

MIMOSA – OpenO&M™ and ISO 15926

An Operations and Maintenance Perspective on Interoperability

MIMOSA/OpenO&M and PCA joint Forum

February 22, 2011

Chevron

Houston, Texas

Alan Johnston

OpenO&M Initiative Chair

MIMOSA President



Presentation Outline

- Scope (Critical Infrastructure Management)
- Context
- Nature of key problems
- Differing perspectives on interoperability (Capital Projects vs O&M)
- A solution path based on collaboration
- Recent progress

Critical Infrastructure

14 Sectors Identified by US Government – Shared Problems & Solutions

- Agriculture and Food – Departments of Agriculture and Health and Human Services
- Water – Environmental Protection Agency
- Public Health – Department of Health and Human Services
- Emergency Services – Department of Homeland Security
- Government – Department of Homeland Security
- **Defense Industrial Base – Department of Defense**
- Information and Telecommunications – Department of Commerce
- **Energy – Department of Energy**
- **Transportation and Shipping – Department of Transportation**
- Banking and Finance – Department of the Treasury
- **Chemical Industry and Hazardous Materials – Department of Homeland Security**
- Post – Department of Homeland Security
- National Monuments and icons - Department of the Interior
- **Critical Manufacturing - Department of Homeland Security**

Interoperability and Standardization are Foundational to Advances in Productivity

- Standardization has provided many major productivity breakthroughs throughout human history
- This process began with language formation followed by weights and measures
- In the industrial age, standardization and interoperability for parts of mechanized devices (firearms, automobiles...) led to huge productivity gains
- The process has worked its way through most areas of manufacturing
- The implications of standardization and interoperability for Operations and Maintenance (O&M) have been just as profound as for manufacturing
- Information architecture and information itself have become increasingly large and critical portions of the deliverables associated with plants, platforms and facilities
- Major productivity gains depend on transitioning to an interoperable, componentized architecture with shared supplier neutral, industry information models, information and utility services
- Large enterprises are now spending 15x or more of license fees on integration efforts. The standards-based interoperability model will dramatically reduce these direct costs while also improving quality, security and sustainability.

Context for Collaboration

The Safe Technology Roadmap™ for Interoperability

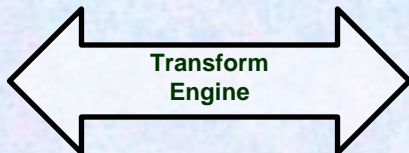
Reference Information Environment

Semantic Context

Execution Environment
"P2B Stack"

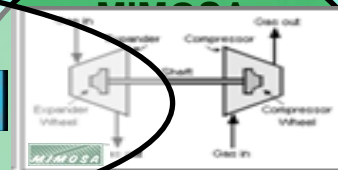
Enterprise Business Systems

En  ion



Information Service Bus

The OpenO&M Initiative



Controls

Registry

Physical Assets

Key Standards & Specifications Enabling Interoperability

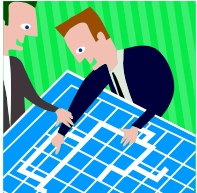
- OpenO&M
 - ✓ Information Service Bus Model (ISBM)
 - Bus Neutral, secure model for intra and inter-enterprise exchange
 - Shared information models and services
 - Pub/Sub and Request/Response Information Exchange Patterns
 - ✓ Common Interoperability Register (CIR)
 - Fuses Locally Unique Identifiers to a true GUID for global interoperability
 - Brownfield and Greenfield
 - ✓ OpenO&M Use Cases
- MIMOSA
 - ✓ Open Systems Architecture for Enterprise Application Integration - CCOM
 - ✓ Open Systems Architecture for Condition Based Maintenance
- ISO 15926
- OPC UA – Data Acquisition – Layer 1-3 Communication

Core Problem

Lack of Interoperability Between Key People, Processes and Systems



Engineering Systems



Proprietary Enterprise Business Systems

Proprietary Middleware

Proprietary Automation Systems

A Critical Paradigm Shift

- A new industry solutions business model where systems of systems interoperate based on open, supplier neutral standards
 - ✓ Shared, supplier neutral industry information models
 - ✓ Shared, supplier neutral industry utility services (SOA-2) driven by industry use cases, with the ability to be validated by 3rd parties
- Shared industry information models, all required industry and enterprise information (including all required O&M information) and shared industry utility services **delivered as part of the EPC process.**
- Cloud technology-based environment(s) for all required O&M and Life-cycle management services enabled by open standards based interoperability.
- Use Case-Driven Methodology
- Owner/Operator Leadership and Governance

The OpenO&M™ Initiative

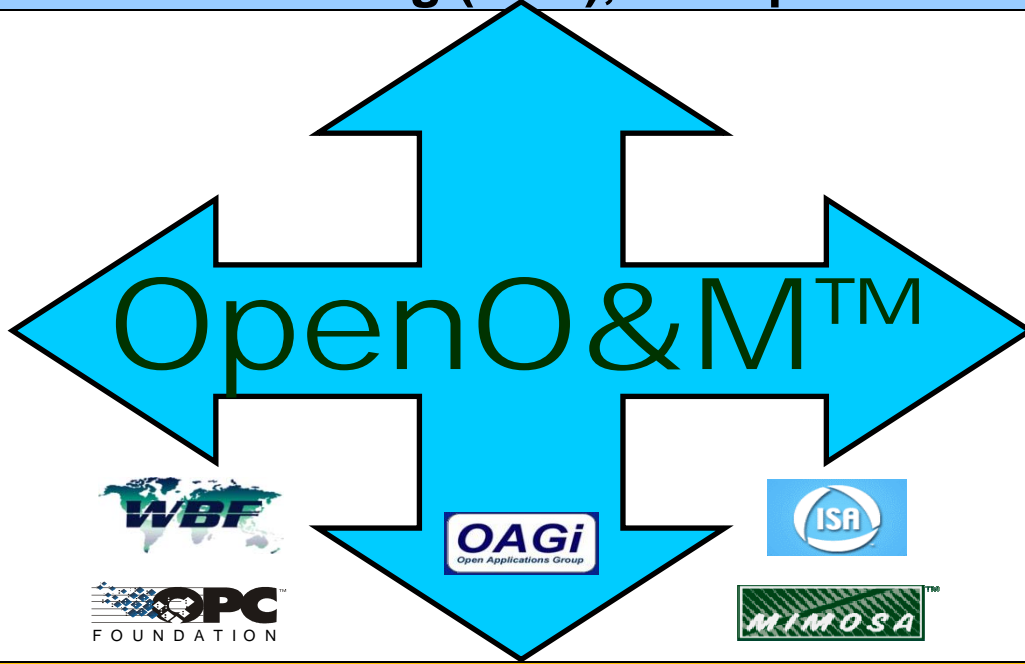
Brings People Processes and Systems Together

