CBM+ In The Context of Asset Life-cycle Management and Industry Standardization Activities

OSIsoft Federal Workshop
Huntsville, AL
April 16, 2015

Alan Johnston

MIMOSA President

ISO TC 184/WG 6 Convener

Standards Leadership Council Co-chair

MIMOSA Summary

- Focus on Physical Asset Life-Cycle Management
  - Conceptualization through End of Life
  - Digital Asset, Physical Asset, **Condition** , Maintenance and Reliability Management
- Develops and publishes industry-driven standards in alignment with ISO and IEC
- Officially organized as a 501 c(6) non-profit industry association in 1997
- International Membership
  - ✓ Owner/Operators – Oil and Gas, Chemical, Aerospace and Defense Sectors
  - ✓ Suppliers/integrators
  - ✓ Academia/Researchers
  - ✓ Industrial Media
- Very Large number of non-member users and project participants
- Founding Member and IP Manager for OpenO&M™ Initiative
- Founding Member Standards Leadership Council

MIMOSA™

Key Asset Management Problems in Industry, US Army and Joint Military Services

- Require improved sustainment & availability, with improved risk management & lower costs
- Increasing complexity of systems and systems of systems
- Increasing regulatory pressure (particularly Safety, Health and Environmental)
- Challenges with Asset Information Management
  - Diversity of often proprietary systems and methods – (Aviation, Ground and Sea)
  - Inconsistent practices with Identifier Management (Functional Locations, Assets, Components)
- Handover (Platform Builder to O/O) is often chaotic and inefficient
  - Contracts with Platform Builders are not specific enough with respect to providing all information required for handover to O&M in consistent, machine interpretable formats
  - Digital Asset is never aligned with the Physical Asset
- Condition & Operations Data volume is growing quicker than management methods
- **Custom Application Development and Traditional Systems integration is too expensive and too fragile with high recurring costs**

MIMOSA™

Critical Intersection for a Supplier Neutral Ecosystem Enabling Multi-domain Systems Interoperability

Enterprise Business Systems

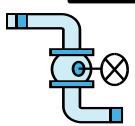
Big Data and Analytics

Supplier Neutral Open Specifications

LIFE CYCLE ENGINEERING Systems

CBM

Automation & Control Systems Platform Integrators



MIMOSA™

System of Systems

- **A System of Systems** (SoS) is a collection of task-oriented or dedicated systems that pool their resources and capabilities together to create a new, more complex system which offers more functionality and performance than simply the sum of the constituent systems. – Wikipedia

- SoS has been developed and is widely used in the aerospace and defense community, but it is now being adopted by many other industry groups
- SoS terminology is linked to the systems engineering community and the International Council on Systems Engineering (INCOSE).

➢ Interoperability is considered to be an intrinsic part of SoS

- ➢ Proprietary approaches have generally not been sustainable
- ➢ Standards provide the rational alternative

MIMOSA™

IEEE Interoperability Definition

- IEEE: The capability…
  - ✓ of two or more systems or elements to exchange information and to use the information that has been exchanged.
  - ✓ for units of equipment to work together to do useful functions.
  - ✓ **that enables heterogeneous equipment, generally built by various vendors, to work together in a network environment.**
  - ✓ **of two or more systems or components to exchange information in a heterogeneous network and use that information.**

MIMOSA™

The Role of Standards in Sustainable Enterprise Solutions

- **Standards help rationalize chaos into widely accepted good practices**
- NGO Standards Organizations such as ISO and IEC
- Industry Standards Organizations – API, ISA, ASME, SAE, MIMOSA…
- Asset Management Practice Standards
  - Such as PAS 55 and ISO 55000
  - Define good asset management practices to be followed
- IT Oriented Standards
  - Such as MIMOSA, ISO 15926, OPC and ISO 18101
  - Enable SoS to properly support PAS 55 and ISO 55000 series good practices

Background on Solutions Activities Where MIMOSA has Played A Key Role

A Historical Perspective in Development of Pragmatic Solutions using Standards-based Interoperability

Aerospace and Defense Sector – SoS - Model, Monitor and Manage

The need for Open Operations and Maintenance Specifications (OpenO&M)

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

MIMOSA Information Network (MIN)

