



MIMOSA and the OpenO&M™ Initiative

Enabling Open Standards-based Interoperability
for Operations & Maintenance (O&M)
People, Processes and Systems

19 - 22 June 2006
Congress Center Basel, Switzerland

Alan T. Johnston
MIMOSA President
OpenO&M™ Initiative Chair

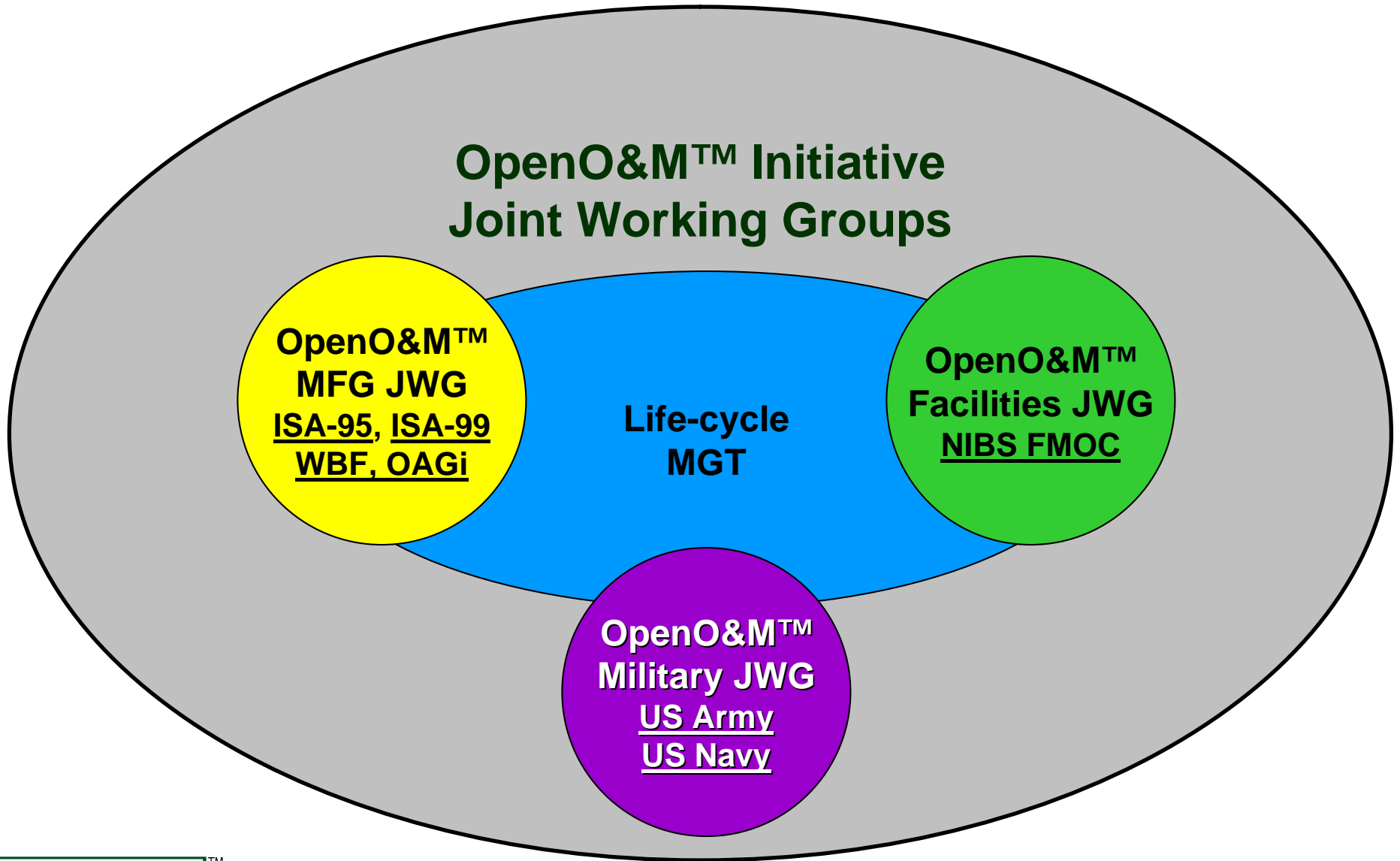


Presentation Themes

- There is a growing understanding of the need to enable diverse O&M related people, processes and systems to properly communicate (or interoperate) with each other in order to achieve operational excellence.
- Standards are not an end unto themselves. They should help enable better, faster, cheaper solutions to achieve and sustain operational excellence.
- MIMOSA & the OpenO&M Initiative enable practical open standards based interoperability solutions today.
 - ✓ Even though academics properly participate, the associated standards are not research projects.
 - ✓ They are driven by business requirements and based on applied engineering.
 - ✓ They provide common “language” and communications mechanisms (or transport) to enable diverse people, process and systems to interoperate.
- The OpenO&M Joint Working Groups are leading the way with key projects.
 - ✓ Owner/operator led
 - ✓ Vendor supported
 - ✓ MIMOSA facilitated
- Maintenance & reliability professionals have a key opportunity to be full peer partners in achieving and sustaining operational excellence.

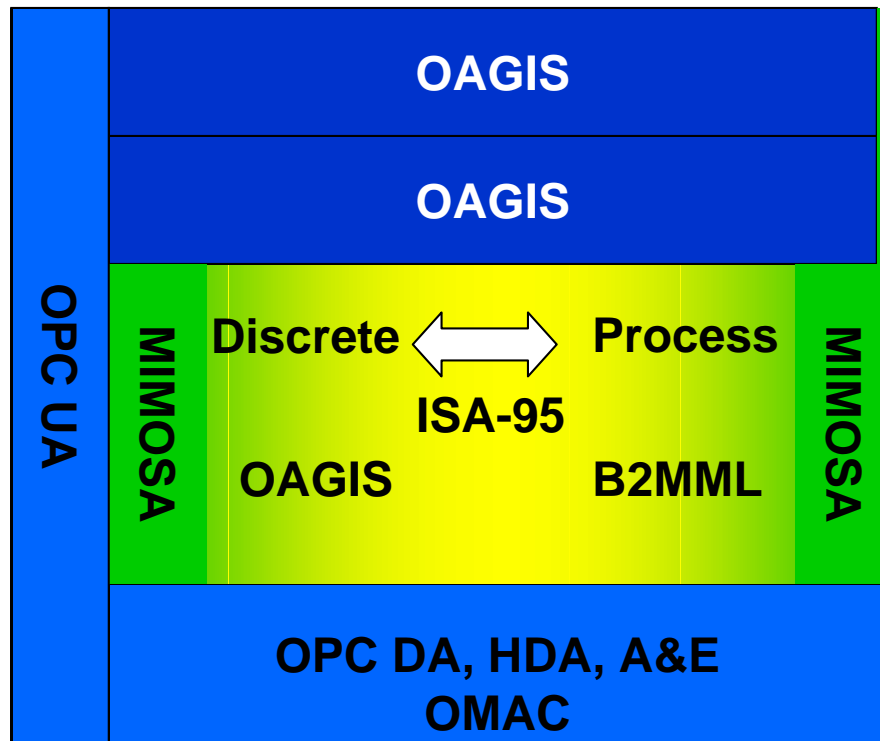


Participating Standards Organizational Model



Vision

OpenO&M™ Manufacturing Domain Mapping



Inter-Enterprise

OAGIS standards enable business information system interoperability.