Enterprise Business Systems

Enterprise Resource Planning (ERP), Enterprise Risk Management

Operations

Maintenance



Physical Asset Control
Real-time Systems

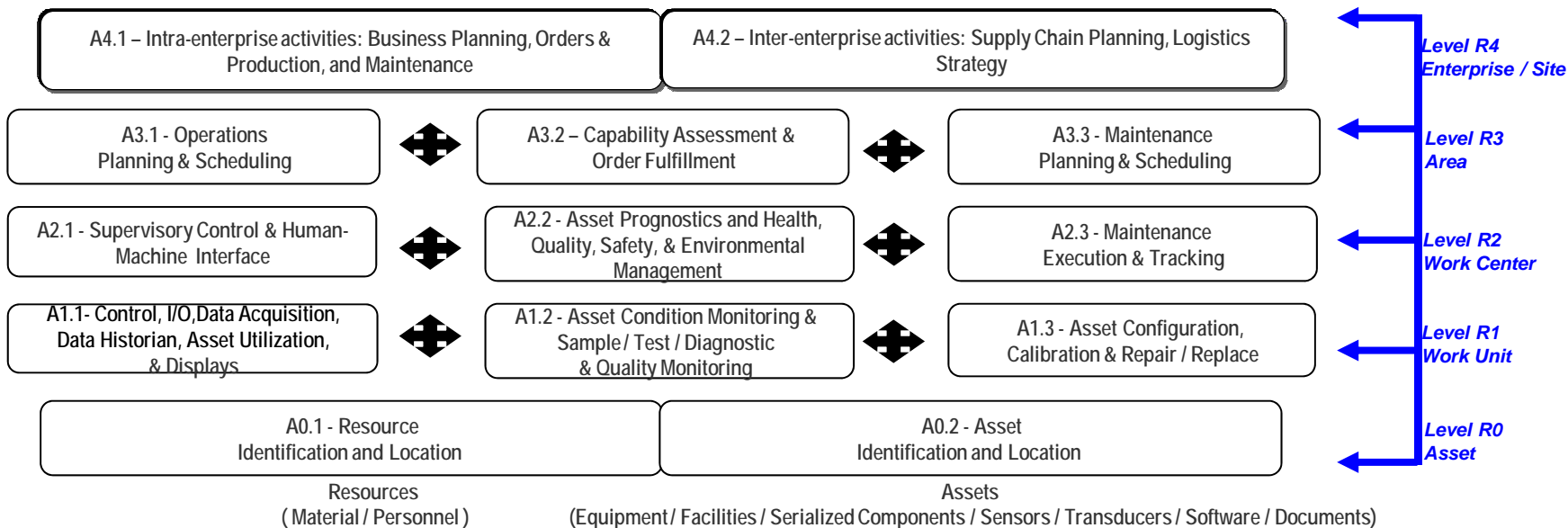


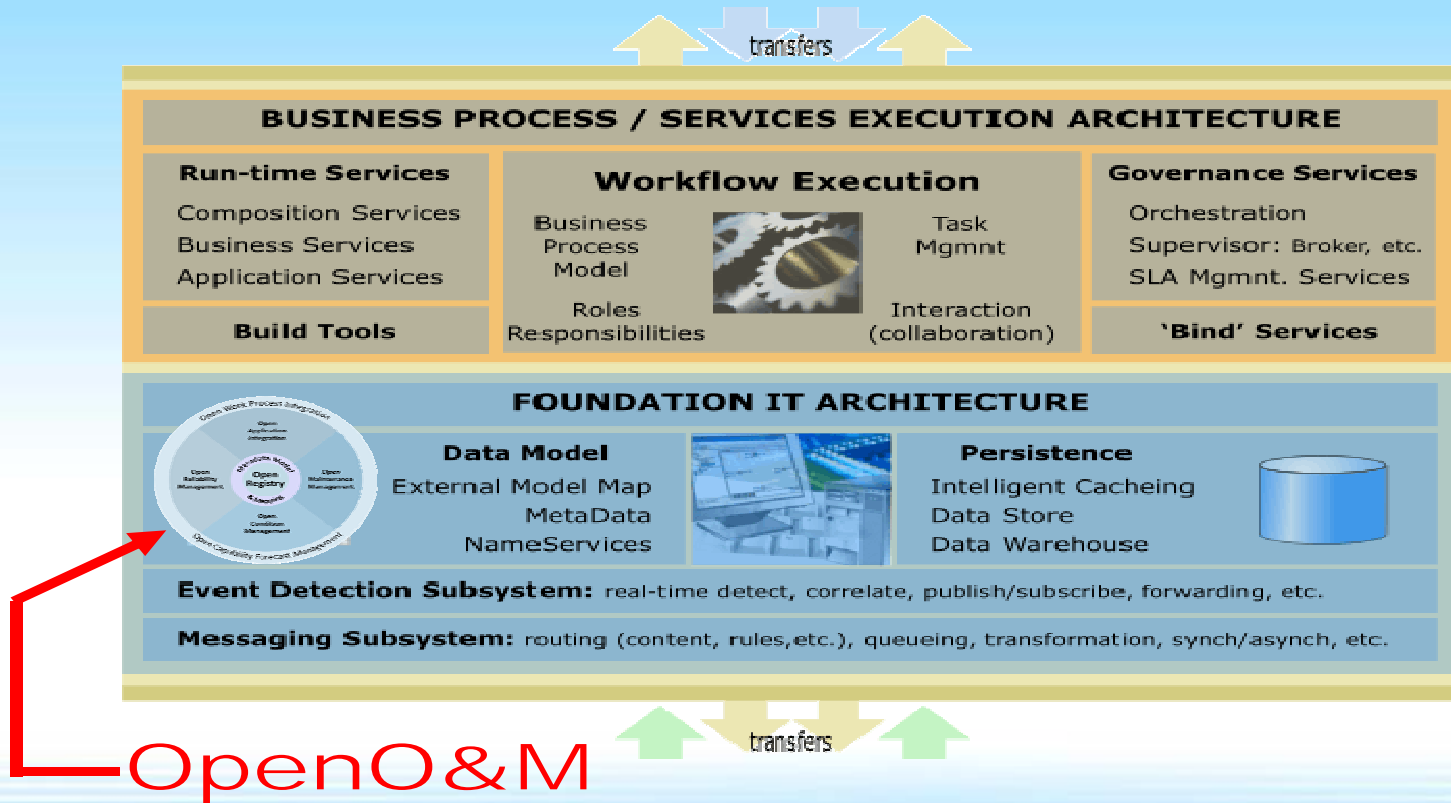
ISO 18435 - 1

Application Domain Integration Diagram



Application Domain Integration Diagram

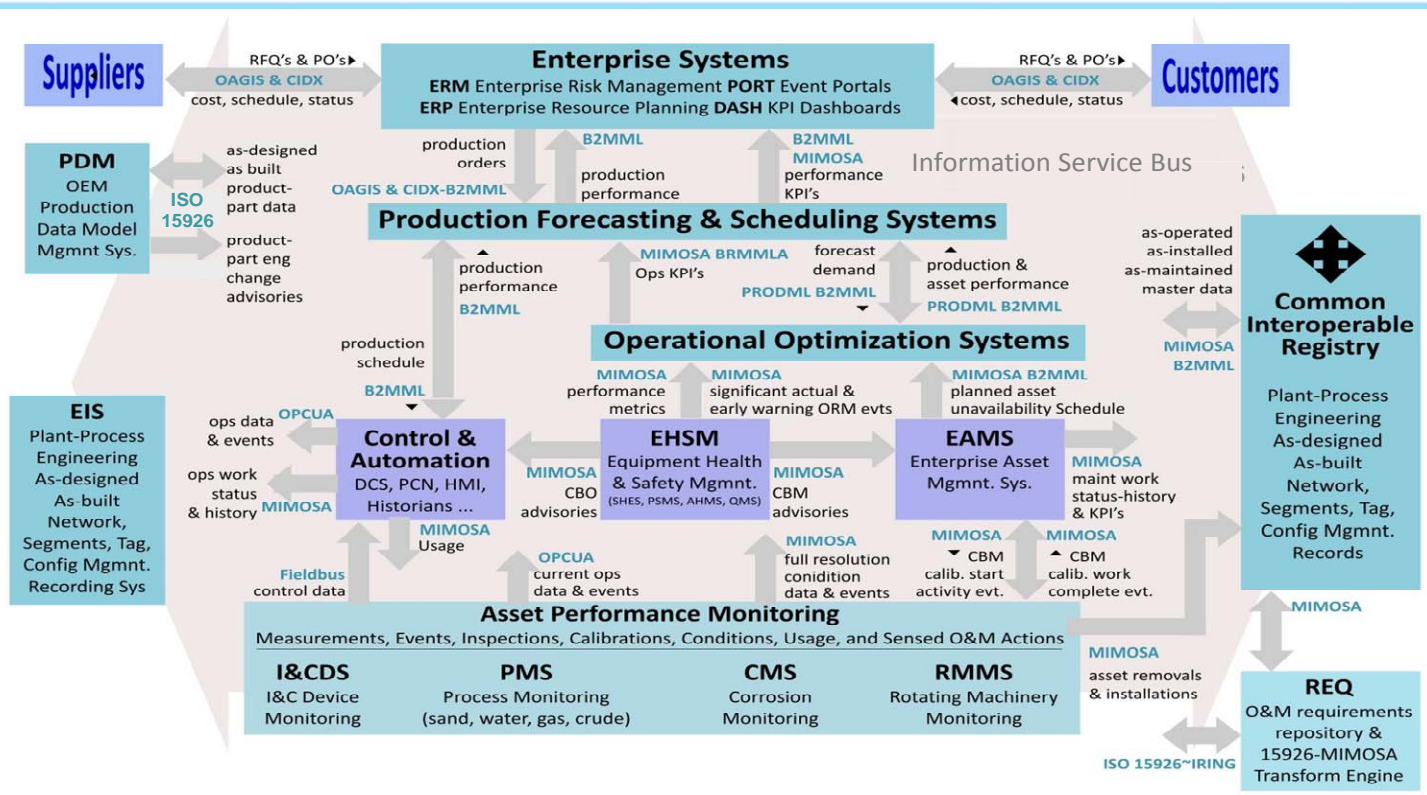




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Oil & Gas Use Cases