June 21, 2000

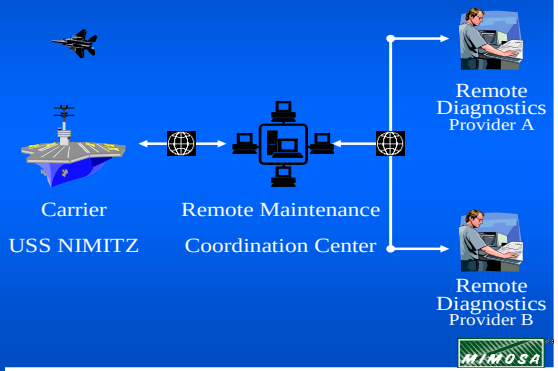
MIN-Viewer

OSA-CBM Presentation

Alan T. Johnston

MIN Project Director

The OSA-CBM MIN Demonstration Concept



MIN-Viewer Segment Navigation 1

User Interface Modeled On The Microsoft Windows Explorer

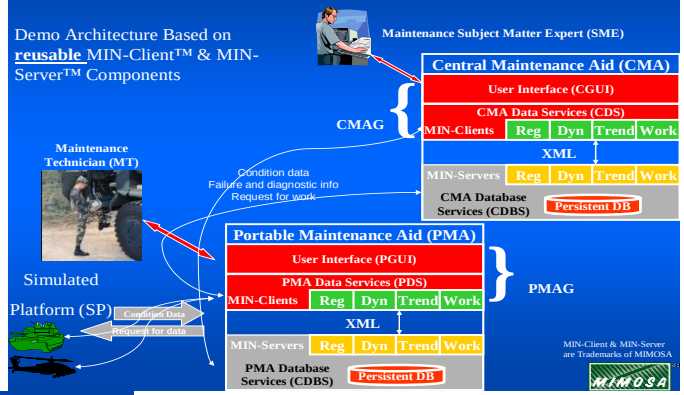
Army Collaborative Telemaintenance – Army CECOM

U.S. Army CECOM
Collaborative Telemaintenance Project

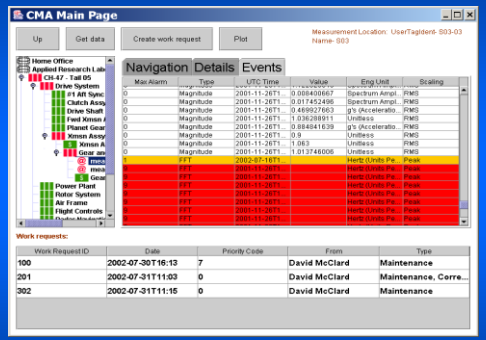
Phase I Demonstration Briefing – July 31, 2002
Alan Johnston – MIMOSA
Kenneth Bever – MIMOSA
Bob Walter – Penn State ARL

U.S. Army Collaborative Telemaintenance Demonstration

Revised 07/03/2002 – Phase I Demonstration



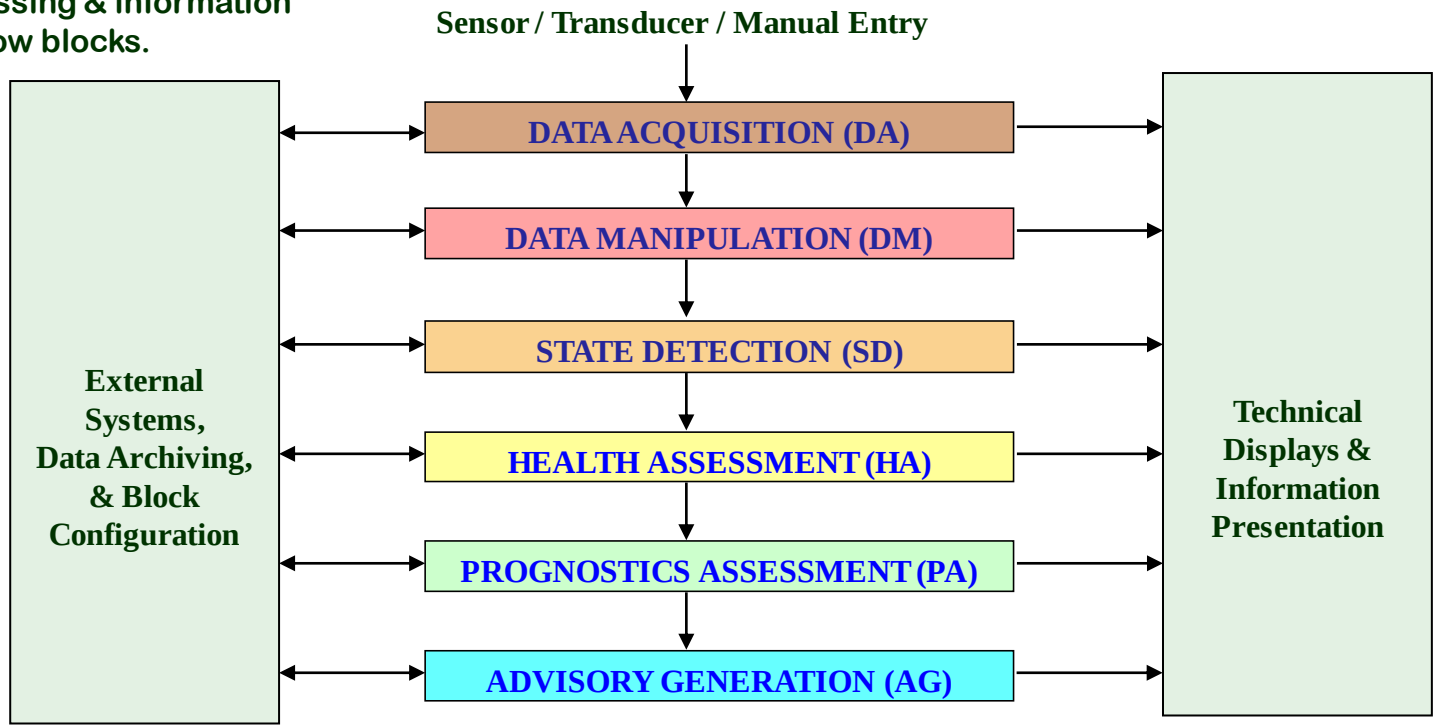
CMA Showing Measurement Events In Alarm



MIMOSA™

ISO 13374 Standard

Machine condition assessment data processing & information flow blocks.