Enterprise

Manufacturing Operations

ISA-95 provides process manufacturing conceptual standards to enable O&M process interoperability.

Machine

MIMOSA and B2MML are Implementation Architectures which support the ISA-95 O&M Concept Models. Together, they provide a common “Language” to enable interoperability for people, processes and systems involved in plant O&M.



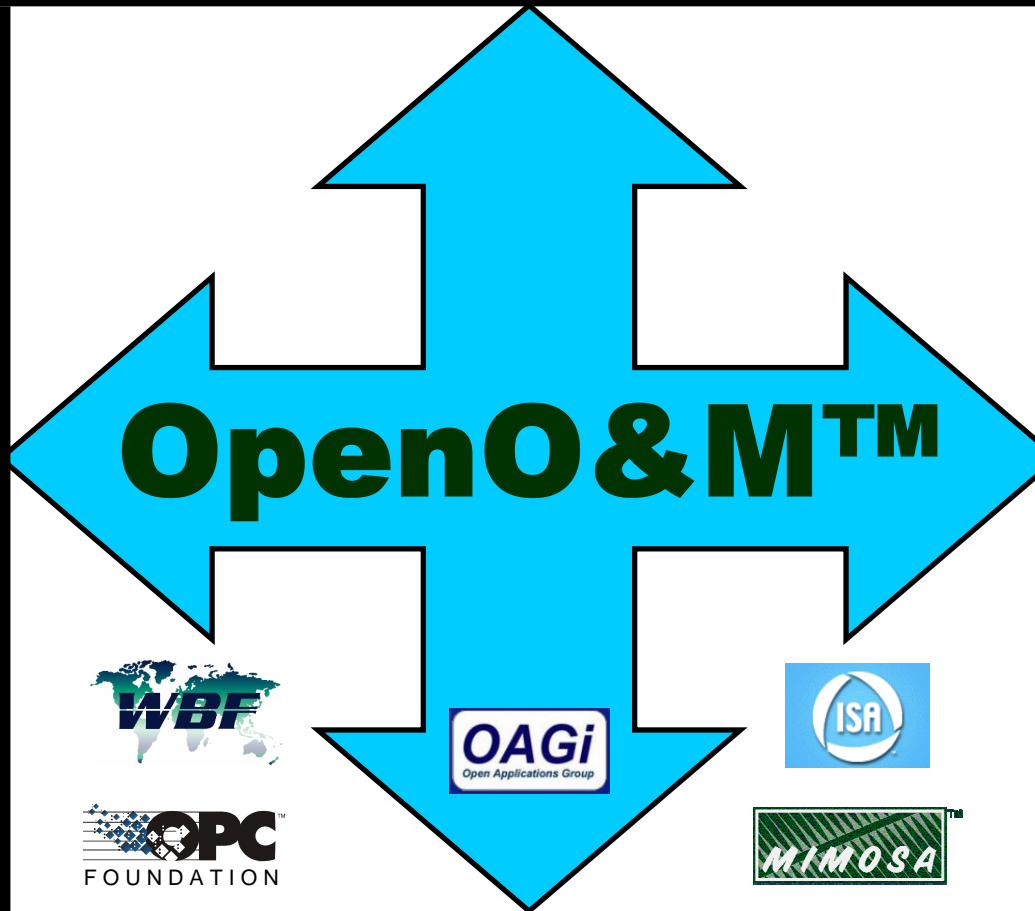
OPC enables shop floor Data acquisition & transport with existing DA and future UA.



The OpenO&M™ Solution: Open Standards & Collaboration Fill the Gaps

Operations

Maintenance



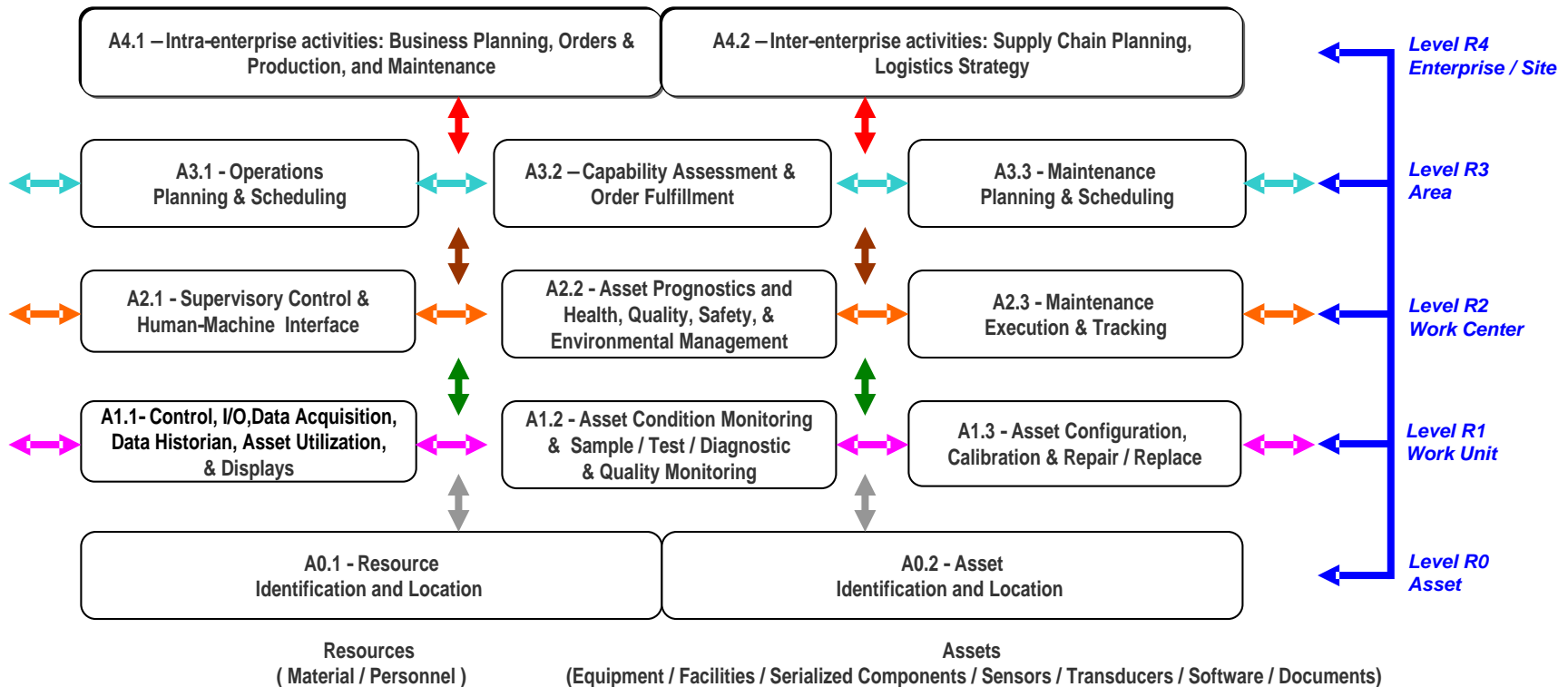
**Physical Asset Control
Real-time Systems**