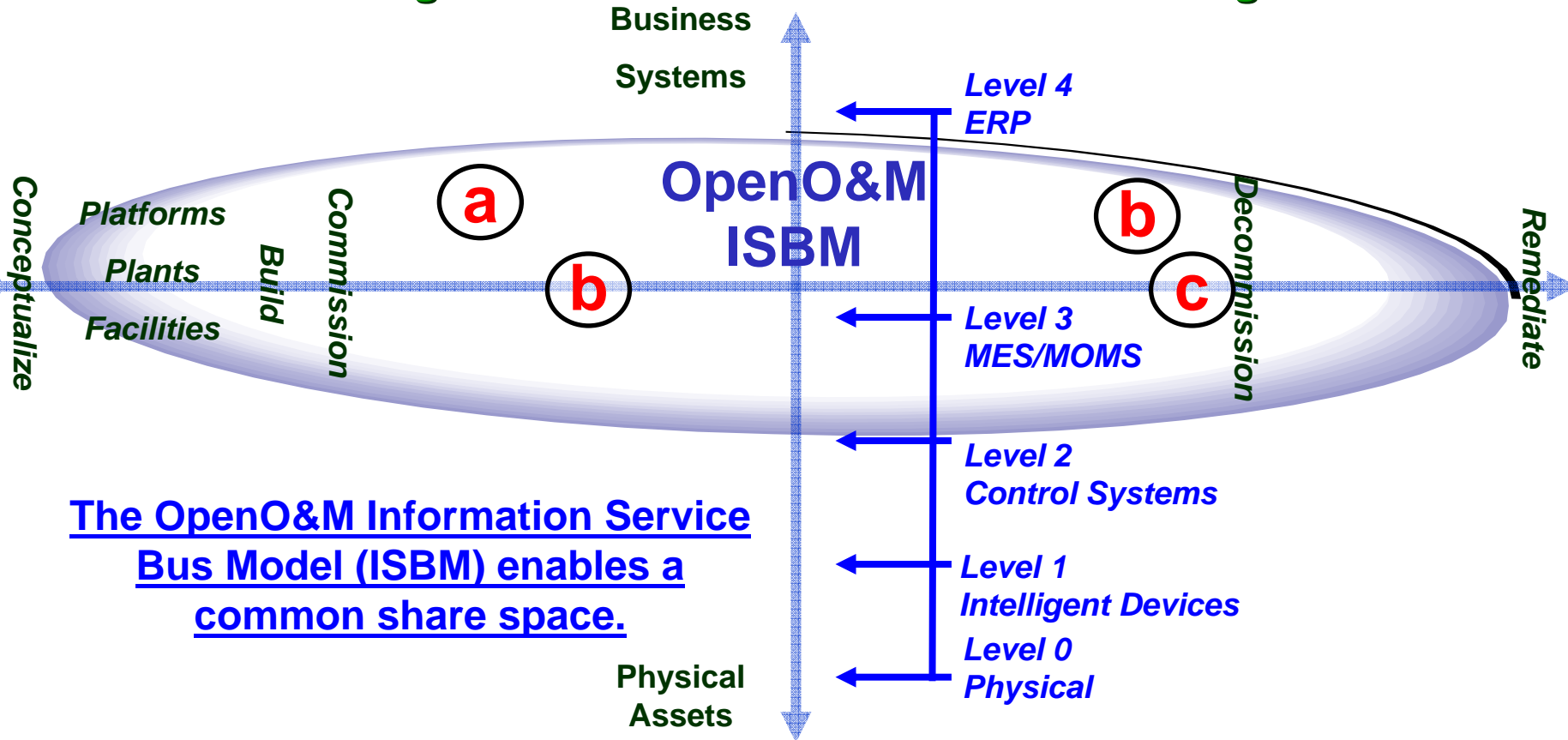


Prime Objective:
Sustainable
Interoperability for
People, Processes and
Systems in the P2B
stack

Methodology
OpenO&M Use Cases
are developed with the
owner/operator
community with a focus
on practical,
experience-based
functional
requirements.

The OpenO&M Use
Cases are mapped to
the Systems and
Scenarios and then to
the standards
supporting the required
data flow