Data Warehousing Architecture

- **Where we are Today**
  - Vetted MIMOSA OSA EAI CRIS
    - **Recommend as the Persistence Layer at LOGSA**
  - Implemented LOGSA Taxonomy in MIMOSA type tables
  - Participating in LIA PoE
    - **Providing - "Enterprise Common CBM DW"**
  - Began Integration of AMCOM CBM DW into the LOGSA Enterprise Common CBM DW 12/31/2007
  - Integrated COBRA data with LOGSA Enterprise Common CBM DW 07/08/2008

- **Action Plan 09**
  - Exercise the LOGSA Enterprise Common CBM DW
    - **Analytical Analysis**
      - Enterprise Data Mining
      - Oracle BI
  - Develop the following tools
    - **Platform Integration Management Module**
    - **Taxonomy Management Tool**
    - **Enterprise My CBM+ tool**

UNCLASSIFIED

UNITED STATES ARMY LOGISTICS

UNCLASSIFIED

CBM+ IT Bridging Infrastructure

25 Sep 2012

Ken Beam
U.S. Army Logistics Innovation Agency
https://lia.army.mil

ALWAYS THERE.

ALWAYS READY.

UNCLASSIFIED

UNITED STATES ARMY LOGISTICS

UNCLASSIFIED

Acquisition Manager's Guide to CLOE/CBM+ (AMG2CC) And Dashboard

AMG2CC Conference

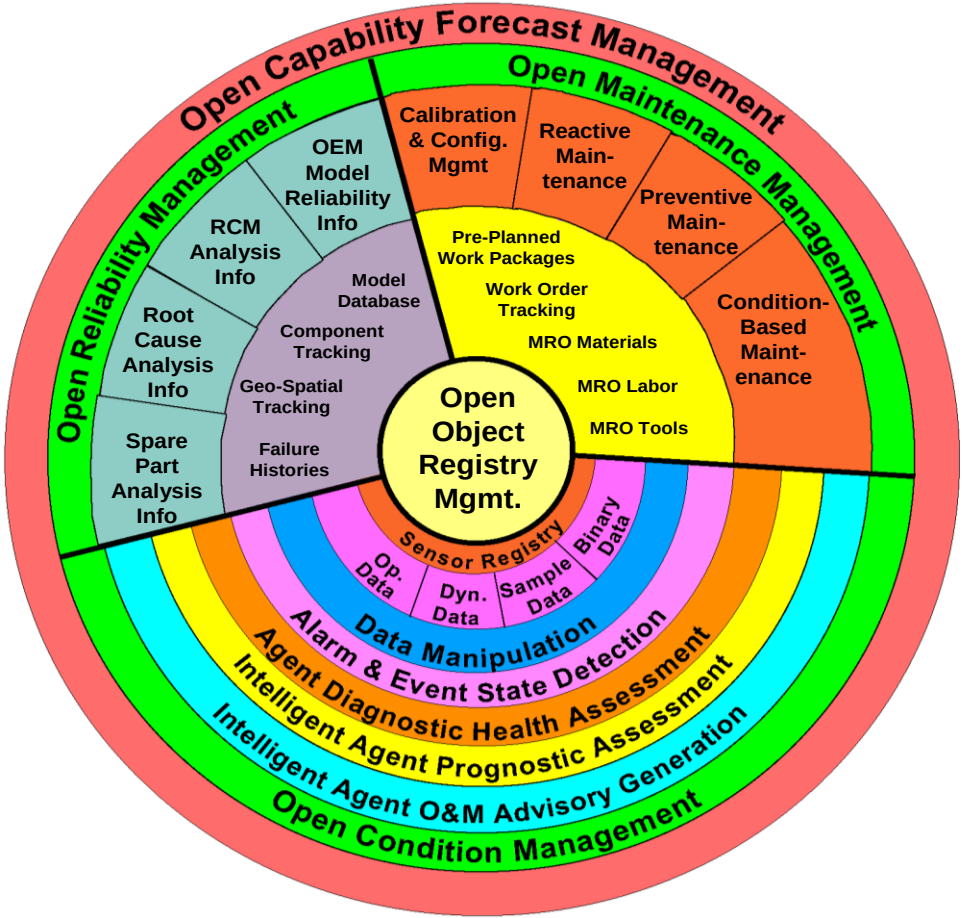
25 February 2015

U.S. Army Logistics Innovation Agency
https://lia.army.mil

ALWAYS THERE.

ALWAYS READY.