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]

BP Enterprise Information Architecture



SAP – Open O&M Presentation

Ken Dunn Enterprise Architecture

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BP Enterprise Information Architecture

BP Business



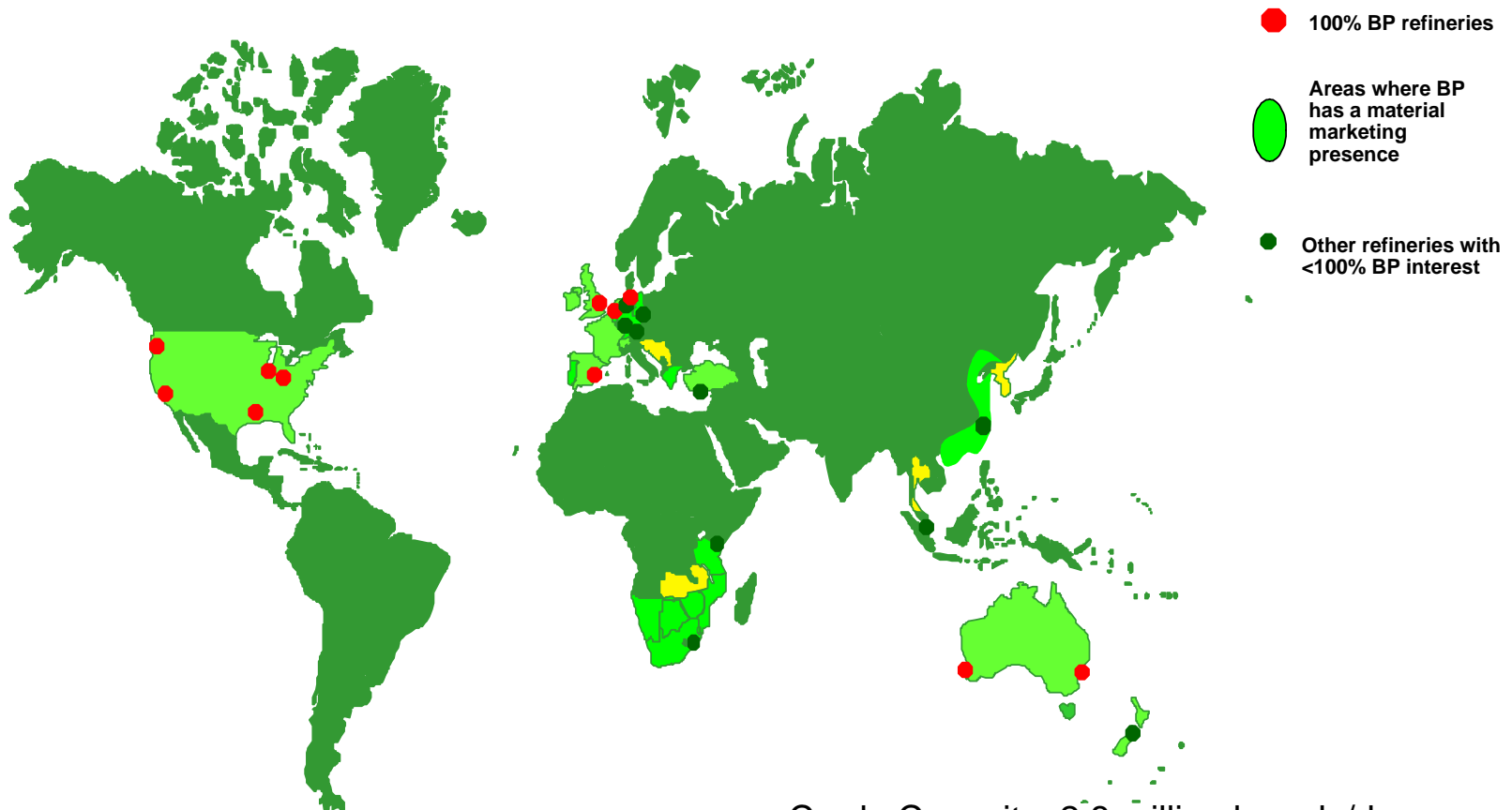
Our business is about finding, producing and marketing the natural energy resources on which the world depends

- Number 2 in Fortune Global 500
- 2005 Revenue ~\$320B
- 1998 Revenue ~\$40B
- 100+ Countries
- 28,000 Service Stations
- 30 Refineries



BP Enterprise Information Architecture

BP Refining Operations



Crude Capacity: 2.8 million barrels/day

Refined Product sales: 6.4 million barrels/day

Source: Blackwells, 3Q 2003. Russian interests not represented & Innovene removed

BP Enterprise Information Architecture

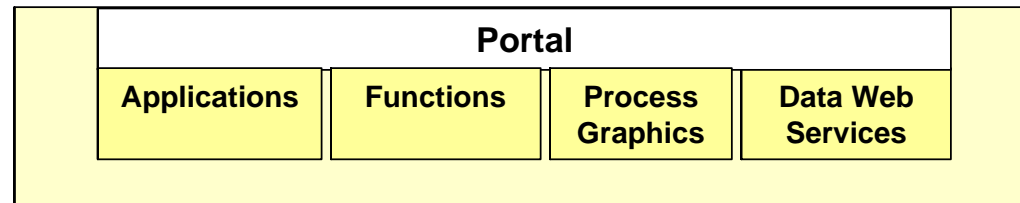
Open O&M Usage Scenario 1 – Application Integration



