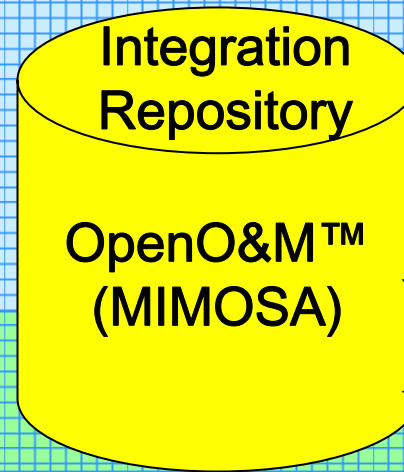
- **Business Logic** for creating automated events, KPIs and alerts
- **Workflow** to synchronize plant and Enterprise business processes
- Built in **OpenO&M™** messages and schema to make legacy systems interoperable

Typical Integration Scenario A

3rd Party Condition Monitoring SAP Integration

Enterprise Business Systems- Transaction Processing ERP
SAP ERP

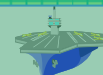
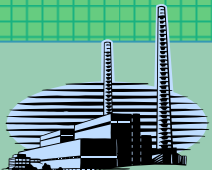
SAP
NetWeaver &
XI
Infrastructure



MIMOSA
XML
Messages



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



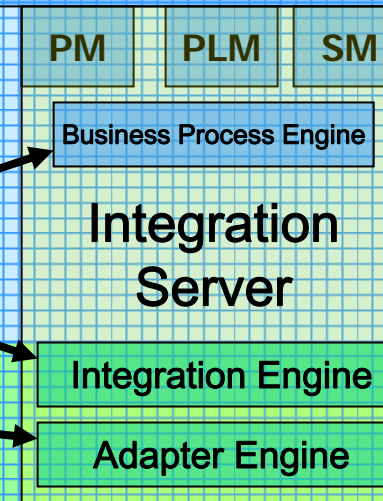
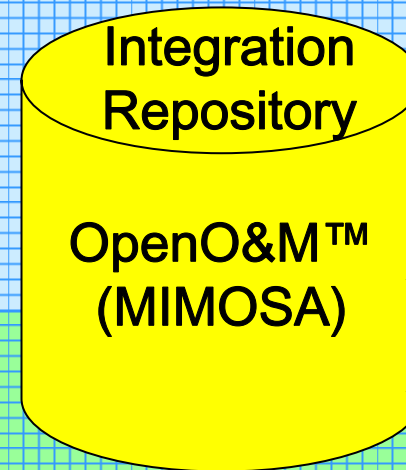
Physical Asset Control-Real-time Systems

Typical Integration Scenario B

3rd Party Condition Monitoring & Reliability Management SAP Integration

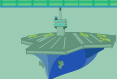
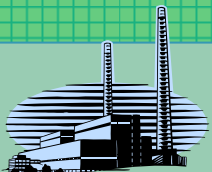
Enterprise Business Systems- Transaction Processing ERP
SAP ERP

SAP
NetWeaver &
XI
Infrastructure



MIMOSA
XML
Messages

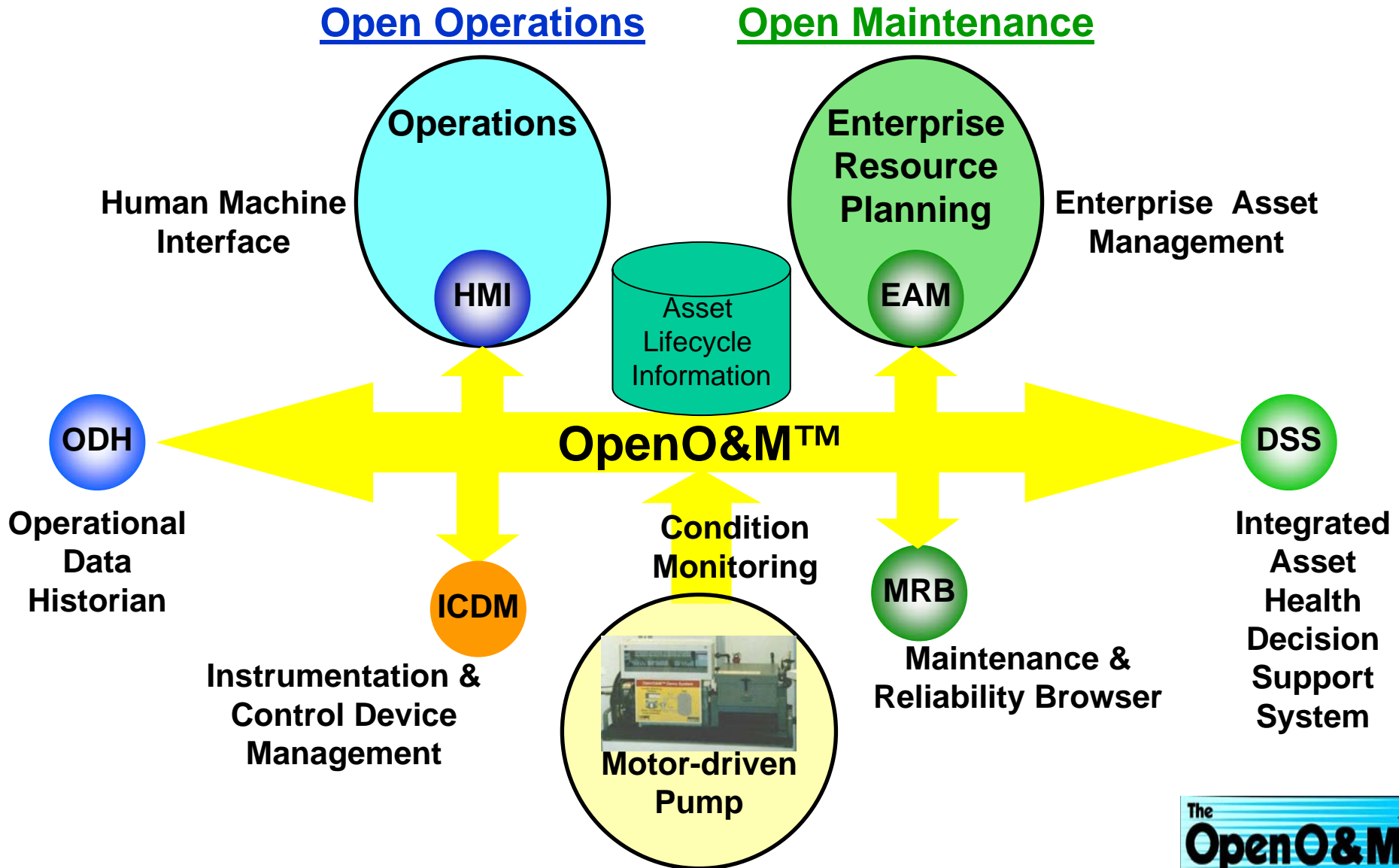
Control Systems & Platforms Implementing
Open Standards (XML, OpenO&M™)