MIMOSA Open Systems Architecture
Information Domain Summary (2007)

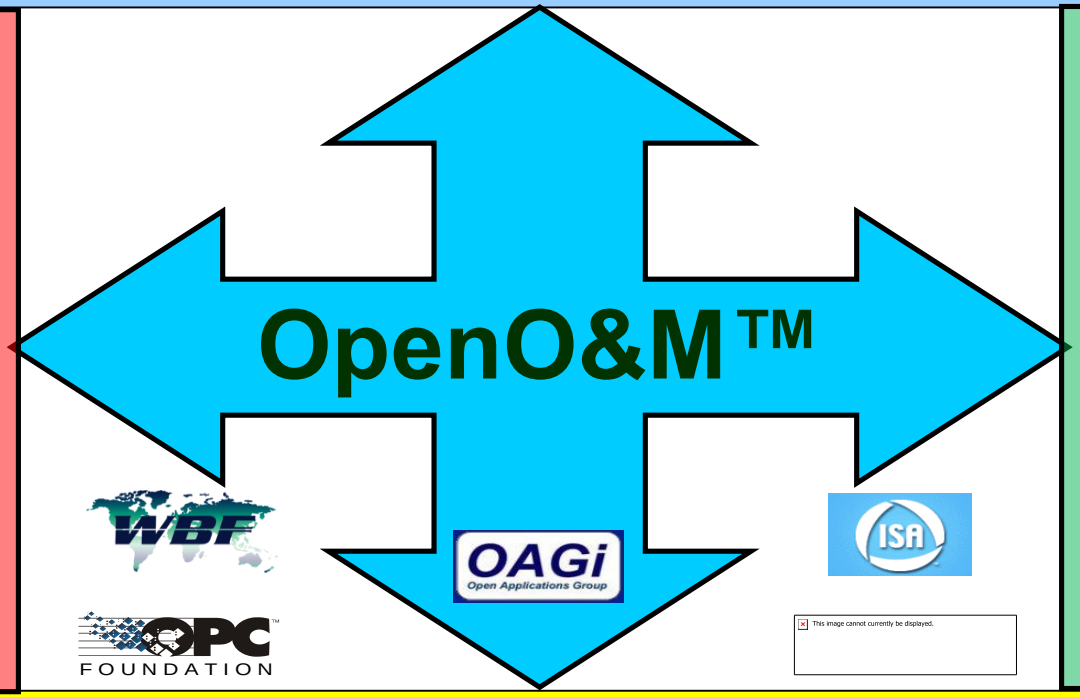


MIMOSA™

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

Enterprise Business Systems
Enterprise Resource Planning (ERP)