User Access



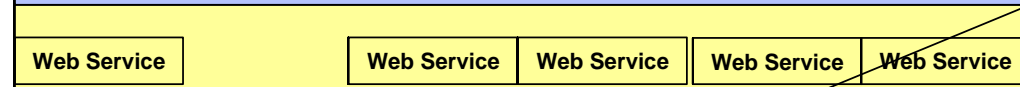
Environment & Applications



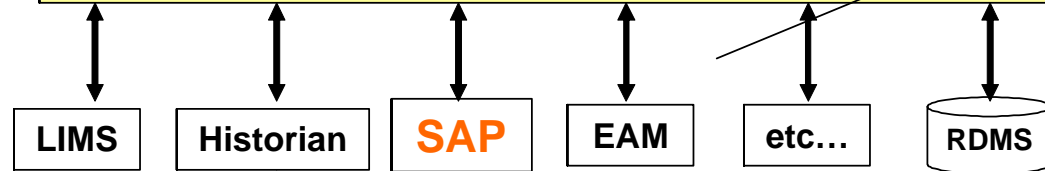
Data Mgmt



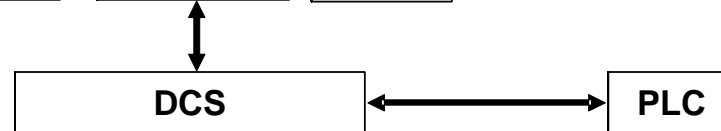
Data Interfaces



Legacy Systems



Controls



Equipment & Devices



Ideally application provides Open O&M compatible Web Service

BP Enterprise Portal Project - eRTIS



BP Refining's Portal: Use of standards and future needs

- Michael Knight - BP Refining Supply Chain Advisor
- ARC Next Generation Manufacturing Forum, February 2006

BP Enterprise Portal Project - eRTIS

BP Refining's heritage



- BP Refining has grown through acquisition
 - Mobil (Europe)
 - Amoco (USA)
 - ARCO (US West Coast)
 - Veba (Rhine Region - Germany)
- IT Systems heritage is diverse
 - Enterprise Asset Management Systems (Maximo, SAP, Teroman, MIMS, other)
 - Laboratory management systems diverse (Sample Manager, WinBliss, other)
 - Multiple Real-time Historians (PI, PHD, IP21)
- Each Refinery historically has had autonomy of IT acquisition/implementation
- Diverse Information Landscape

BP Enterprise Portal Project - eRTIS

Approach



- **Problem:**
 - Diverse IT infrastructure
 - Capability to effect corporate business process change hampered by IT Information, applications & infrastructure divergence at sites
- **Requirements:**
 - Project to provide common operating environment & integration infrastructure for 14 majority owned BP Refineries
- **Solution:**
 - Common Data Model
 - Common Integration & Application Infrastructure (Mega Centre)
 - Common Applications (8 Operations & Maintenance Composite Applications)

BP Enterprise Portal Project - eRTIS



Where we are today

- Current Applications suite being embedded in the business
 - Application owner teams
 - General environment (data model) has business ownership
- Mimosa Data Model maps to our Operations & Maintenance requirements
- MIMOSA is being used as more than an interface standard – it is a the heart of our portal integration solution and will form a significant portion of our future Refining Roadmap and the basis of links to the trading organisation
- So what next

BP Enterprise Portal Project - eRTIS

Way forward

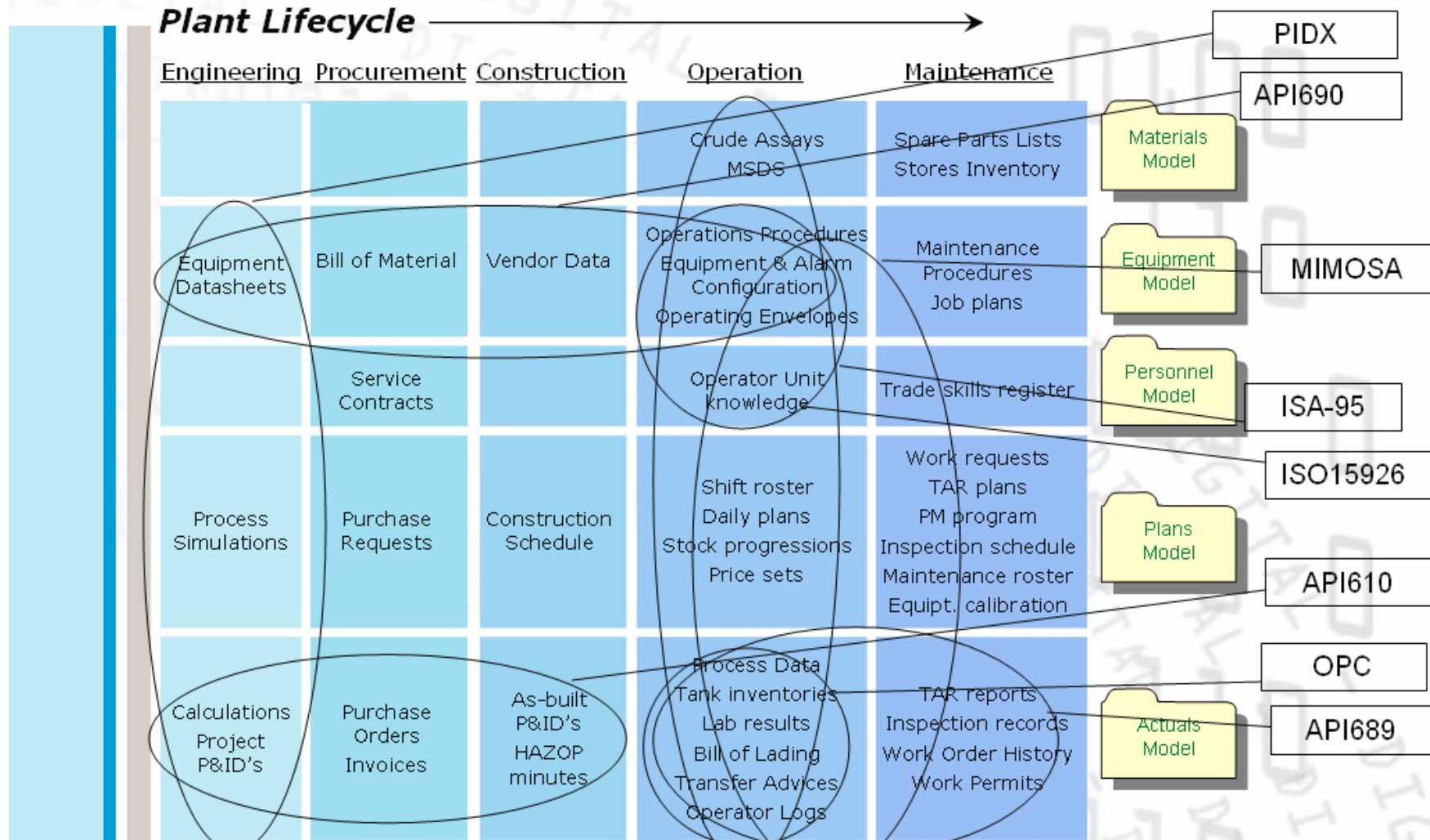


- We will support OpenO&M
 - Scope fits well with business needs
 - S95 and Mimosa seen as the way ahead
 - Balance between Operations and Maintenance priorities
- We will work with suppliers as needed
 - e.g. AspenTech Foundation Client Program
- We will continue to work with some other specific standards bodies
 - e.g. CAPE-Open CoLan
- We will continue to implement in a carefully managed program

