



OpenO&M™

Open Operations & Maintenance

OpenO&M for Manufacturing

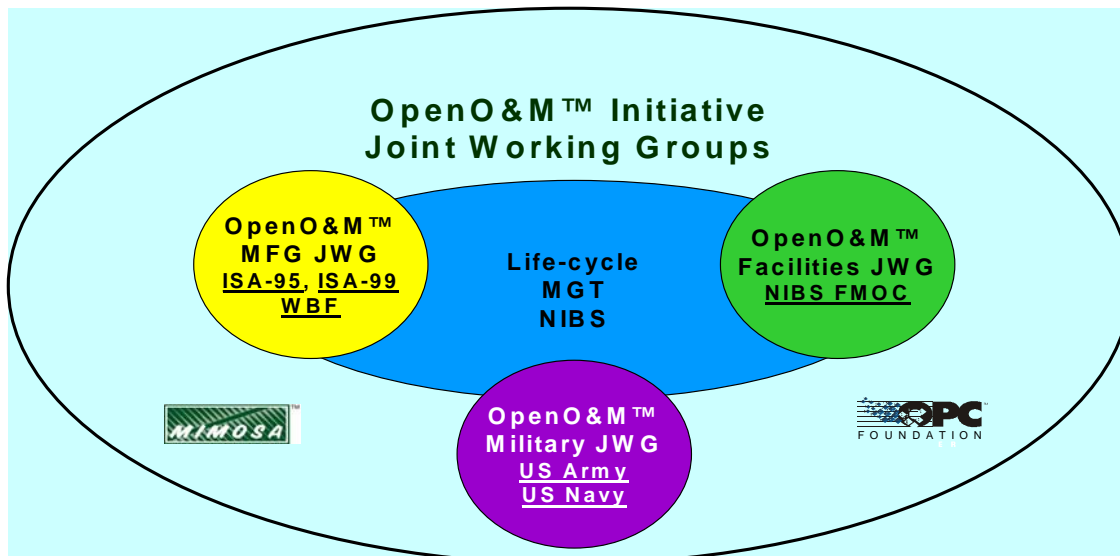
Introduction

The OpenO&M™ Initiative is an effort by multiple industry standards organizations to provide a harmonized set of information standards for the exchange of Operations & Maintenance (O&M) data and associated context. The OpenO&M Initiative is an open, collaborative, effort composed of diverse groups of subject matter experts organized in industry specific Joint Working Groups (JWG) that are focused on enabling O&M applications interoperability for manufacturing plants, fleets and facilities.

OpenO&M is a virtual organization, maintained by MIMOSA, which serves as an umbrella for collaboration. There are no dues, with individual participants volunteering from participating standards groups and other groups are encouraged to join. Members of the group strive to incorporate the OpenO&M work into the standards they represent. Key current members of the OpenO&M Manufacturing JWG include:

- MIMOSA - Asset management related information standards
- OPC Foundation - Data transport standards
- SP95 – ISA's Enterprise-Control System Integration Standards Committee
- WBF – B2MML (Business To Manufacturing Markup Language)

Participating Standards Organizational Model





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The OpenO&M Initiative operates by having participants harmonize key standards from their respective organizations. Participating organizations work to cross reference their related standards and collaborate on their content. Participants develop and demonstrate reference implementations based on resultant harmonized standards. These efforts culminate in the issuing of whitepapers, authored by OpenO&M members, addressing standards related benefits of industry interest. Of most recent interest was inter-operability demonstration performed at the International Maintenance Conference (IMC-2004) in December, 2004. This conference was attended by nearly 900 maintenance, reliability and operations managers, with the OpenO&M demonstration highlighted in the Conference Key note session. Over 14 vendors participated in the demonstration at various levels with maintenance and operations integration successfully demonstrated.

While MIMOSA and OPC focus on information standards that are applicable across many industry sectors, collaboration with more industry specific organizations (such as ISA S95 for manufacturing) within the aforementioned Joint Working Groups (JWG) enables standards-based applications interoperability in industry-focused domains. These industry-focused JWGs provide a common face for multiple standards applicable within an industry or industry facet, while the JWGs gain key cross-industry synergies with each other by supporting a common set of harmonized standards for core asset and functional segment modeling, tracing and lifecycle management. Examples of Joint Working Groups already in place include:

- ◆ OpenO&M Manufacturing Joint Working Group
- ◆ OpenO&M Military Joint Working Group- consists of representatives from the US Army and US Navy
- ◆ OpenO&M Facilities Joint Working Group- consists of representatives from NIBS – National Institute of Building Sciences-FMOC