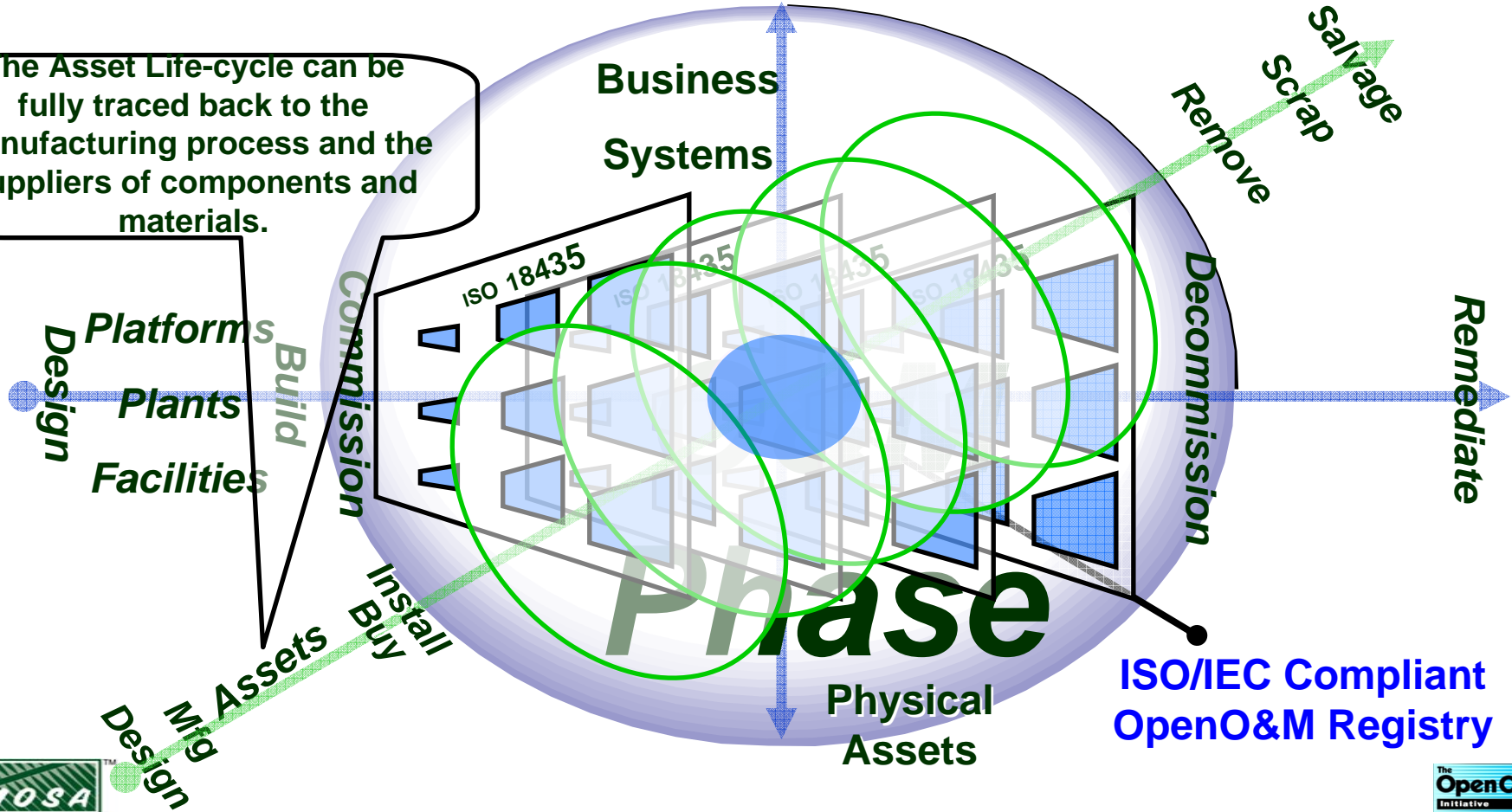
The need for an open Information Service Bus (ESB Neutral) enabling safe and secure information exchanges



The OpenO&M Information Service Bus Model (ISBM) enables a common share space.

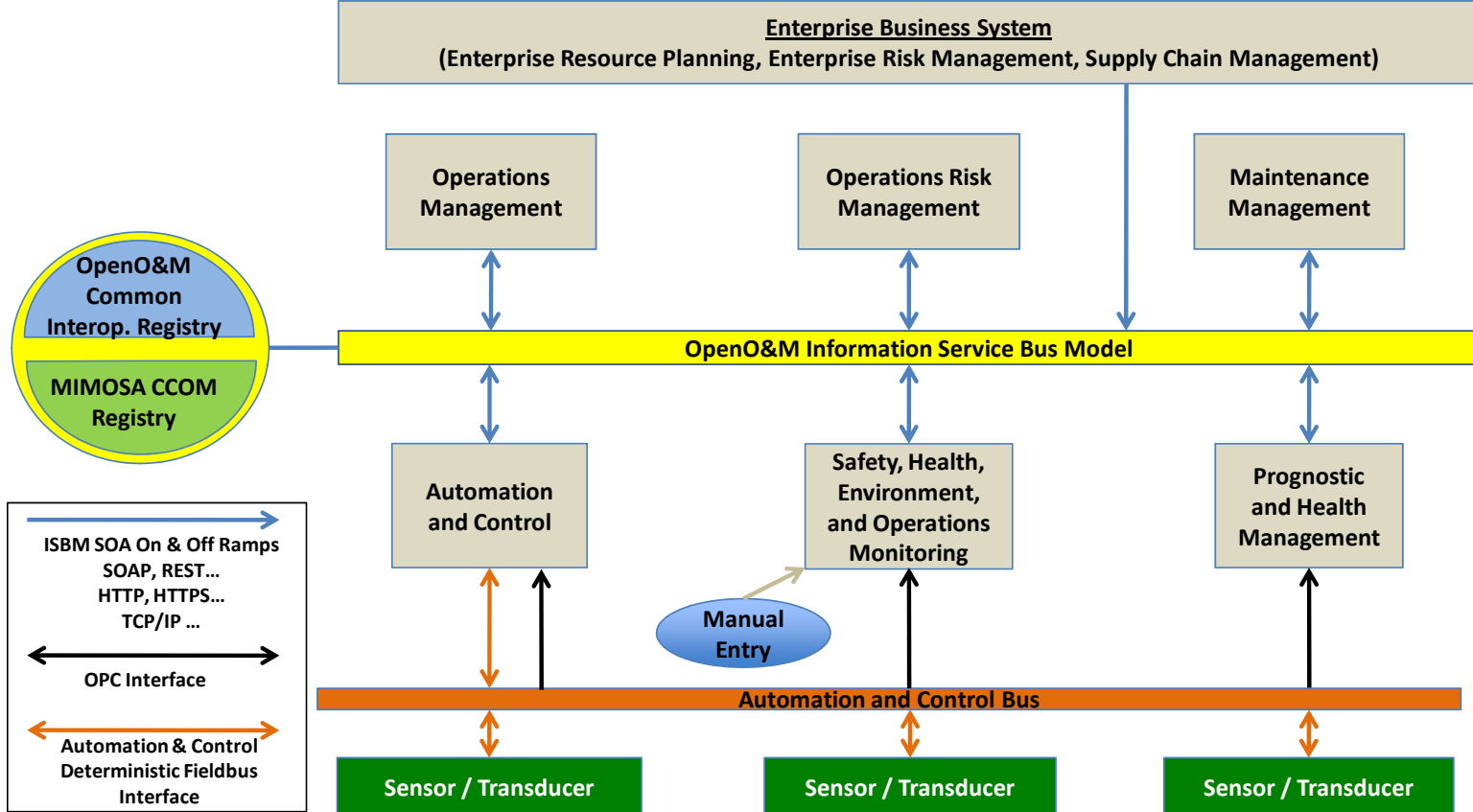
Life-cycle Management of Change (Simplified By Removing In-process Supply Chain Axis)

The Asset Life-cycle can be fully traced back to the manufacturing process and the suppliers of components and materials.