Chevron Concurrence With BP Refining Standards Analysis








Data Model Mapping – just one look



2006 Updated Analysis From BP Reflecting MIMOSA 3.x

Data Model - mapping of Industry standards to requirements

-  PISTEP / PIDX
-  ISA-95
-  MIMOSA
-  OPC
-  ISO 14224

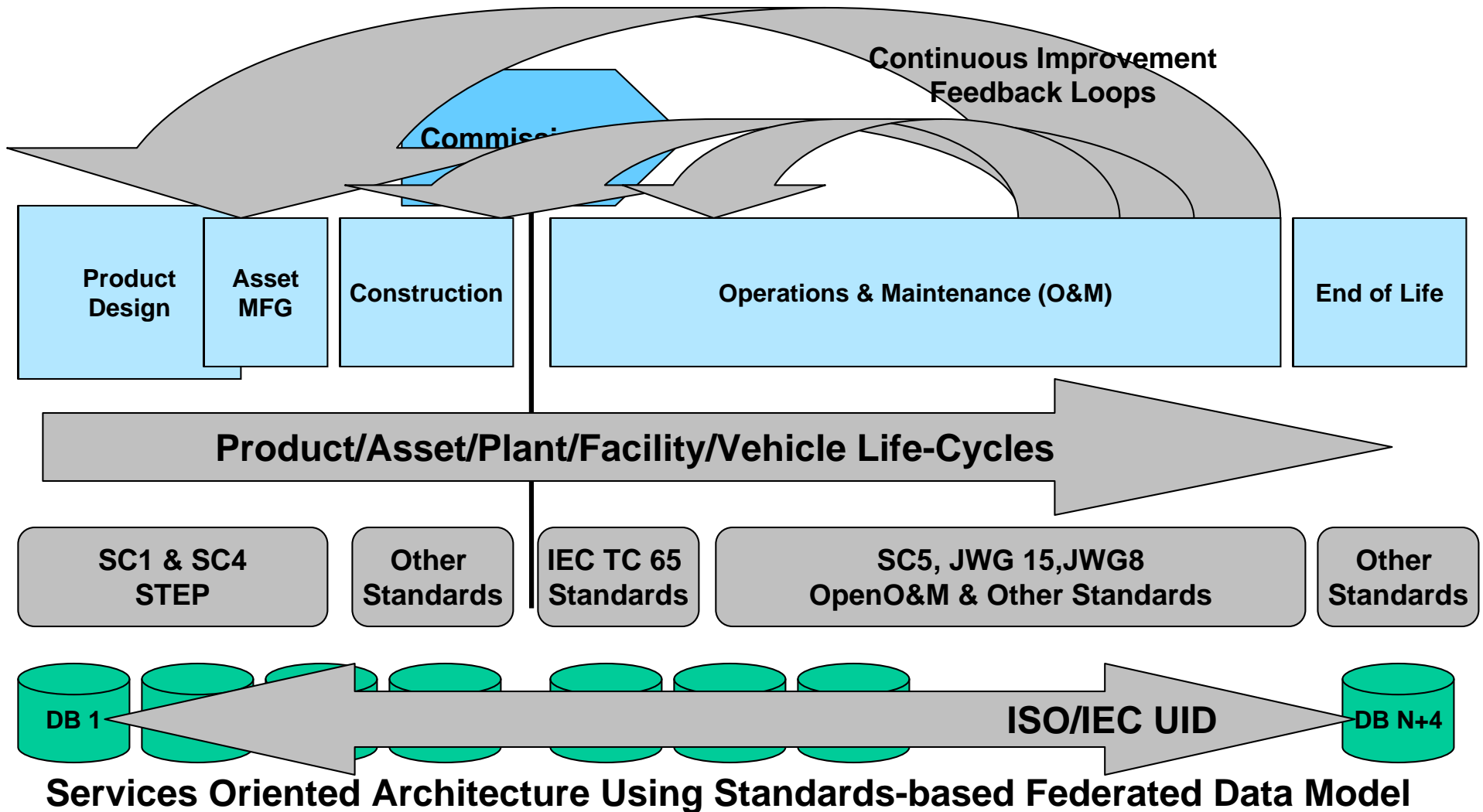


Plant Lifecycle					
Engineering	Procurement	Construction	Operations	Capability (Maintenance & Reliability)	
Material Specifications	Piping Specifications Material Master Catalogs	Tool Catalogs	Crude Assay MSDS	Spare Parts Lists Stores Inventory Material Reliability Data Model Part Reliability Data	<i>Materials Model</i>
Vendor Catalogs	Bill of Material	As-Installed Equip. Data	Operations Procedures Alarm Configuration As-Operated Equip. Data Operating Envelopes	Maintenance Procedures Job Plans As-Maintained Equip. Data Component Install. Data As-Operated Reliab. Data	<i>Equipment Model</i>
Vendor Contracts Engineering Contracts Eng. Capability Assess.	Service Contracts	Contracted Services Tracking	Operator Unk. Knowledge	Trade Skills Register Root Cause Analysis Data	<i>Personnel Model</i>
Design Requirements	Purchase Requests	Construction Schedule	Shift Roster Daily Plans Stock Progressions Price Sets	RCM/FMECA Analysis Data Work Requests TAR Plans PM Program Inspection Schedule Maintenance Roster Equipment Calibrations Equip. Capability Forecast	<i>Plant Model</i>
Calculations Project P&ID's	Purchase Orders Invoices	As-built P&ID's Hazard Minutes	Tag/Monitoring Locations Process Data Tank Inventories Lab Results Bill of Lading Transfer Advices Operator Logs	TAR Reports Fault Data w/ Op. Param. CBM Data / Exceptions Component Tracking Inspection Records Work Order History Work Permits	<i>Actuals Model</i>

ISO TC184 Manufacturing Asset Management Integration Task Force – Chair- Alan T. Johnston