OpenO&M™ Benefits

The OpenO&M Initiative provides many benefits associated with **standards-based applications interoperability**. While individual standards usually enable interoperability and cost savings in discrete functional domains, much greater benefits are achieved as multiple standards groups collaborate in appropriate industry-focused and cross industry efforts. The OpenO&M Initiative provides important synergies in major functional domains, including:

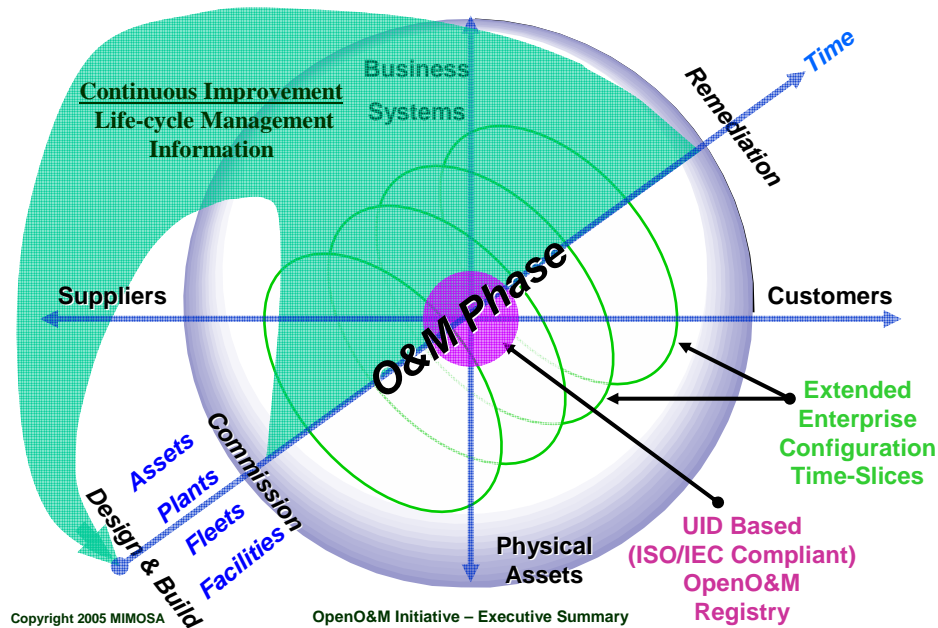
- ◆ Collaborative Asset Life-cycle Management (CALM) – Enabling the practical implementation of the ARC Advisory Group's CALM Model
- ◆ Universal Identification (UID) – Enabling UID-based Asset Traceability throughout supply and support chains cutting across all industry groups
- ◆ Condition Based Maintenance (CBM) – Enabling and product neutral CBM implementations that can leverage both internal and third party Logistical and Maintenance Support organizations

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- ◆ Condition Based Operations (CBO) – Integrated data exchange between operations and maintenance domains enables near real-time, *context sensitive*, capabilities forecasting. This, in-turn enables operational planning and scheduling decision support systems to facilitate near real-time operational optimization.

Collaborative Asset Life-cycle Management OpenO&M™ Interoperability Model



In order to visualize the nature of the information integration that is enabled by the OpenO&M Initiative, the 3 dimensional model in the attached figure is presented. The horizontal and vertical axis represent a “snapshot” of your extended enterprise at any given moment in time. The information standards associated with the OpenO&M Initiative enable complex horizontal and vertical O&M information integration within your extended enterprise thus enabling the near-real time decision support applications that are at the heart of condition based operations. The 3rd dimension represents the type of life-cycle information management that is enabled by the MIMOSA Universal ID based open asset registry. This capability can be supported within a single site, or on a multi-site basis and it also addresses the multi-enterprise aspect of an extended supply chain. This key capability may be needed for a variety of reasons including continuous improvement programs, supply chain optimization and regulatory requirements.

