Open Industrial Interoperability Ecosystem (OIIE)
ISO 18101 and OIIE OGI Pilot

For: Open Industrial Digital Ecosystem Webinar

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MIMOSA President, ISO TC 184/WG 6 Convenor
July 1, 2020
MIMOSA Summary

- Meeting since 1993, Officially organized in 1997 as a 501 (c) 6
- An industry Standards Developing Organization (SDO)
- Funded by our members and project sponsors
- Has multiple collaboration partners
  - SDOs
  - Other industry Associations
- Develops and Publishes Industry Standards and Specifications focused on Digitalization and Interoperability for Asset Lifecycle Management
  - Open Systems Architecture for Enterprise Application Interoperability (OSA-EAI)
  - Open Systems Architecture for Condition Based Maintenance (OSA-CBM)
  - MIMOSA Common Conceptual Object Model (CCOM Data Model)
- Follows a formal industry use case methodology, framed by a Standard Use Case Architecture
- Takes many of these standards to ISO
  - ISO 13374 (OSA-CBM)
  - ISO 18101 - Open Industrial Interoperability Ecosystem (OIIE)
The OpenO&M Initiative was formed by an MOU in 2007

- Objective: Facilitate broader collaboration between the participating SDOs
- Founding Members:
  - ISA
  - MIMOSA
  - OAGi
  - OPC Foundation
  - WBF (now MESA)
MIMOSA Information Network (MIN)

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

User Interface Modeled On The Microsoft Windows Explorer

Industrial Digital Transformation – 2020 and Beyond
A Pragmatic Solution: Standards-based Interoperability and the OIIE

Open Standards-based Interoperability

- Defined by vendor-neutral standards
- Highly Heterogeneous, SME Friendly
- System of Systems Interoperability
- Suppliers build and maintain standard adaptors with commercial support model
- Higher quality with lower costs and risks
- **Practical basis for industry digital transformation**

Open Industrial Interoperability Ecosystem (OIIE)
ISO 18101

Industry Standard Digital Ecosystem
- Standard use case architecture
- Standard use cases, scenarios & events
- Standard data models
- Standard message models
- Standard reference data
- Standard APIs and services definitions
- Standard adaptors

Supports
- Digital Twins
- Systems of Systems
- Interoperability
- AI, Ontology, OTDs
- Analytics

OIIE Oil and Gas Interoperability Pilot → Builds and Verifies OIIE and ISO 18101
Qualifies for NERA and FEnEx matching funds if R&D is based at UniSA

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MIMOSA standardization efforts focus on digitalization and interoperability covering the asset lifecycle, while our collaborating colleagues focus on other aspects of CAPEX and OPEX activities.
OLIE Inter-Enterprise Systems Connectivity and Services Architecture

EPC Firms
Engineering, Procurement and Construction

IT Networks

OEMs
Manufacturers
Enterprise Business Systems

IT Networks

Manufactured Asset Data
(Make/Model Information, Serial #)

Automation and Control

Business Requirements

Functional and Technical Requirements
Model and Instance Information

PFD, P&ID, Tags, Docs & Requirements

Operations & Maintenance Data
(Monitoring, Diagnostics Prognostics)

Automation and Control

Owner/Operators
Enterprise Business Systems
OIIE Intra-Enterprise Systems Connectivity and Services Architecture

Enterprise Business Systems

- OIIE Administration
- Planning
- Engineering Design
- Construction Management
- Operations Management
- Operations Risk Management
- Maintenance Management

ISA95/IEC 62264 Messaging Service Model /OpenO&M ISBM

Automation Control Bus

- Automation and Control
- HSE and Operation Monitoring
- Prognostic & Health Management

IIOT Device

Device

Sensor/Transducer

Shared Information and Semantic Context

Enterprise Reference Data Libraries

IIoT Device Metadata

Industry Reference Data Libraries

IIoT Device Metadata (ISO 15926, OTD, CDD...)