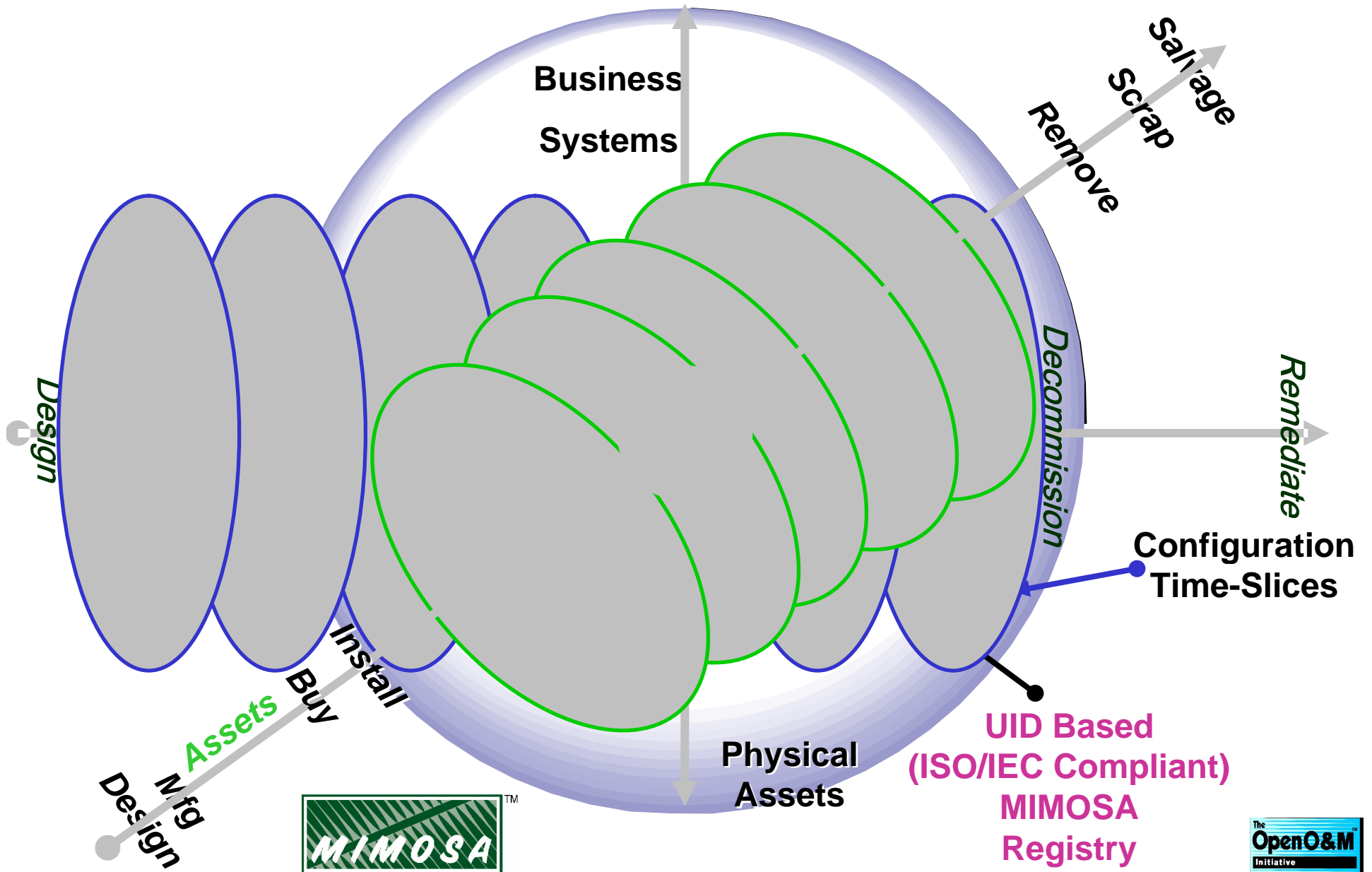
Total Life-Cycle Summary

(Potential Harmonized Implementation Model-DRAFT)

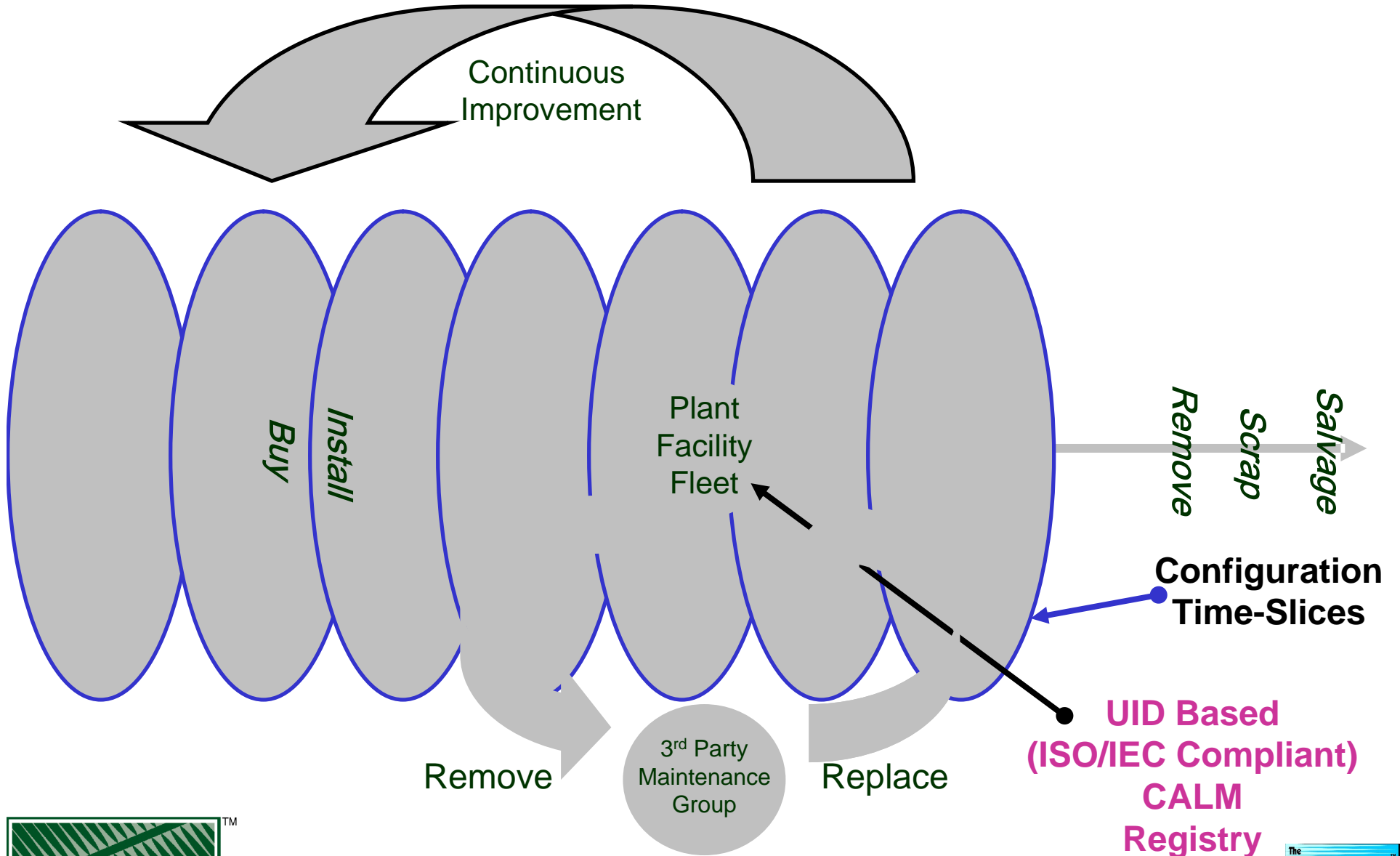


Enabling Collaborative Asset Life-cycle Management

Reliability Management - Configuration Management Model



Collaborative Asset Life-cycle Management Reliability Management Tracing & Tracking Model - A



