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

Standards Leadership Council Meeting
Paris, France

Feb 18, 2014

Alan Johnston
MIMOSA President
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
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
MIMOSA Information Network (MIN)

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

The OSA-CBM MIN Demonstration Concept

Remote Diagnostics
Carrier
USS NIMITZ
Remote Maintenance
Coordination Center
Remote Diagnostics
Provider A
Remote Diagnostics
Provider B

MIN-Viewer Segment Navigation 1
User Interface Modeled On The Microsoft Windows Explorer

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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-Server™ Components

Condition Data
Request for data
U.S. Army Collaborative Telemaintenance Demonstration
Revised 07/03/2002 – Phase I Demonstration

CMA Showing Measurement Events In Alarm
Aerospace and Defense Industry Developed Life-cycle Reference Data Exchange Sets

Process Industry Developed, Ontology-based Geometry, Topology and Reference Information Standards

Cross Industry Developed Physical Asset Management Standards (Sensor To Enterprise)

Government Developed Military Platform Element Definitions in ISO STEP AP Formats

Aerospace and Defense Industry Developed IETM Standard

ISO 15926-3&4

MIMOSA

OSA-EAI OSA-CBM

STEP PLCS

DEXs

GEIA STD 0007

ASD S1000D

Aerospace and Defense Industry Developed Life Cycle Information Management Concept Mapping - Aerospace & Defense Industry

Developed Life-cycle Reference Data Exchange Sets

Government Developed Military Platform Element Definitions in ISO STEP AP Formats

Aerospace and Defense Industry Developed IETM Standard

Process Industry Developed, Ontology-based Geometry, Topology and Reference Information Standards

Cross Industry Developed Physical Asset Management Standards (Sensor To Enterprise)
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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.
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.
- ISO TC 184 and TC 184/WG 6 Meetings- December 2013, Rosslyn, VA
- 2014 Smart Fields Summit- Jan 27-28 – Houston, Texas
- 2014 ARC Forum- Feb 10-12- Orlando, Florida (Automation and Controls Industry)
LEVERAGING THE ISO PROCESS FOR ESTABLISHING STANDARDS AND SPECIFICATIONS

- The ISO Manufacturing asset management Integration Task Force
- ISO OGI Technical Specification (ISO 18101)
ISO TC184 Manufacturing Asset Management Integration Task Force
Total Asset Life-Cycle Summary

March 2009

Product/Asset/Plant/Facility/Vehicle Life-Cycles

- Product Design
- Asset MFG
- Construction
- Operations & Maintenance (O&M)
- End of Life

Continuous Improvement Feedback Loops

SC1 & SC4

Other Standards

IEC TC 65 Standards

SC5, SC5-IEC/JWG5, SC4-SC5/JWG8
OpenO&M & Other Standards

Other Standards

DB 1
DB 2
DB 3
DB 4
DB N
DB N+1
DB N+2
DB N+4

ISO/IEC UID

Services Oriented Architecture Using Standards-based Federated Data Model
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
- ISO 18435
- MIMOSA
- O&M Requirements Repository
- Registry

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

Controls

Physical Assets

Transform Engine

OpenO&M Information Service Bus

ISO TC 184/WG 6
Additional Reference Slides
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
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, I/O, Data Acquisition, Data Historian, Asset Utilization, & Displays

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
A0.2 - Asset Identification and Location

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

Level R4: Enterprise / Site
Level R3: Area
Level R2: Work Center
Level R1: Work Unit
Level R0: Asset
Machine condition assessment data processing & information flow blocks.

ISO 13374 Standard

ADVISORY GENERATION (AG)
PROGNOSTICS ASSESSMENT (PA)
HEALTH ASSESSMENT (HA)
STATE DETECTION (SD)
DATA MANIPULATION (DM)
DATA ACQUISITION (DA)

Sensor / Transducer / Manual Entry

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

ISO TC 184/WG 6