The Oil and Gas Interoperability (OGI) Pilot
Enabling Sustainable Interoperability for the Oil and Gas Industry

MIMOSA Members Meeting
Applied Technology Publications

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ISO TC 184/WG 6 Convener
OGI Pilot Business Use Cases Roadmap - Part 1

Enterprise Capital Project Data Management Standards

Plan / Program / Contract

Engineer / Design

Procure

Fabricate / Construct

Complete / Commission / Startup

Operate / Maintain

Decommission / Dispose

Continuous Handover of Structured Digital Assets
Establishing an Environment for Lifecycle System of Systems Interoperability

Sustained Lifecycle Digital Asset Management

OGI Use Case 1: Capital project handovers to O&M

OGI Use Case 4: Enterprise Product Data Library Management

OGI Use Case 10: Automated provisioning of O&M systems

OGI Use Case 11: Enterprise Reference Data Library (RDL) Management

Fiatech EDRC Use Case 1: Pump Replacement Specification Handover (O/O to EPC)

Fiatech EDRC Use Case 2: Field Instruments & Control System (EPC to Supplier)
OGI Pilot Business Use Cases Roadmap - Part 2

OGI Use Case 2: Recurring Engineering Updates to O&M
OGI Use Case 3: Field Changes to Plant/Facility Engineering
OGI Use Case 4: Enterprise Product Data Library Management
OGI Use Case 5: Asset Installation/Removal Updates
OGI Use Case 6: Preventive Maintenance Triggering
OGI Use Case 7: Condition-Based Maintenance Triggering
OGI Use Case 8: Early Warning Notifications
OGI Use Case 9: Incident Management/Accountability
OGI Use Case 10: Provisioning of O&M systems
OGI Use Case 11: Enterprise Reference Data Library (RDL) Management
MIMOSA Summary

- Focus on Physical Asset Life-Cycle Management and Facilities 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

- Membership
  - ✓ Owner/Operators – Oil and Gas, Chemical, Aerospace and Defense Sectors
  - ✓ Suppliers/integrators
  - ✓ Academia/Researchers
  - ✓ Industrial Media

- Founding Member and IP Manager for OpenO&M™ Initiative
- OpenO&M Owner/Operator Leadership Council
- 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)
  - ISO TC 184/WG 6 – Developing ISO OGI Technical Specification
MIMOSA CCOM Object Identifier History

- 1998
  - CRIS MED ASCII Document Exchange

- 2002
  - CRIS DTD XML Document Exchange

- 2003
  - CRIS XML Schema Point-to-Point Web Services

- 2007
  - CRIS XML Schema for Compound Documents Web Services
  - CCOM XML Schema with ISBM Web Services

Today

- Immutable, Globally-Unique, Non-Meaningful ISO/IEC 11578 Object Identifier

Distinct Objects for Functional Tag (Segment), Product Catalog Object (Model), andSerialized Equipment (Asset)
Platform Life-cycle Information Management

Concept Mapping - Aerospace & Defense Industry

ISO 15926-3&4
MIMOSA
OSA-EAI  OSA-CBM
ASD S1000D

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

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

Aerospace and 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

STEP PLCS
DEXs
GEIA STD 0007

Aerospace and Defense Industry Developed IETM Standard

Developed Life-cycle Reference Data Exchange Sets

Cross Industry Developed Physical Asset Management Standards (Sensor To Enterprise)
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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
Points of intersection
Reasons for Oil and Gas Interoperability (OGI) Pilot and ISO OGI TS (ISO 18101)

- **Problem Statement** – Current Oil and Gas and other Asset Intensive industry enterprise solutions are too chaotic and too difficult to sustain.
  - The current enterprise solutions model is critically dependent on large amounts of custom Systems Integration and this is a weak link.
    - Chaotic and Fragile – Vulnerable to breakage and exploitation
    - Expensive to sustain (20% annual recurring maintenance cost)
    - Proprietary point to point interfaces also limit flexibility and constrain innovation
  - The current solutions model often forces data to be re-entered many times rather than managing it on a full life-cycle basis and data is “trapped” in proprietary applications.
    - Decreases availability and portability of information
    - Highly inefficient and chaotic business process
    - Increases costs
    - Decreases quality

- **Owner/Operators are asking for a better Solutions Model**
Current Eco-system Options

Walled Garden

- Large suppliers proprietary eco-systems
- Suppliers make the rules
- Suppliers often set high barriers to entry
- High switching cost – O/O lock in
- O/O data is trapped in proprietary apps
- Innovation can be constrained