Operations



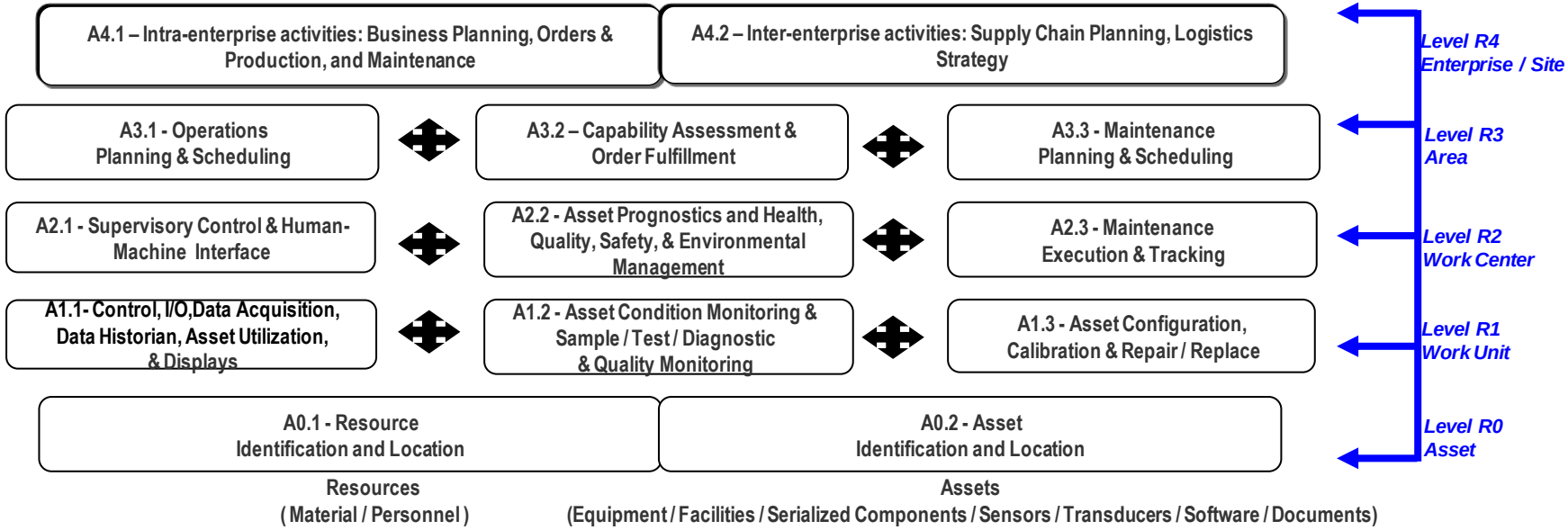
Maintenance

Physical Asset Control
Real-time Systems

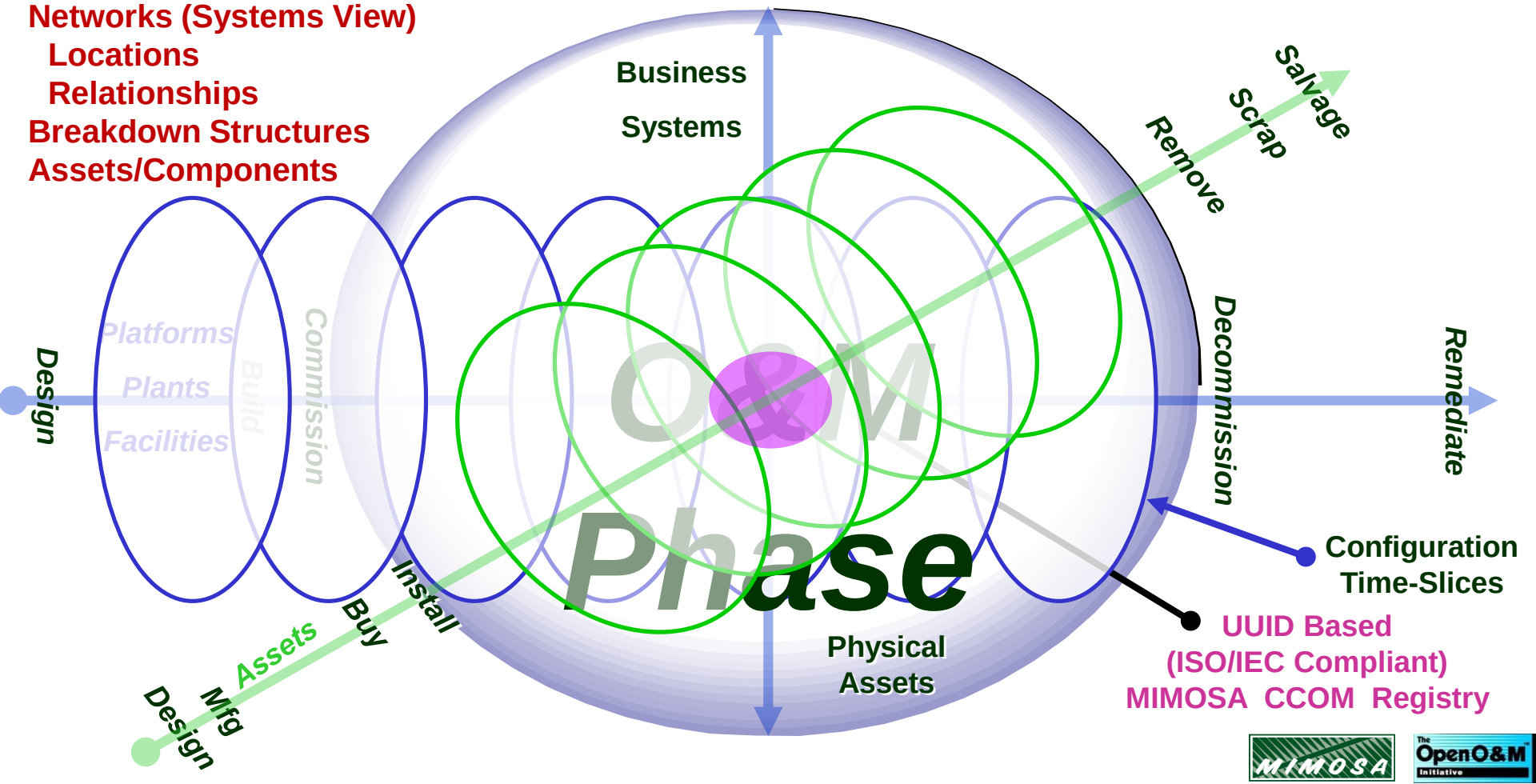
Formed 2006

ISO 18435 - 1
Application Domain Integration Diagram

Application Domain Integration Diagram

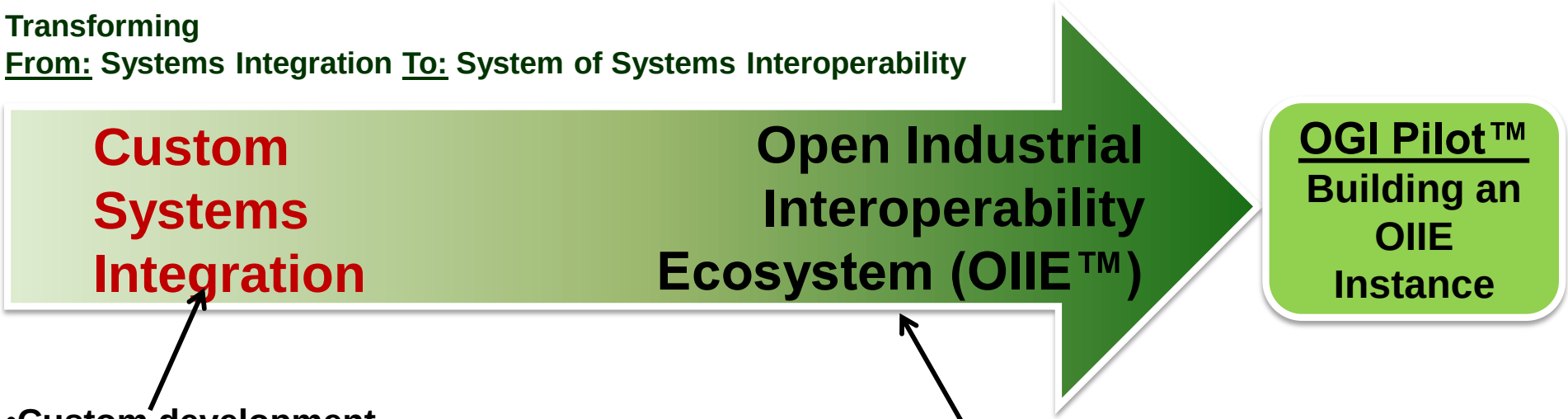


MIMOSA CCOM Asset Information Model



Key Objective

Transforming
From: Systems Integration To: System of Systems Interoperability