Physical Asset Control-Real-time Systems

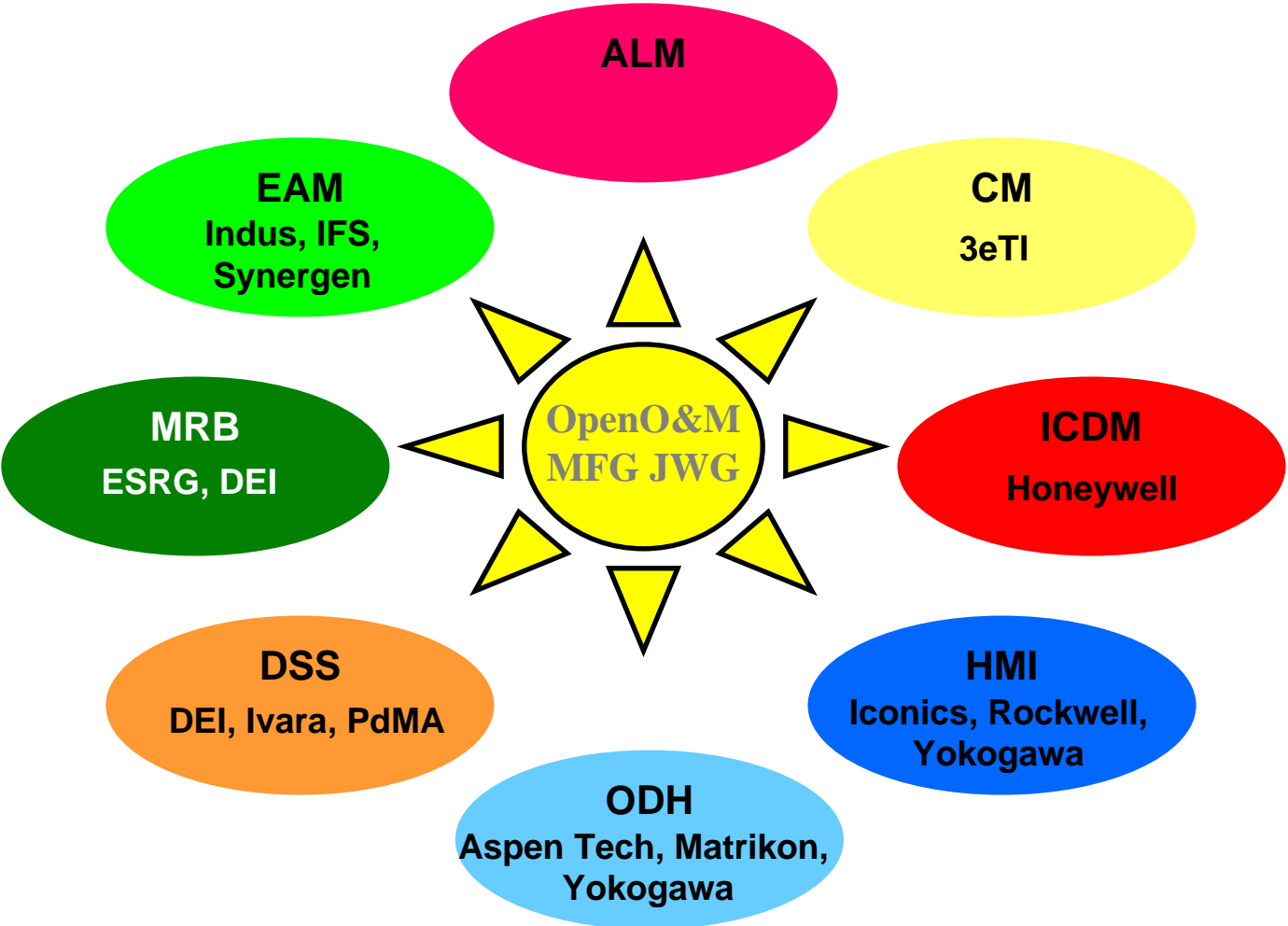
OpenO&M™ Interoperability Demonstration

IMC 2004



OpenO&M™ Interoperability Demonstration Participants

International Maintenance Conference – 12/3/04



Function Legend

- 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™ 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