MIMOSA Summary



An Operations and Maintenance Information Open Systems Alliance

- A 501 (c) (6) non profit organization
- Funded by membership and collaborative projects
 - ✓ Vendors
 - ✓ Integrators
 - ✓ End-Users
- Publishing interoperability standards & specifications
 - ✓ **Free public licensing of final versions since 1998**
 - ✓ Members licensing of work in progress
 - Standards & Specifications
 - Tools & Technology



MIMOSA Collaboration For OpenO&M™

- MIMOSA Center of Excellence: U.S. Army AMRDEC SED
- SMRP: Mapping MIMOSA Stds To SMRP Body of Knowledge
- ISO Draft STD 18435: TC 184/SC 5/WG 7–D-Liaison (O&M Integration)
- Chair ISO TC184 Manufacturing Asset Management Integration Task Force
- ISO STD 13374: TC108/SC 5 - Condition Monitoring & Diagnostics-
MIMOSA is the Informative Reference



Technical Committee 108
Sub-Committee 5

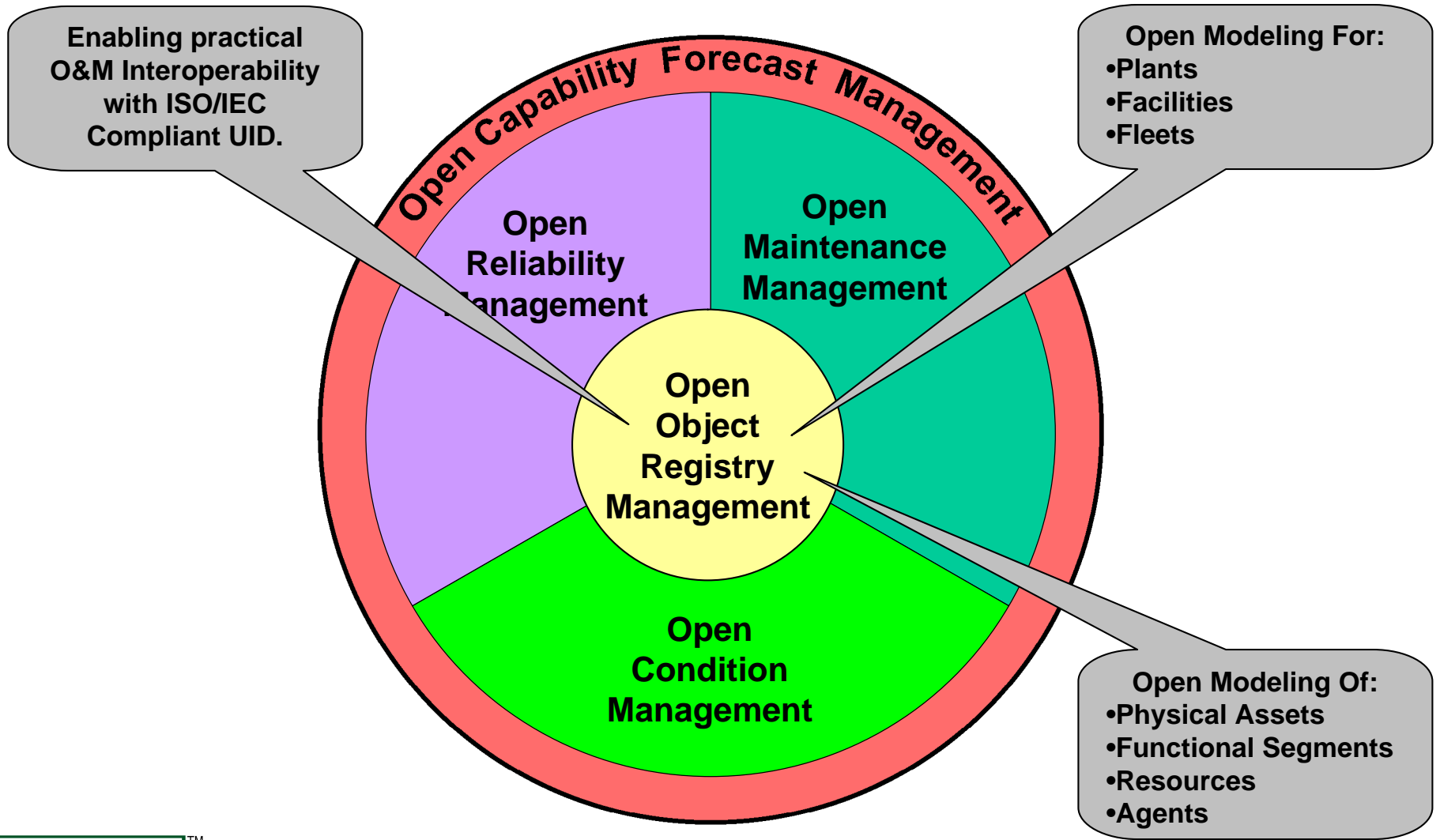


Accredited Standards
Committee S2



MIMOSA

Open Asset Management Information Model



MIMOSA Open Systems Architecture for Enterprise Application Integration (OSA-EAI) Building Common Language for O&M Interoperability