Second Generation SOA – Information Bus

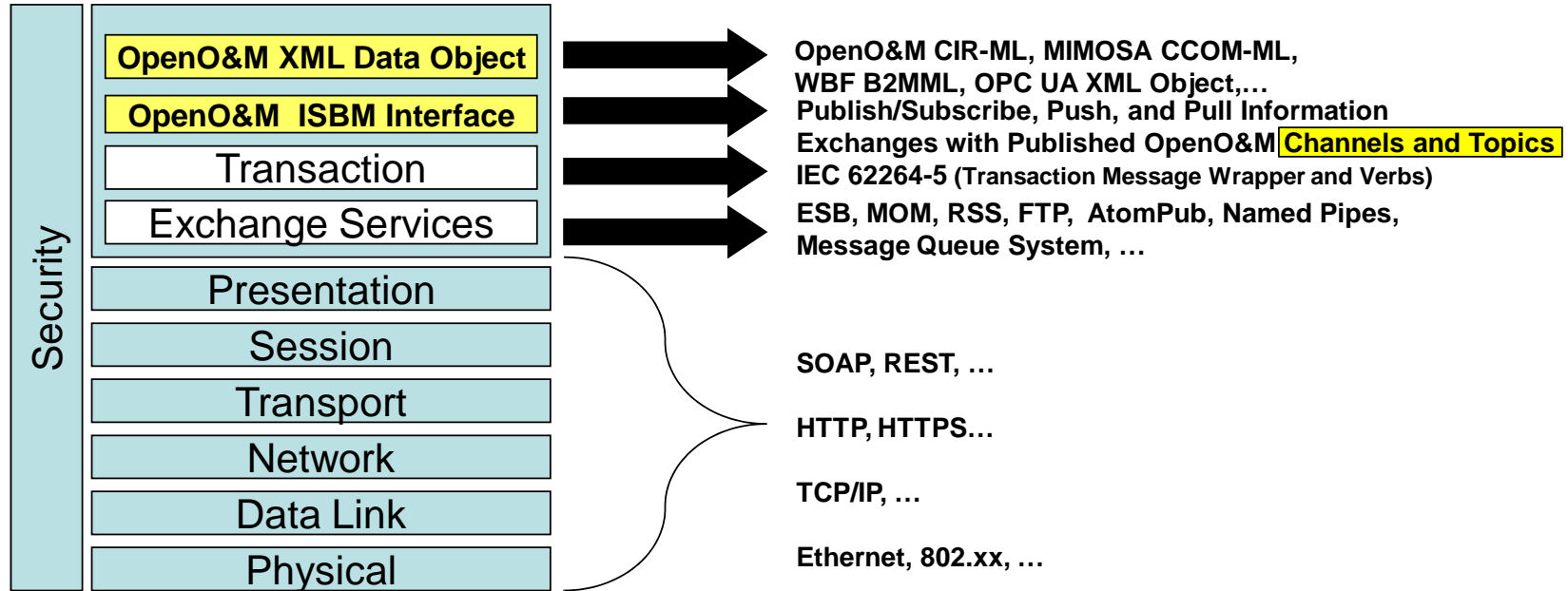
The Execution Environment



The IT Stack for Second Generation SOA

Building On the Past, Enabling the Future

information Bus Architecture



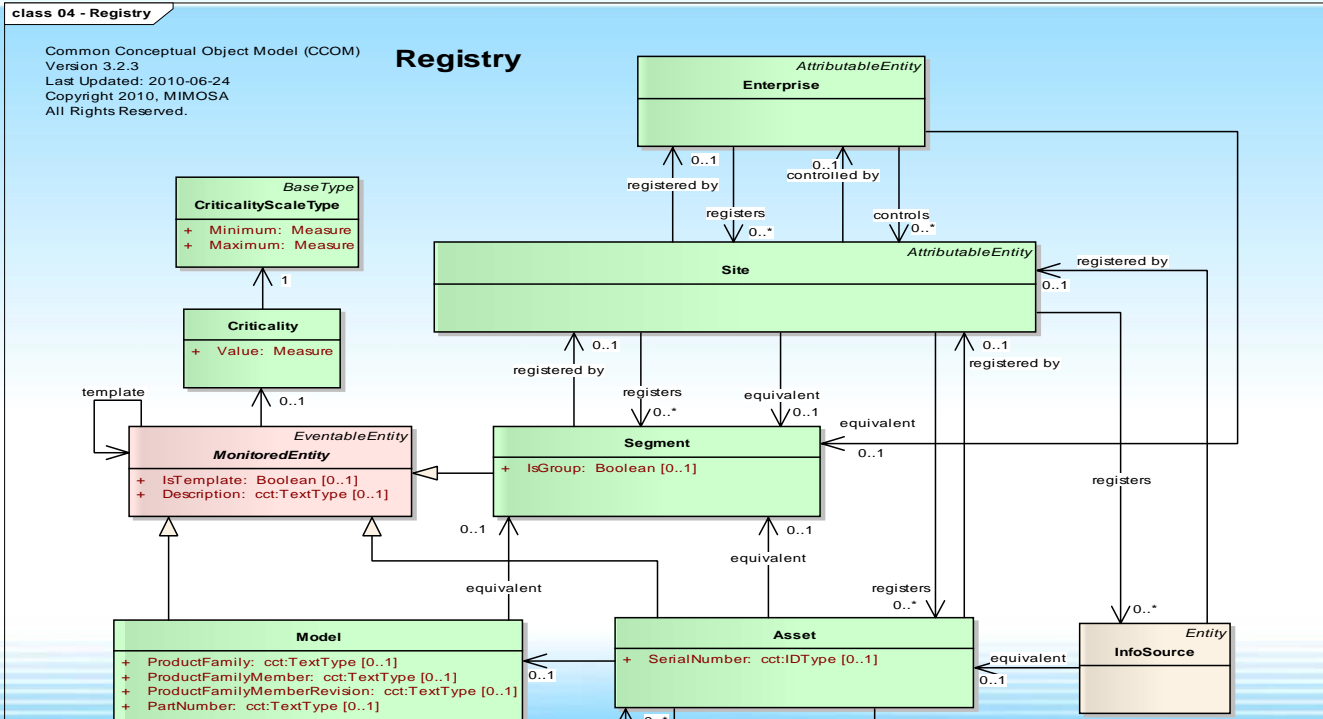
Channels – ISO 18435 Domains

Topics – MIMOSA CCOM Objects (UML)

MIMOSA CCOM UML Version 3.2.3 Sample



MIMOSA Open Systems Architecture for Enterprise Application Integration (OSA-EAI) Common Conceptual Object Model



OPPORTUNITY: LEVERAGE BEST PRACTICES, STANDARDS AND TECHNOLOGIES DEVELOPED ON A CROSS INDUSTRY BASIS

Critical Infrastructure Management

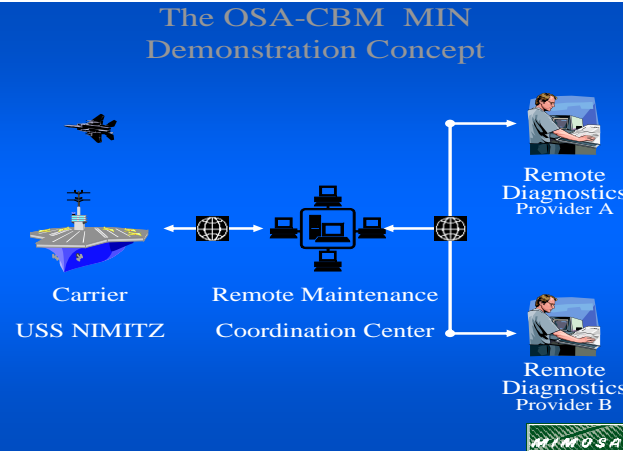
Dual Use Technology Investment

Applying Commercial Off The Shelf Solutions to Solve Complex Problems

OSA-CBM Dual Use Technology Program - Office of Naval Research

MIMOSA Information Network (MIN)