Connectivity Legend

- IIoT Connections
- (Constrained)
- Trusted IT/OT connections
- ISBM Web Services
- (Constrained)

Standard, Cloud Friendly Enterprise Solutions Architecture For Digital Business Ecosystems

Inter-Enterprise Connections

Level R4

Level R3

Level R2

Level R1

Level R0

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OIIE/OGI Standardized Use Case Architecture
Standardized Methodology to Define and Re-use OIIE Components

- **User Stories**
  - High-level
  - Pictographic
  - Depict 1 or more Use Cases, Scenarios, and/or Events
  - Actors, Systems, Exchanges, Data

- **Use Cases**
  - Background
  - Scope
  - Preconditions
  - Successful End Condition
  - Actors
  - Triggers
  - Process Workflows
  - Scenarios

- **Scenarios**
  - Actors
  - Data Content
  - Data Formats
  - Reference Data
  - Information Service Bus Configuration
  - (OIIE) Events

- **Events**
  - Individual Message Exchange
  - Specific Data Content
  - Required data processing
  - Expected Response Event
  - Implemented by CCOM BODS and possibly others

(Designed by OpenO&M Initiative)
Standardized OIIE Use Case List

OIIE Use Case 01 – Information Handover from EPC to O/O
OIIE Use Case 02 – Engineering Updates
OIIE Use Case 03 – Field Changes to Plant/Facility Engineering
OIIE Use Case 04 – Online Product Data Library Management
OIIE Use Case 05 – Asset Installation/Removal Updates
OIIE Use Case 06 – Preventive Maintenance Triggering
OIIE Use Case 07 – Condition-Based Maintenance Triggering
OIIE Use Case 08 – Early Warning Notifications
OIIE Use Case 09 – Incident Management/Accountability
OIIE Use Case 10 – Information Provisioning of O&M Systems
OIIE Use Case 11 – Enterprise Reference Data Library Management
OIIE Use Case 12 – RFI and RFI Response for Models Meeting Requirements (Greenfield & Brownfield)
OIIE Use Case 13 – Lockout-Tagout
OIIE Use Case 14 – Condition-Based Maintenance Data Acquisition
OIIE Use Case 15 – Capital Project Asset Installation

OpenO&M O/O Leadership Team
Standard Use Cases-2007
Build on Success from OIIIE OGI Pilot Phase 3.1

1. P&ID Creation and Export of Condenser Unit P&ID to Proteus XML Format
   (Worley)

2. Transform to CCOM XML Format
   (UniSA)

3. Greenfield RFI/RFI Response
   - RFI based on functional requirements (UniSA)
   - RFI Response, Models (Yokogawa)

4. Capital Project Asset Installation
   (UniSA)

5. (Simulated) Handover of As-Built Data to PdMA
   (UniSA)

6. CBM—Collection of Measurement data and output of Advisory
   (PdMA)

7. Remove and Replace Maintenance Activity
   (UniSA)

8. Brownfield Information Remediation
   - RFI based on limited asset data (UniSA)
   - RFI Response, Model/Asset data (Yokogawa)

OIIE Use Case 1
(As-Designed)
Bentley and Hexagon

OIIE Use Case 15

OIIE Use Case 1
(CBM Acquisition, Triggering, and Resulting Maintenance)

CII will be adding AWP Concepts

OIIE Use Case 12

OIIE Use Case 12
“This document was prepared by Technical Committee ISO/TC 184, Automation systems and integration.