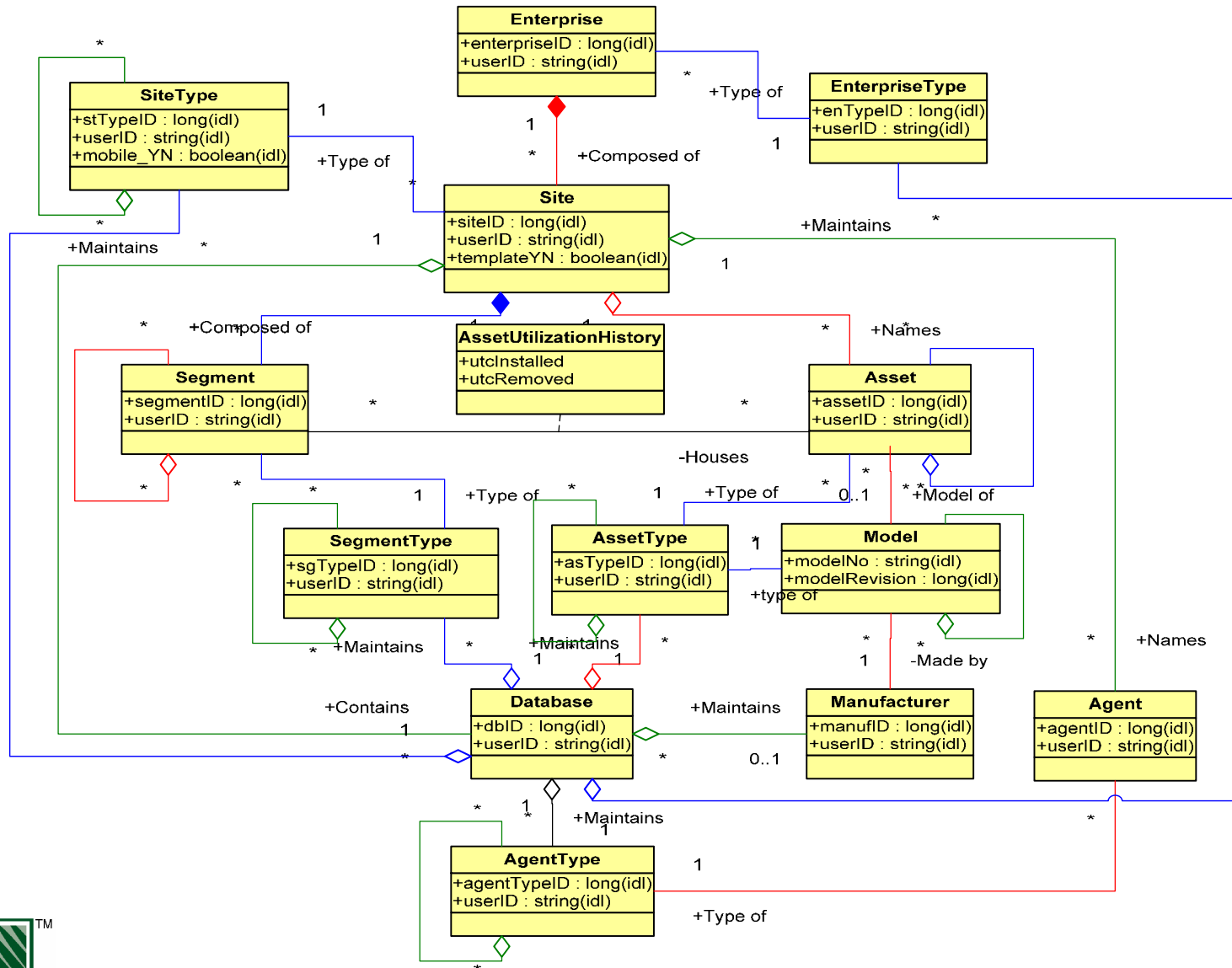
<i>Tech-File Export For XML File Exports</i>	<i>Tech-CDE for Web Services Clients & Servers</i>	<i>Tech-Web For HTTP Tech-XML Clients & Servers</i>	<i>Tech-XML For Web Services Clients & Servers</i>	EAI Application Interoperability
<i>Tech-Doc CRIS Content Producer/Consumer XML Schema</i>	<i>Tech-CDE Large CRIS Data Transaction Client & Server Schema</i>	<i>Tech-XML Small CRIS Data Transaction Client & Server Schema</i>		XML Content
CRIS Reference Data Library				MetaData Taxonomy
Common Relational Information Schema (CRIS)				Implementation Model
OSA-EAI Common Conceptual Object Model (CCOM)				Conceptual Model
OSA-EAI Terminology Dictionary				Semantic Definitions

Technologies Support [*Tech-*]

REG (Object Registry Management)
 WORK (O&M Agent Work Management)
 DIAG (Diagnostics / Prognostics / Health Assessment)
 TREND (Operational Scalar Data & Alarms)
 DYN (Dynamic Vibration/Sound Data & Alarms)
 SAMPLE (Oil/Fluid/Gas/Solid Test Data & Alarms)
 BLOB (Binary Data/Thermography Data & Alarms)
 REL (RCM/FMECA/Model Reliability Information)
 TRACK (Physical Asset GeoSpatial Tracking Info.)



MIMOSA Open Object Registry Reg Core



OpenO&M™ - 2006 Key Opportunities to Participate

- **OpenO&M MFG Joint Working Group Collaboration Activities**
 - ✓ On Going – Weekly Conference Calls
 - ✓ Owner/Operator led, Vendor Supported, MIMOSA Facilitated
 - ✓ Pilot Projects and Production Projects moving forward in 2006
- **ARC's Fourteenth Annual Forum:**
 - ✓ Driving Enterprise Performance through Next Generation Manufacturing Concepts
 - ✓ June 26-28, 2006 - Boston, Massachusetts
 - ✓ OpenO&M MFG JWG Owner/Operator Panel to present collaboration on pilot projects (BP, Nova Chemical, Suncor)
- **MIMOSA Technical Committee & OpenO&M MFG JWG Meetings**
 - ✓ ISO TC184 MAMI Task Force Meeting co-located
 - ✓ September 6-8
 - ✓ Calgary, Canada
- **ISO TC184,SC5,WG7 Meeting**
 - ✓ September 11-13, 2006
 - ✓ Tokyo Japan
- **ISA Expo 2006**
 - ✓ October 17-19, 2006
 - ✓ Reliant Center - Houston Texas
 - ✓ Discuss Pilot Projects & Upcoming Demo
- **2006 International Maintenance Conference (IMC)**
 - ✓ December 5-8, 2006 – Daytona Beach, Florida
 - ✓ OpenO&M Interoperability Demonstration



OpenO&M™ Initiative For Maintenance and Reliability Professionals Summary

- Open standards-based O&M interoperability is achievable now for substantial functional domains
 - ✓ Business Focused – Achieving Operational Excellence by fully leveraging O&M people, processes and systems
 - ✓ Practical - The OpenO&M Initiative is focused on practical, applied engineering, not research projects
- Significant open standards-based interoperability projects are proceeding
 - ✓ End-user led
 - ✓ Vendor Supported
 - ✓ MIMOSA Facilitated
- Developing an OpenO&M Economic Opportunity Model For Process Industries
 - ✓ Objective – Help establish a consensus industry economic opportunity model for O&M related investments
 - ✓ Inclusive of direct and indirect cost savings including risk management
 - ✓ Strong focus on identifying opportunity for gains to top-line
 - ✓ In collaboration with ISA
- The OpenO&M Initiative provides an important opportunity for Maintenance and Reliability professionals to fully contribute as peer-partners in the development and use of comprehensive enterprise information models
- Get involved now or live with systems created without your expertise!