June 21, 2000
 MIN-Viewer
 OSA-CBM Presentation
 Alan T. Johnston
 MIN Project Director



MIN-Viewer Segment Navigation 1

Pic	Nav	Description	Work Completed	Measurements
	000	General Guidance & Administration	GRP 000 GUID & ADMIN	GRP 100 HULL STRUCT
	400	Command & Surveillance	GRP 400 COMB & SURV	GRP 500 AHEAD
	600	Outfit & Furnishings	GRP 600 COMB & SUPP	GRP 600 OUT & FURNISH
	900	Ship Assembly & Support Services	GRP 900 ASSEM & SUPP	GRP 900 LOADS
	F00	Loads	GRP F00 LOADS	GRP M00 MARGINS
	M00	Margins	GRP M00 MARGINS	

User Interface Modeled On The Microsoft Windows Explorer





ISO TC184

Oil and Gas asset management operations and maintenance Interoperability (OGI) Technical Specification Proposal

Nils Sandsmark and Alan T. Johnston
Co-Chairs

ISO TC 184 Plenary
May 4, 2010
Rosslyn, VA
ISO TC184

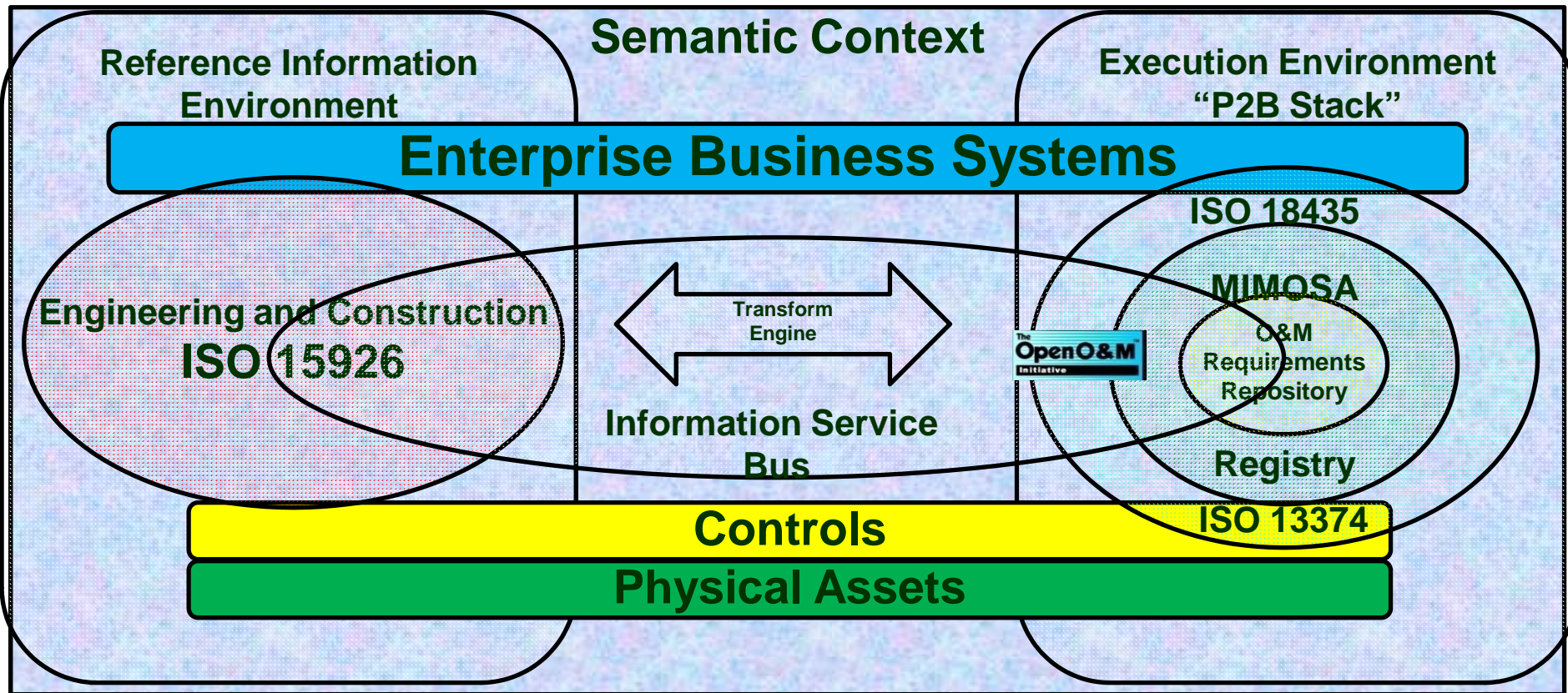


Problem and Opportunity

- Currently, most major Oil and Gas companies operate in a relatively siloed fashion.
 - ✓ Lines of Business
 - Upstream - Exploration/Drilling/Production/Well Management/Mining /Separation (Oil Sands)
 - Downstream - Upgrading/Refining
 - Trading
 - Pipelines/Distribution
 - ✓ Functional/Departmental
 - Capital Projects
 - Enterprise Business Systems
 - Enterprise IT
 - Automation and Controls
- They desire to shift to an environment where people processes and systems interoperate in a comprehensive and sustainable way.
 - ✓ Suppliers tend to be organized to support the existing silos
 - ✓ Standards have been developed reflecting these same points-of-view and they are distributed over many ISO Committees and industry standards organizations
 - ✓ Frequently, all of the points-of-view are legitimate
 - ✓ The multiple points-of-view need to be brought together in a mutually respectful manner



Context for Collaboration





Some Relevant ISO Related Activities

ISO TC 67

Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries

ISO TC 108

Mechanical vibration and shock

ISO TC 184

Industrial automation systems and integration

SC5

Condition monitoring and diagnostics of machines

SC4

Industrial Data

SC5

Architecture, communications and integration frameworks

ISO 14224

Petroleum, petrochemical and natural gas industries --
Collection and exchange of reliability and maintenance data for equipment

ISO 13374

MIMOSA OSA-CBM

WG6

Formats and methods for communicating, presenting and displaying relevant information and data

15926-Data for Process Industries

10303-Product data representation and exchange

STEP/PLCS

OASIS

Collaborating on the deployment of an international standard for product data exchange (ISO 10303)