This document provides an overview and outlines the fundamental principles of the ISO 18101 series. Future parts of the ISO 18101 series will be developed including sets of industry developed use cases, once the use cases have been documented using the Open Industrial Interoperability Ecosystem (OIIE) use case architecture and validated using the OIIE Oil and Gas Interoperability (OGI) Pilot, with the results captured in Technical Reports. These use cases will incrementally define industry prioritized elements of the secondary business process, which is the scope of the ISO 18101 series.”
Objective: Move From Systems Integration to Systems Interoperability and Digitalization - Asset Lifecycle Focus

Inter-Enterprise View

WG 6 Status:

- ISO TS 18101-1 Published June 2019
- Asset Intensive Industries includes supply chains for CAPEX and OPEX Use Cases
- Includes ISO, IEC and Industry SDO inputs, digital twins for capital projects
- NWIP for Part 2 Terminology
- OIIIE OGI Pilot Phase 3.2 In Progress
  - Per ISO TS 18101-1 Pilot Develops and Validates content for future parts of ISO 180101
  - Phase 3.2 formalizing set of OIIIE Use Cases

Participating National Committees: (13)
Canada, China, Finland, France, Germany, Italy, Japan, Korea, Netherlands, Norway, Sweden, United Kingdom, United States
Future Energy Exports CRC: Vision & Objectives

1. Innovation for higher levels of efficiency in the LNG industry
2. Grow Australia’s hydrogen export industry
3. Unlock value with interoperable digital technologies
Current Partner Organisations:

Australian-Based Global Companies
- Chevron
- ITM POWER
- HYUNDAI
- wood.
- SAMSUNG
- SAMSUNG HEAVY INDUSTRIES

Australian Companies
- Aenergy
- Australian Gas Infrastructure Group
- CO2CRC
- ETP
- HORIZON
- Origin

Government, Regulatory & Peak Bodies
- Government of Western Australia
- Government of South Australia
- Queensland Government
- appea
- Asset Institute
- MIMOSA

Australian Research Capabilities
- QUT
- Curtin University
- University of South Australia

International Collaborators

Total partner contributions: $127M
Committed partner cash: $39M
Committed in-kind FTEs: 183
Federal Funding Approved 3/2020
Structure

RP1: Efficient LNG Value Chains

RP2: Hydrogen Exports & Value Chains

RP3: Digital Technologies & Interoperability

RP4: Market & Sector Development
This is version 2.0 which can be found at: http://www.openoandm.org/isbm/2.0

The latest published version of this specification can always be found at: http://www.openoandm.org/isbm/latest

Defines standard APPLICATION interfaces for
- publish/subscribe,
- query response,
- end-point independent,
- multiple publishers & providers,
- message content independent,
- full security specification,
- WEB/SOAP and REST interfaces

Allows one application code set and architecture to work across any asset owner defined infrastructure.
CII and MIMOSA Join Forces to move Interoperability Forward for Capital Projects

CII and MIMOSA sign MOU to use the Open Industrial Interoperability Ecosystem (OIIE) as the interoperability framework for CII best practices

July 1, 2020 - CII and MIMOSA announce their collaboration to adopt and progress the standards for an open, vendor neutral digital ecosystem supporting data and systems interoperability in capital projects, operations and maintenance enabling digital transformation of the full asset lifecycle. The MOU establishes the basis for a CII/MIMOSA Joint Working Group to develop best practices for standards based interoperability in capital projects leveraging the organizations combined strengths. It will develop formal OIIE Use Cases for capital projects based on Industry Functional Requirements developed by CII, starting with those associated with Advanced Work Packaging (AWP). These OIIE Use Cases will be validated in the OIIE Oil and Gas Interoperability (OGI) Pilot before they are published and licensed for use on a world-wide royalty free basis. Once the jointly developed OIIE Use Cases are validated in the pilot, CII and MIMOSA intend to submit them to ISO TC 184/WG 6 for inclusion in future parts of ISO 18101.

• Supports data and systems interoperability in capital projects, operations and maintenance enabling digital transformation of the full asset lifecycle;
• Establishes the basis for a CII/MIMOSA Joint Working Group to develop best practices for standards based interoperability in capital projects;
• Will develop formal OIIE Use Cases for capital projects based on Industry Functional Requirements developed by CII, starting with those associated with Advanced Work Packaging (AWP);
• These OIIE Use Cases will be validated in the OIIE Oil and Gas Interoperability (OGI) Pilot.
Questions?

Thank You

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