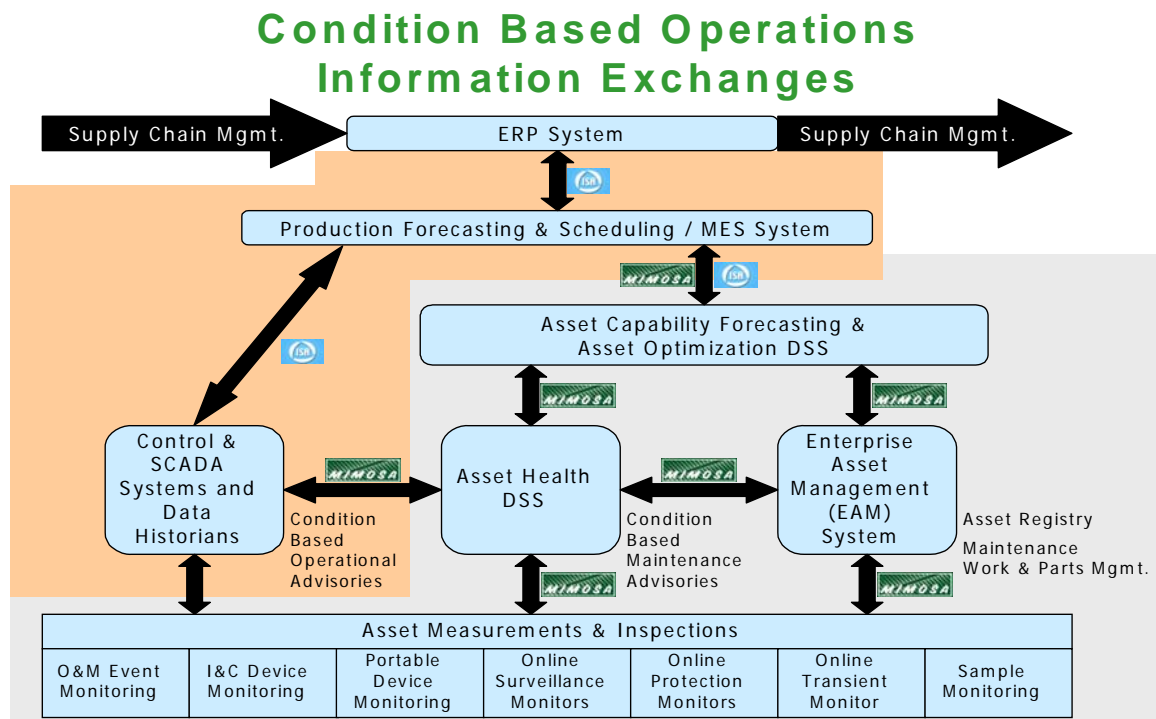
Opportunities for Condition-based operation (CBO) driven applications extend across a variety of industries, disciplines and domains. Consider the following:

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- ◆ Manufacturing - Integrated data exchange between operations and maintenance domains enable production planning and scheduling systems to provide near real-time production optimization
- ◆ Military - Integrated data exchange between operations and maintenance domains enable mission planning and scheduling systems to provide near real-time mission optimization
- ◆ Facilities - Integrated data exchange between operations and maintenance domains enable facilities operators to optimize resource utilization and optimize operational planning and scheduling with their clients. This can also be extended to address:
 - Optimal Allocation of Critical path resources (Space, Equipment)
 - Optimal Energy Management

The specific manufacturing initiative for OpenO&M was highlighted in a recent white paper addressing the merits of condition based operations. This white paper is available on the MIMOSA web site and was recently published in the January Maintenance Technology journal. The various integration points are shown in the figure below.



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OpenO&M Initiative – Executive Summary

This figure shows the vision of how MIMOSA, ISA-95 and OPC could be used together to integrate maintenance and operational plans in a manufacturing setting. The bottom of the figure shows different condition monitoring and inspection functions. For automation system based measurements, OPC can be used to move the data to a control/SCADA system or a



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historian. For specialized measurement (e.g. vibration) or manual asset inspections readings, MIMOSA interfaces may be used to pass this information between systems.

EAM and Asset Health/Decision Support Systems (DSS) will use the asset measurement and inspection data to predict failures, issue work orders, track maintenance work. The Asset Capability Forecasting and Asset Optimization DSS function uses the EAM and Asset Health DSS data to forecast & schedule maintenance work to optimize asset availability.

In parallel, ERP-MES-Control systems may use the ISA-95 standard to pass production schedules from the ERP level to the control system level and report on actual production back to the ERP level, but in today's manufacturing plants there is a weak link between the production schedules/forecasts and the maintenance schedules/forecasts. A key OpenO&M Manufacturing JWG vision is to leverage the harmonized combination of ISA-95 and MIMOSA standards to enable standards-based interoperability between these functional domains. This would permit production schedules to be based upon real-time, condition-monitoring-based, capabilities and maintenance forecasts. Likewise maintenance schedules could be adjusted to reflect changes in production schedules to minimize downtime that might impact production.

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