Leveraging Cross-Industry Physical Asset Management Standards and Methods for Oil and Gas Industry Infrastructure

Standards Leadership Council Meeting
Houston, Texas

March 19, 2014

Alan Johnston
MIMOSA President
Points of intersection
MIMOSA Summary

- Focus on Physical Asset Life-Cycle Management and Infrastructure O&M
  - Develops and publishes industry-driven standards in alignment with ISO
  - 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
Requirements-driven Development of Standards

- MIMOSA has a rich history of developing industry standards which are driven by industry requirements
  - Open Systems Architecture for Enterprise Application Integration (OSA-EAI)-1997
  - Open Systems Architecture for Condition Based Maintenance (OSA-CBM)-1999
  - OpenO&M Information Service Bus Model (ISBM)-2011
  - OpenO&M Common Interoperability Register (CIR)-2011

- MIMOSA works closely with formal standards bodies to help develop international standards reflecting industry requirements
  - ISO TC 108/SC 5 – ISO 13374 (CBM)
  - ISO TC 184/SC 5 – ISO 18435 (O&M)
  - IEC (Includes abstract ISBM and CIR Specification)
  - ISO TC 184/WG 6 – Developing ISO 18101 OGI Technical Specification
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

Demo Architecture Based on
reusable MIN-Client™ & MIN-
Servers™ Components

Measurement
Technology (MT)

Simulation
Platform (SP)

Central Maintenance AID (CMA)

Portable Maintenance Aid (PMA)

MIN-Central (MC)

MIN-Client

CMAS

Sensor

XML

Simulation Interface

PMA Database

Services (DDS)

CMA-Database

Services (CDS)

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

Enterprise Business Systems
Enterprise Resource Planning (ERP)

OpenO&M™

Operations

Maintenance

Physical Asset Control
Real-time Systems
Owner/Operators Objective
Shared Industry Foundation Architecture

**OpenO&M Information Service Bus Model (ISBM)**

- **Data Model**
  - External Model Map
  - MetaData
  - NameServices

- **Persistence**
  - Intelligent Cacheing
  - Data Store
  - Data Warehouse

- **Event Detection Subsystem**: real-time detect, correlate, publish/subscribe, forwarding, etc.

- **Messaging Subsystem**: routing (content, rules, etc.), queueing, transformation, synch/asynch, etc.

OpenO&M
LEVERAGING THE ISO PROCESS FOR ESTABLISHING STANDARDS AND SPECIFICATIONS

- The ISO Manufacturing asset management Integration Task Force
- ISO 18101 – OGI Technical Specification

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ISO TC 184/WG 6 (ISO 18101)
Oil and Gas asset management operations and maintenance Interoperability (OGI)
Technical Specification Project Update

Alan T. Johnston
Convener
Nils Sandsmark
Co-convener

Shell
June 26-27, 2013
Rijswijk, Netherlands
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
Context for Collaboration

Enterprise Business Systems

Reference Information Environment
- ISO 15926
  - Engineering & Construction
  - PCA
  - RDL/Ontology

Semantic Context
- OpenO&M Information Service Bus
- Transform Engine

Execution Environment “P2B Stack”
- ISO 18435
  - MIMOSA
    - O&M Requirements Repository
  - Registry
- ISO 13374

Controls
- Physical Assets

ISO TC 184/WG 6
2014 Q1 MIMOSA Status

- Completed Joint MIMOSA/PCA IT Architecture Version 1.0
- Working with ISA 95 and IEC for standardization of the ISBM and CIR
- Completed redevelopment of mimosa.org website (now more mobile friendly)
- Helping with GAO effort to improve government utilization of standards
- Have over 800 qualified, unique registrants on our opt-in contact lists for:
  - Joint MIMOSA/PCA O&M SIG and OGI Pilot Teams
  - Global owner/operators of asset intensive industries and their key O&M suppliers.
- Solutions 2.0 – July 28-31, Bonita Springs, FL - Asset Information Management
Further Information Is Available at
www.mimosa.org

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

Enterprise Business Systems
Enterprise Resource Planning (ERP)

OpenO&M™

Physical Asset Control
Real-time Systems
ISO 18435 - 1
Application Domain Integration Diagram

Application Domain Integration Diagram

A4.1 – Intra-enterprise activities: Business Planning, Orders & Production, and Maintenance

A3.1 - Operations Planning & Scheduling
A2.1 - Supervisory Control & Human-Machine Interface
A1.1 - Control, IO, Data Acquisition, Data Historian, Asset Utilization, & Displays

A4.2 – Inter-enterprise activities: Supply Chain Planning, Logistics Strategy
A3.2 - Capability Assessment & Order Fulfillment
A2.2 - Asset Prognostics and Health, Quality, Safety, & Environmental Management
A1.2 - Asset Condition Monitoring & Sample/Test/Diagnostic & Quality Monitoring

A3.3 - Maintenance Planning & Scheduling
A2.3 - Maintenance Execution & Tracking
A1.3 - Asset Configuration, Calibration & Repair/Replace

A0.1 - Resource Identification and Location

Resources (Material/Personnel)

A0.2 - Asset Identification and Location

Assets (Equipment/Facilities/Serialized Components/Sensors/Transducers/Software/Documents)

ISO TC 184/WG 6
ISO 13374 Standard
Open CM&D Processing Architecture Requirements

Machine condition assessment
data processing & information
flow blocks.

Sensor / Transducer / Manual Entry

DATA ACQUISITION (DA)

DATA MANIPULATION (DM)

STATE DETECTION (SD)

HEALTH ASSESSMENT (HA)

PROGNOSTICS ASSESSMENT (PA)

ADVISORY GENERATION (AG)

External Systems,
Data Archiving,
& Block Configuration

Technical Displays & Information
Presentation

August 2009

ISO TC 184/WG 6
Scope and Deliverables

- The OGI TS specifies the use of a combination of ISO and industry standards to meet the interoperability requirements of the Oil and Gas industry and appropriate closely related industry groups such as the Petrochemical industry.

- Major associated deliverables include:
  - Industry developed and owned Pilots driven by industry Use Cases
    - Downstream Pilot
    - Upstream Production Optimization and Drilling Automation Pilots
  - Industry developed and owned Use Cases are prioritized by owner/operators and incorporated by reference
  - Industry developed and owned pilot & Compliance Data Sets are incorporated by reference
    - Downstream Data Set – Plant Light Ends Unit with debutanizer and depropanizer towers
    - Upstream – Drilling Automation, Rigs and Wells Construction Data Sets – with SPE DSATS