ISO 18435

MIMOSA OSA-EAI

WG7

Diagnostic and maintenance applications integration

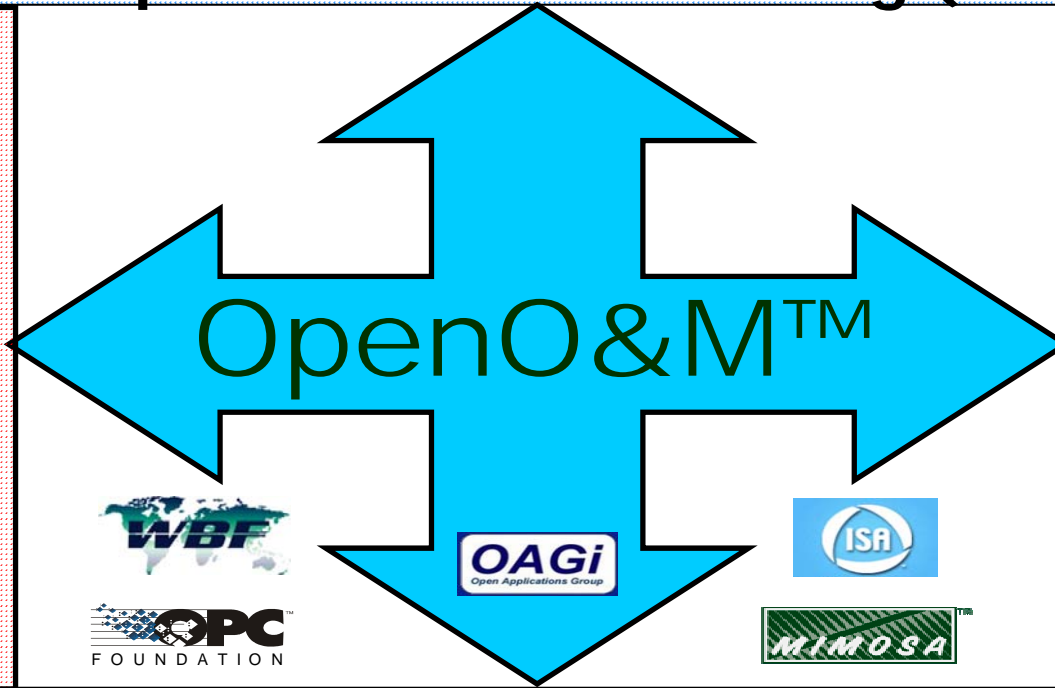


The OpenO&M™ Initiative Enabling Open Standards-based O&M Interoperability

Enterprise Business Systems
Enterprise Resource Planning (ERP)

Operations

Maintenance



Physical Asset Control
Real-time Systems

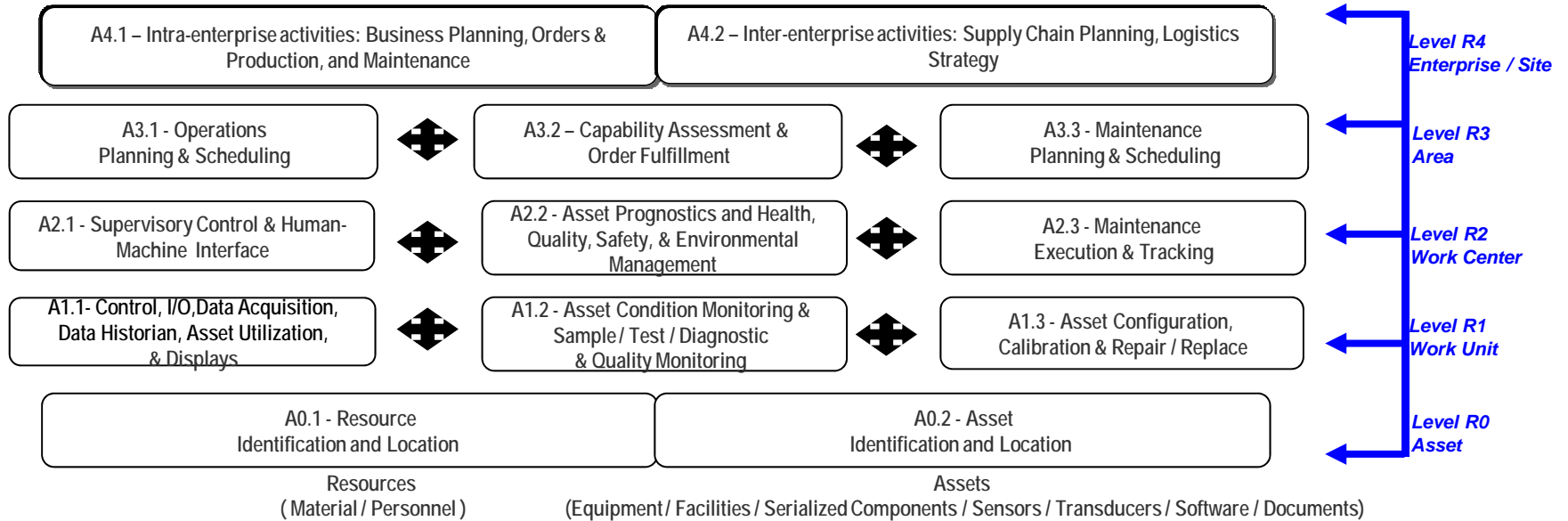


ISO 18435 - 1

Application Domain Integration Diagram



Application Domain Integration Diagram





Task Force Result Global Collaboration

- MIMOSA/OpenO&M
- FIATECH
- POSC Caesar
- Center for Integrated Engineering Asset Management (CIEAM)



MIMOSA/OpenO&M, FIATECH, POSC Caesar and the CIEAM have begun collaboration on a global basis to foster improved approaches to open standards-based interoperability for asset management through an industry-use case driven solutions process.

ISO TC 184



Invitation

Offshore Oil Executive Briefing

September 15, 2010
5:30 pm - 8:50 pm

Houston Museum of Natural Science

Cockrell Butterfly Center Lobby
5555 Hermann Circle Drive
Houston, TX 77030

RSVP Today!

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Smarter
Oil & Gas



IBM cordially invites you to join offshore oil industry executives at an exclusive dinner briefing, *Charting a Solution Path through Emerging Offshore Oil Industry and Regulatory Imperatives*.

Featuring keynotes by:

- **Dr. Lee Hunt**, Chief Executive, International Association of Drilling Contractors (IADC)
- **Rear Admiral Mary Landry**, United States Coast Guard Commander, Eighth Coast Guard District
- **Dr. Thore Langeland**, Manager Integrated Operations, Norwegian Oil Industry Association (OLF)

There will also be a panel discussion featuring owner-operators.

The briefing will explore:

- Key implications for the offshore oil industry
- Regulatory corporate compliance and risk management to reduce human factors on critical safety environmental processes
- An Integrated Operations and Maintenance approach to business and operational process management

For more information, please contact Debra Miller Fleischer at 720-395-6685 or debra@us.ibm.com.

Free parking. Enter from the parking garage on the 1st floor, go through the gift shop (closed to the public), take a right to Grand Hall.

Recent Oil and Gas Industry Upstream Event Held In Houston

Keynote Speakers

Dr. Lee Hunt – President IADC
USCG Rear Admiral Landry

Dr. Thore Langeland – Manager IO, OLF

Theme

It is a small, interconnected world and we need to collaborate to develop and deploy the needed solutions.



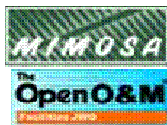
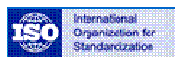
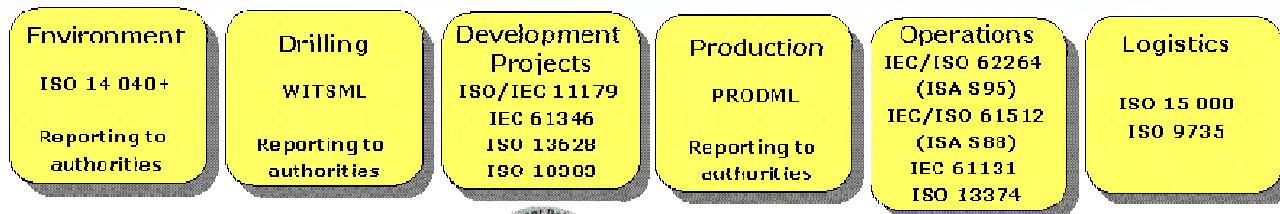
Integrated Operations reduce risks and improve productivity

Dr. Thore Langeland
Manager IO, OLF
September 15, 2010



**Dr. Thore Langeland
Presentation
Selected Slides**

PCA collaborates globally on the oil and gas ontology



Data integration based on ISO 15926 for creating an Oil and Gas Ontology (OGO)



<http://www.posccaesar.com/>



Collaboration between standards organizations is key if we are to enable pragmatic industry solutions where interoperability is fully based on standards.