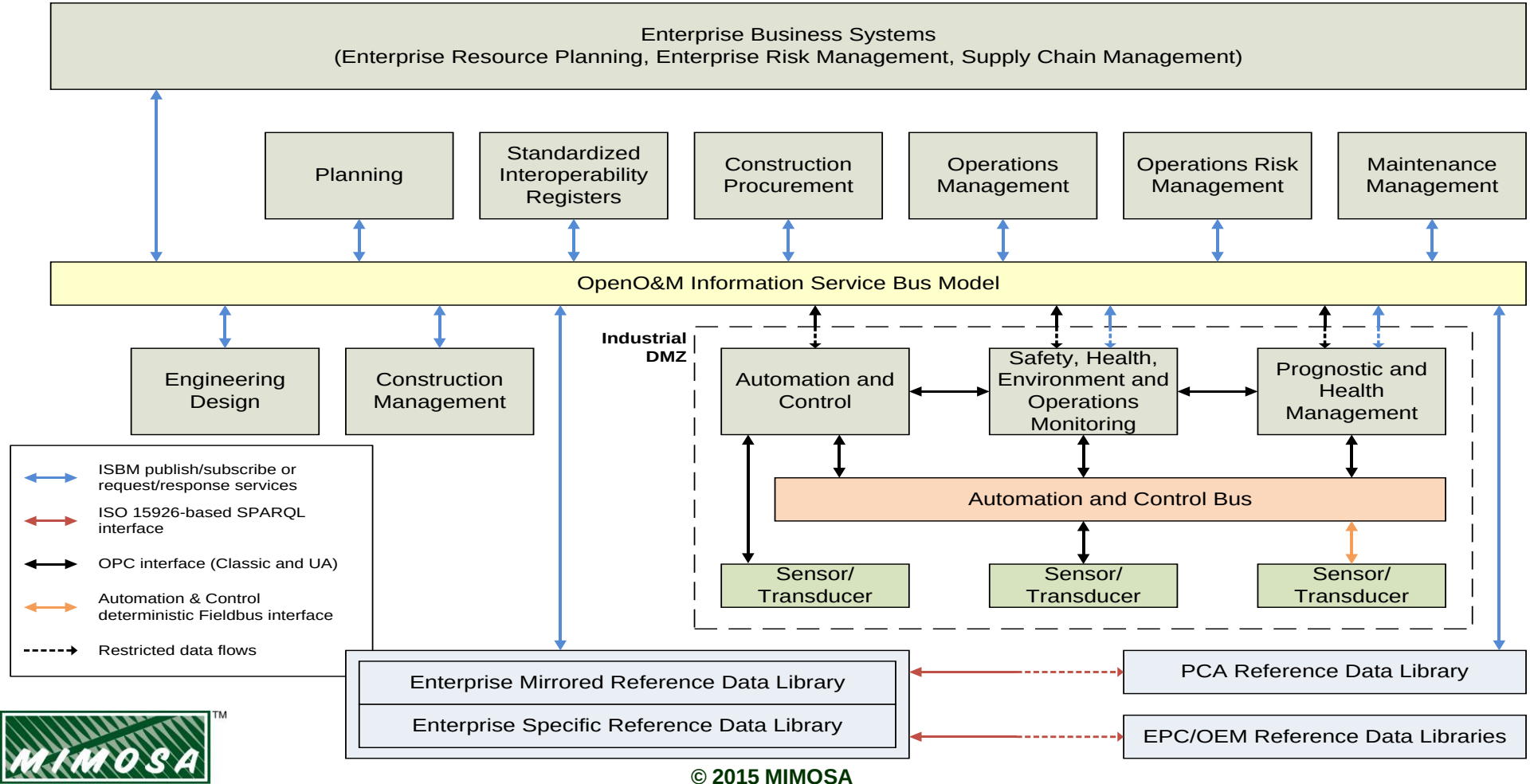


- Custom development
- Application Specific data adapters
- Owner/operator responsible for sustainment
- Too Expensive and Too Fragile

- Commercial off the Shelf (COTS) Applications
- Standardized OIIE Adapters (Plug and Play)
- Cloud Friendly Solutions Architecture
- Configuration rather than customization & integration
- Defined by, published supplier neutral open standards