Open Source

- Can be chaotic
- Suppliers may be unknown
- Ambiguous support model
- Fragmentation often takes place
- Interoperability may become poor
- Critical infrastructure often precluded

Industrial solutions are still heavily dependent on large scale custom integration services efforts. Individual Owner/Operators redundantly bear the development and sustainment cost for each of these efforts.
We Need a Significant Paradigm Shift
The “Un-walled Garden” and the OGI Ecosystem

- A new industry solutions model where systems of systems interoperate in an industry eco-system defined by open, supplier neutral standards
  - Collaboration between industry standards bodies – Bring proven standards together
  - Shared, supplier neutral industry information models – O/O Data is not trapped
  - Shared, supplier neutral industry utility services, driven by industry use cases
  - All other required conventions maintained and published by industry (not individual suppliers)
- Suppliers have responsibility for developing and maintaining compatibility of their own solutions components
- Trusted public/private organization provide third-party certification & identification
- Owner/Operator Leadership and Governance
- Incremental, prioritized transformation
Life-cycle Interoperability Context for O&M
Critical Control Point for a Supplier Neutral Ecosystem Enabling Systems Interoperability

Enterprise Business Systems

Automation and Control Systems

LIFE CYCLE ENGINEERING Systems

Ecosystem Control Console
Supplier Neutral Open Specifications

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Why an Oil and Gas Industry Pilot Is Required

- The OGI Ecosystem model offers cost, quality, flexibility and risk management features distinctively superior to those achievable by individual owner/operators.

- Establishing and validating a “To Be” Industry Ecosystem and the required Industry Foundation Architecture is not something which can be reasonably addressed by individual owner/operator project teams.

- Industry Use Case-driven, solutions component specifications can be safely taken from the industry pilot and applied to real projects, only once they have been properly proven in an industry pilot – Makes standards “consumable”.

- A properly supported OGI Pilot provides a required transformational development and validation proving grounds at minimum total cost and risk:
  - Focused on proper asset classes and prioritized functions
  - Downstream, mid-stream and upstream
  - At industry scale
  - Enables pragmatic, incremental transformation for owner operators
2013 MIMOSA Members Meeting - Status

- Have reached key milestones for OGI Pilot in preparation for Machine Readable, Supplier Neutral Handover from Capital Project to Operations and Maintenance
- Just published Joint MIMOSA/PCA IT Architecture Version 1.0
- Are prepared to pivot back to O&M Suppliers starting in 2014
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.), queuing, transformation, synch/asynch, etc.
Worley Parsons - Lead EPC for Downstream OGI Pilot

- Developing and Managing Reference Engineering Data Set
- Providing standard engineering artifacts used for EPC process
Oil and Gas Interoperability (OGI) Pilot - Summary

- Owner/Operator leadership
- Industry Use Case driven - (OpenO&M, PCA and SPE DSA-TS) Use Cases
- Cooperatively aligned with PCA under Joint MIMOSA/PCA O&M SIG
- Managed like a true capital project - Worley Parsons-Lead EPC for downstream
- Pragmatic focus on Commercial Off The Shelf (COTS) products
- Suppliers assume responsibility for compliance of their own products

Current Status - Planning Phase 2 inclusions based on closing gaps identified in Phase 1, adding existing O&M use cases and adding upstream specific elements

Publication – Working documents and results are on the mimosa website at www.mimosa.org

Proven OGI Pilot output provides basis for ISO 18101 Technical Specification

Industry press coverage for OGI Pilot
- iRING Today
- www.PhysicalAssetLifecycle.com
LEVERAGING THE ISO PROCESS FOR ESTABLISHING STANDARDS AND SPECIFICATIONS

- The ISO Manufacturing asset management Integration Task Force
- ISO OGI Technical Specification (ISO 18101)
ISO TC 184/WG 6
Oil and Gas asset management operations and maintenance Interoperability (OGI) Technical Specification Project Update

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Convener
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Co-convener

September 23-25, 2012
Orlando, FL

ISO TC 184/WG 6
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
Resources (Material / Personnel)

A0.2 - Asset Identification and Location
Assets (Equipment / Facilities / Serialized Components / Sensors / Transducers / Software / Documents)
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
Some Relevant ISO RelatedActivities

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

ISO 13374
MIMOSA OSA-CBM
WG6
Formats and methods for communicating, presenting and displaying relevant information and data

ISO 14224
Petroleum, petrochemical and natural gas industries -- Collection and exchange of reliability and maintenance data for equipment

SC4
Industrial Data

ISO 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
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