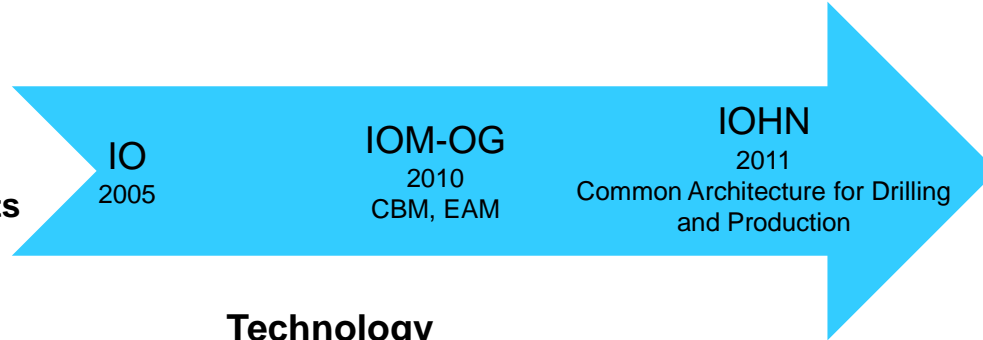
A Proposed Solution Path

Working Together Globally for Common Benefit

Regulation

When possible, industry and government should work together to refine and enhance existing international regulations (such as those developed by the International Maritime Organization) to meet the challenges posed by energy exploration, drilling and production, rather than creating new and potentially conflicting regulations.

**Programs
and
Research Projects**



Technology

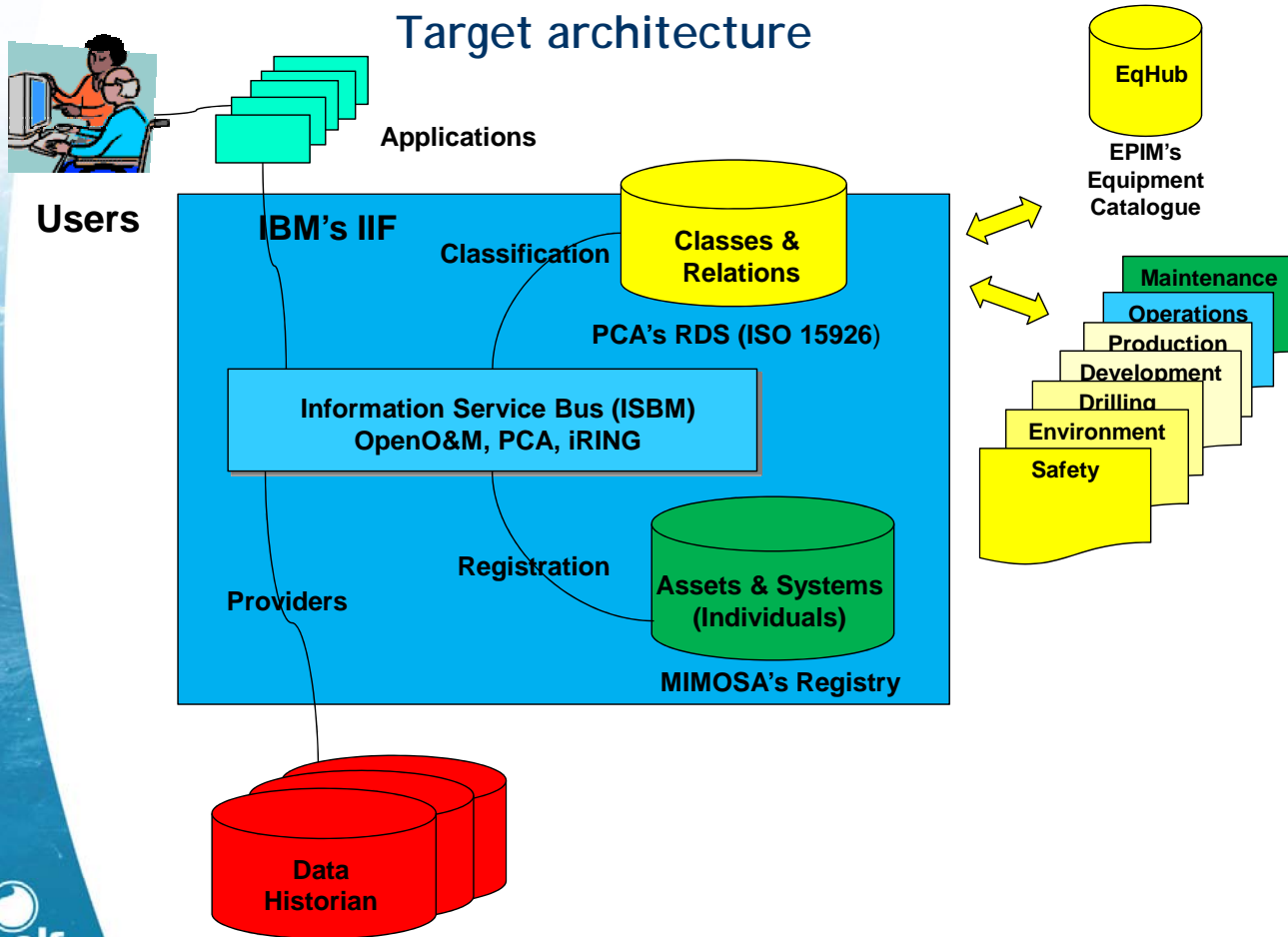
New Technology will help us implement these regulations in practical ways to achieve the needed gains in productivity and risk management. Transparency and timeliness of information availability on-shore should be substantial foci as this will naturally tend to result in better management.

**IO Continues To
Move Forward**

**Maintenance is now
being explicitly added to
enable IOM-OG**

**The IOHN project is now
developing O&M use
cases with a common
information architecture
including both Drilling
and Production**

Target architecture



A Comprehensive Architecture for Sustainable, Risk Managed, Standards-based Interoperability

**Includes:
Capital Projects
Operations
Maintenance
Life-cycle Engineering**

Conclusion

- We are making significant progress in solving key EAM problems through broad, interdisciplinary collaboration including MIMOSA/OpenO&M and POSC Caesar Association (with a focus on ISO 15926)
- The OpenO&M Initiative has established strong momentum
 - ✓ Feb 2010- Established a formal OpenO&M sub-committee under MIMOSA, putting all OpenO&M specifications under MIMOSA IPR Policy (Copied from OASIS)
 - ✓ June 2010 - OpenO&M Specifications Published (CIR and ISBM) - MIMOSA CCOM 3.2.3 Published - UML Driven Web Services
- Engineering Asset Management and the CIEAM organization are providing required multi-disciplinary, asset-centric principals
- December 30, 2010 - Chevron becomes a MIMOSA Sponsor
- February 11, 2011 – Japan Becomes 5th nation officially supporting the ISO OGI Proposal – This will now officially move forward! – Still seeking other participants
- February 22 - Woodside becomes a MIMOSA Sponsor

**Further information about OpenO&M and MIMOSA
is available on the MIMOSA website at**

www.mimosa.org