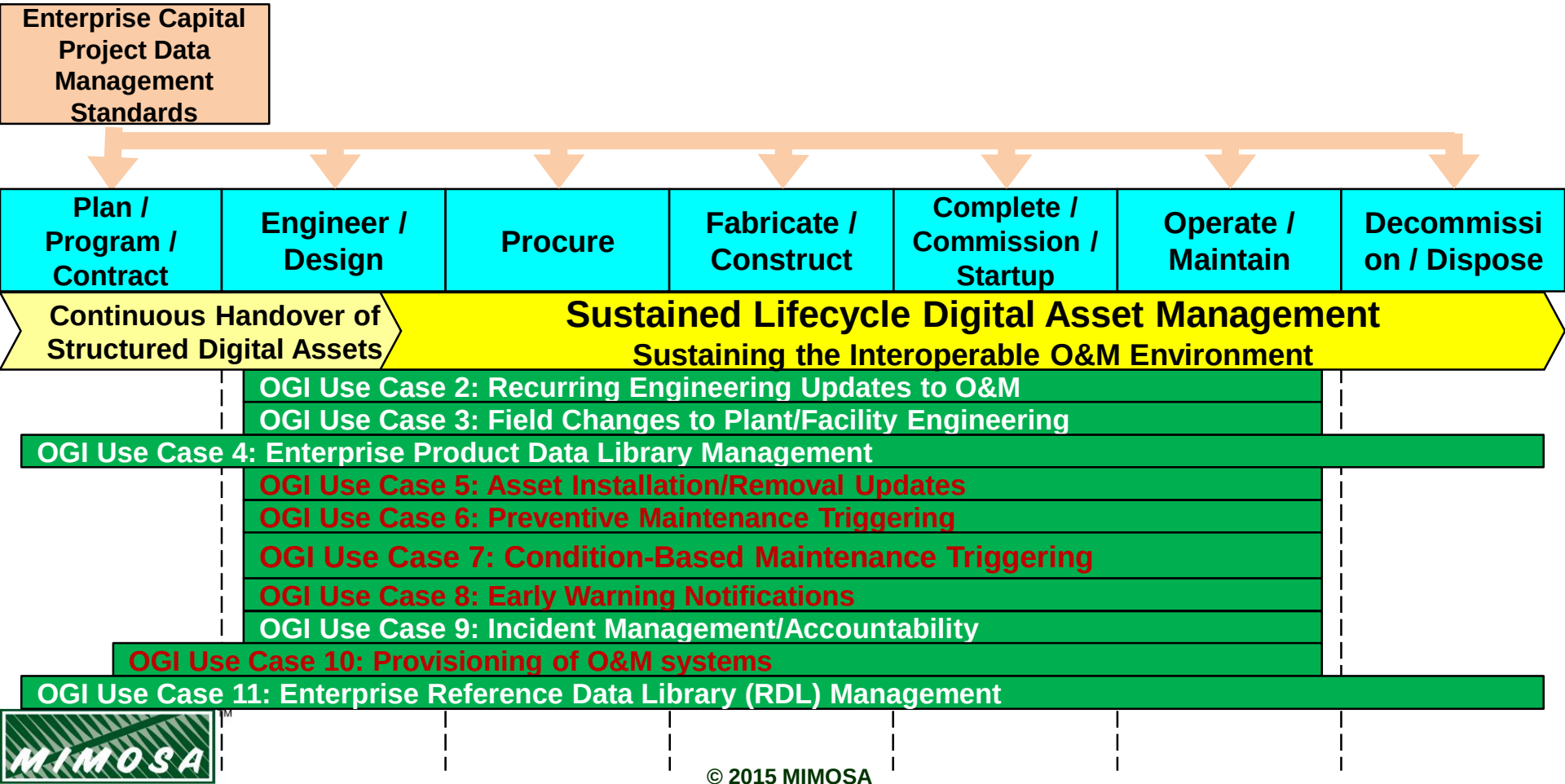
MIMOSA™

Simplified OIIE Systems Architecture



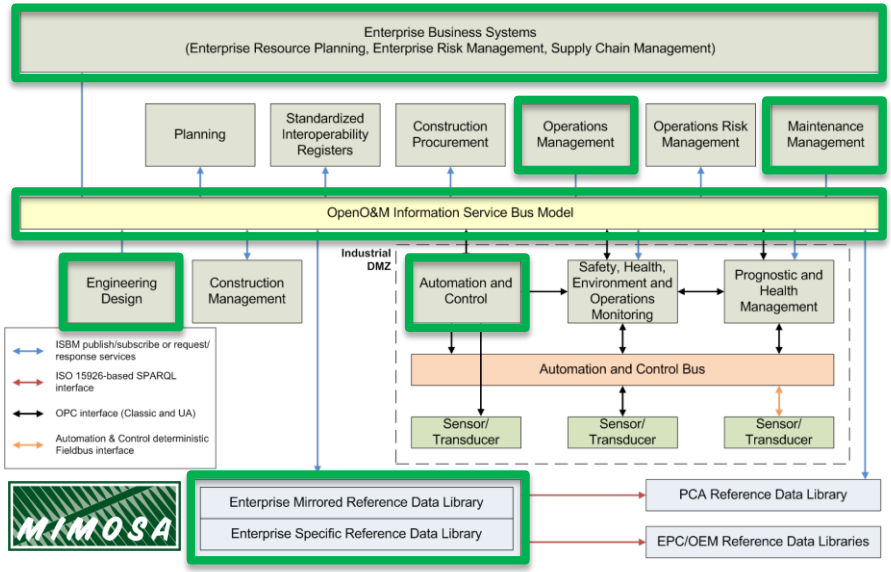
MIMOSA™

OGI Pilot Business Use Cases Roadmap - Part 2



The BP interoperability PoC

As Presented at Fiatech Conference 04/15/2015



- Testing has demonstrated capability to deliver interoperability through shared reference data and standard connectors
- Fully integrated testing of PoC scope is ongoing as vendors complete development of standard product adaptors
- We have proved the concept, but collaboration required to deliver benefits at industrial scale

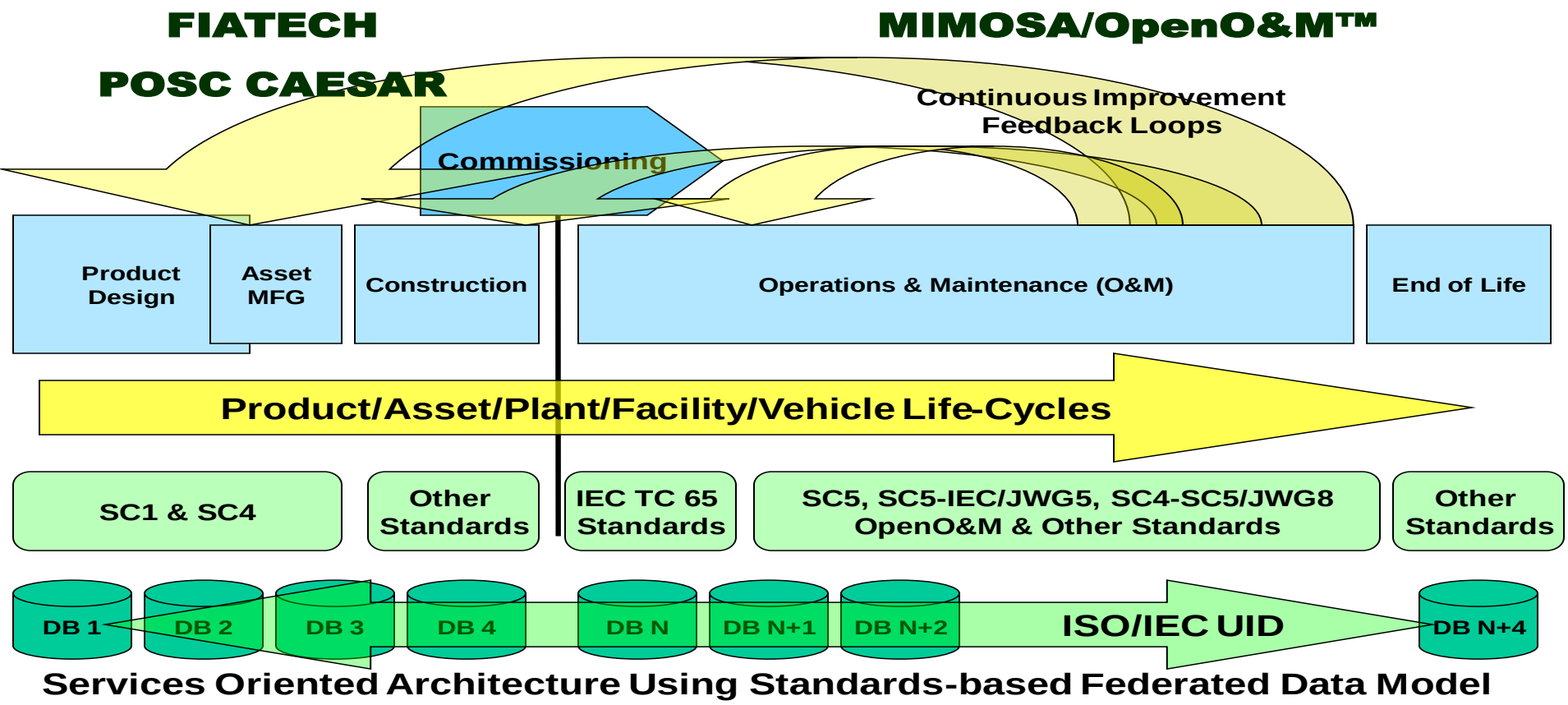
Bentley IBM OSIsoft. SAP

- **A pure instance of the OIIE**
- **No custom systems integration required**
- **Functional locations, assets, relationships**
- **CCOM 4.0 exchange payload optimization**

MIMOSA™

ISO TC184 Manufacturing Asset Management Integration Task Force
Total Asset Life-Cycle Summary

March 2009



Lessons Learned

- Physical Asset Life-cycle Management (ALM) is increasingly critical for all asset intensive organizations
- CBM and Asset Performance Management (APM) need to be performed in the context of ALM for maximum benefit
- Traditional systems integration techniques are proving inadequate for ever more complex systems of systems

➢ **Commercial off The Shelf (COTS) solutions are preferable when:**

- A high percentage of user requirements are met without customization
- COTS suppliers support appropriate standards to enable systems interoperability rather than systems integration

➢ **A Standards-based Interoperability Ecosystem is the way forward**

Close

OIIE and OGI Pilot To Be Featured At Future Events

- Fiatech Technology Showcase – April 13-16, Boca Raton Resort, FL
- Solutions 2.0 – August 3-7, 2015, Westin Galleria, Houston, TX

Hundreds of Senior Experts from Asset Intensive Industries (including aerospace, integrated energy and critical manufacturing) are Auditing and/or Participating in the OIIE and OGI Pilot.

All OIIE and OGI Pilot Working Documents are available at

www.mimosa.org

Alan T. Johnston
MIMOSA
atjohn@mimosa.org