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

For: Open Industrial Digital Ecosystem Webinar

Alan Johnston

MIMOSA President, ISO TC 184/WG 6 Convenor

July 1, 2020

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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)
  - MIMOS 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)

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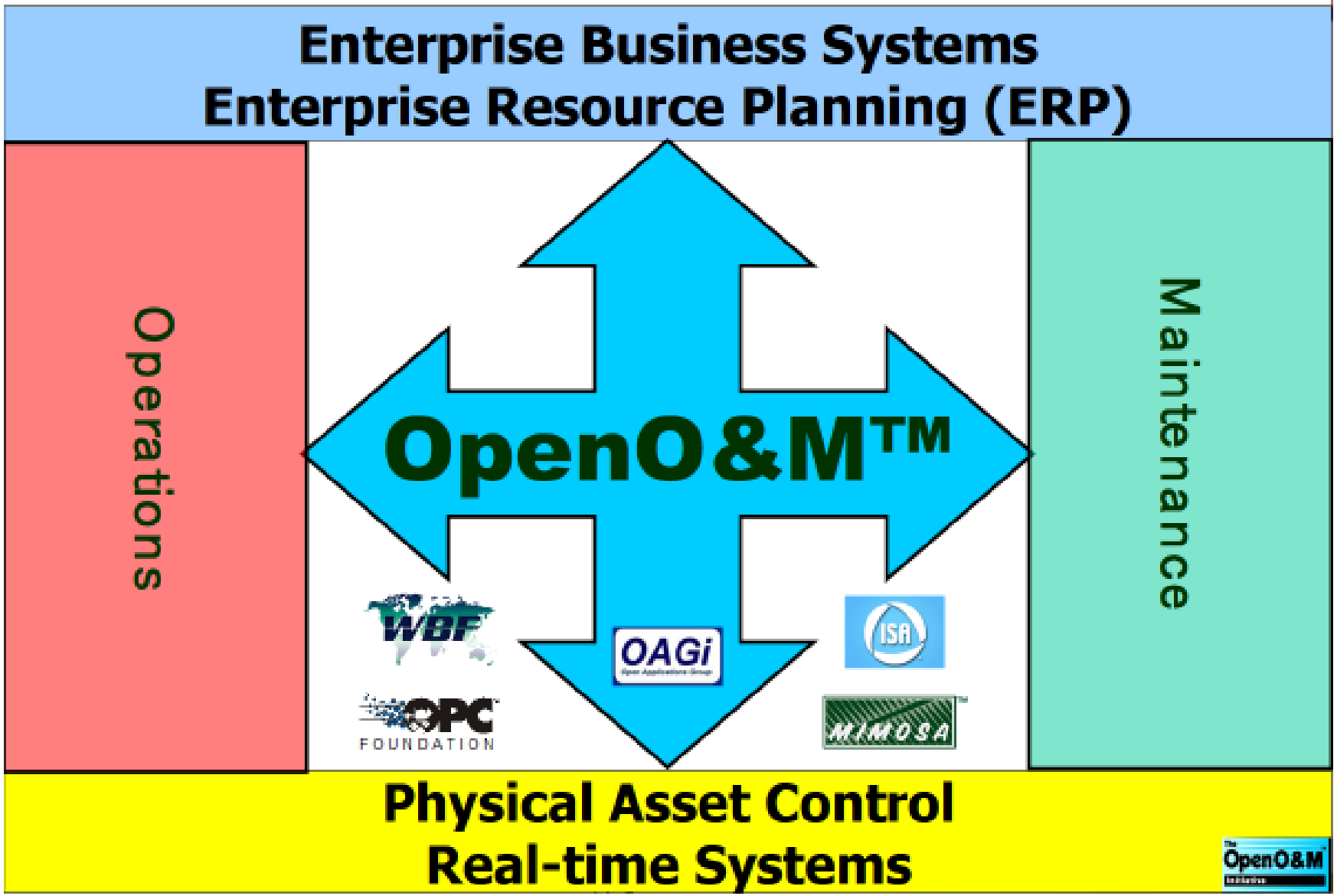
The OpenO&M™ Solution: Open Standards & Collaboration

Get Everyone on the Same Page & Fill the Whitespace



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)

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

MIMOSA Information Network (MIN)

June 21, 2000

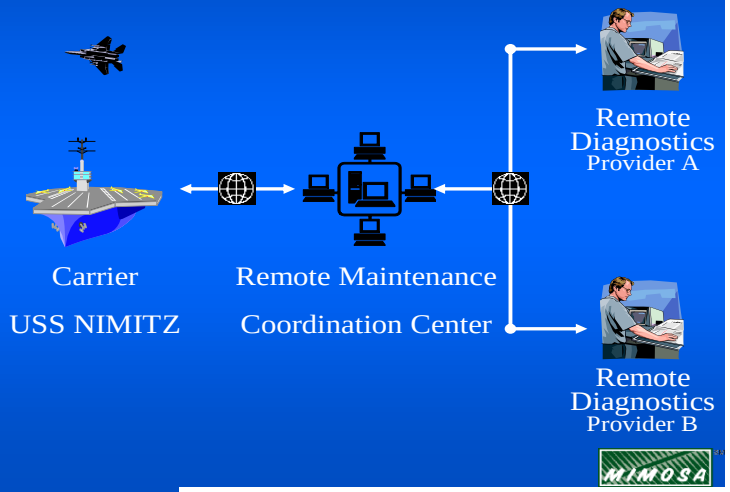
MIN-Viewer

OSA-CBM Presentation

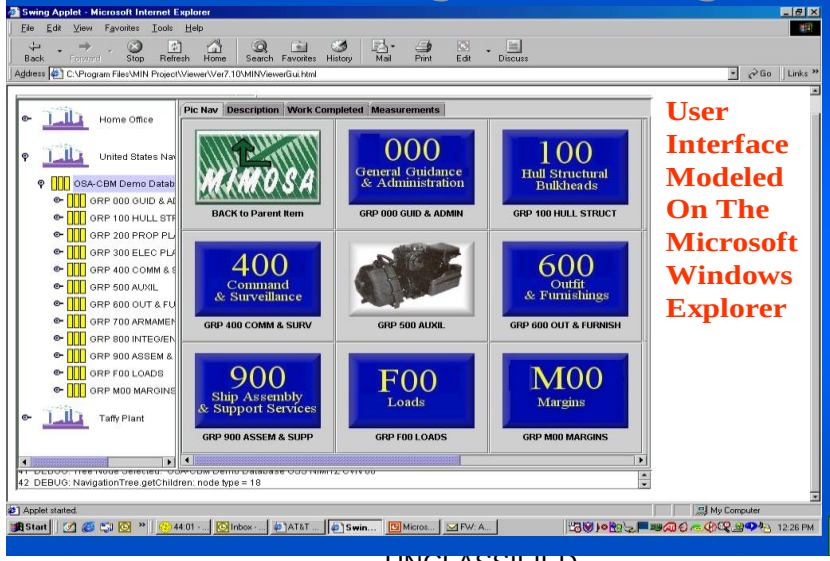
Alan T. Johnston

MIN Project Director

The OSA-CBM MIN Demonstration Concept



MIN-Viewer Segment Navigation 1



User Interface Modeled On The Microsoft Windows Explorer

MIMOSA Background: Modeling, Monitoring and Managing US Naval Assets circa 2000.

DRIVEN. WARFIGHTER FOCUSED.

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

Supports

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

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

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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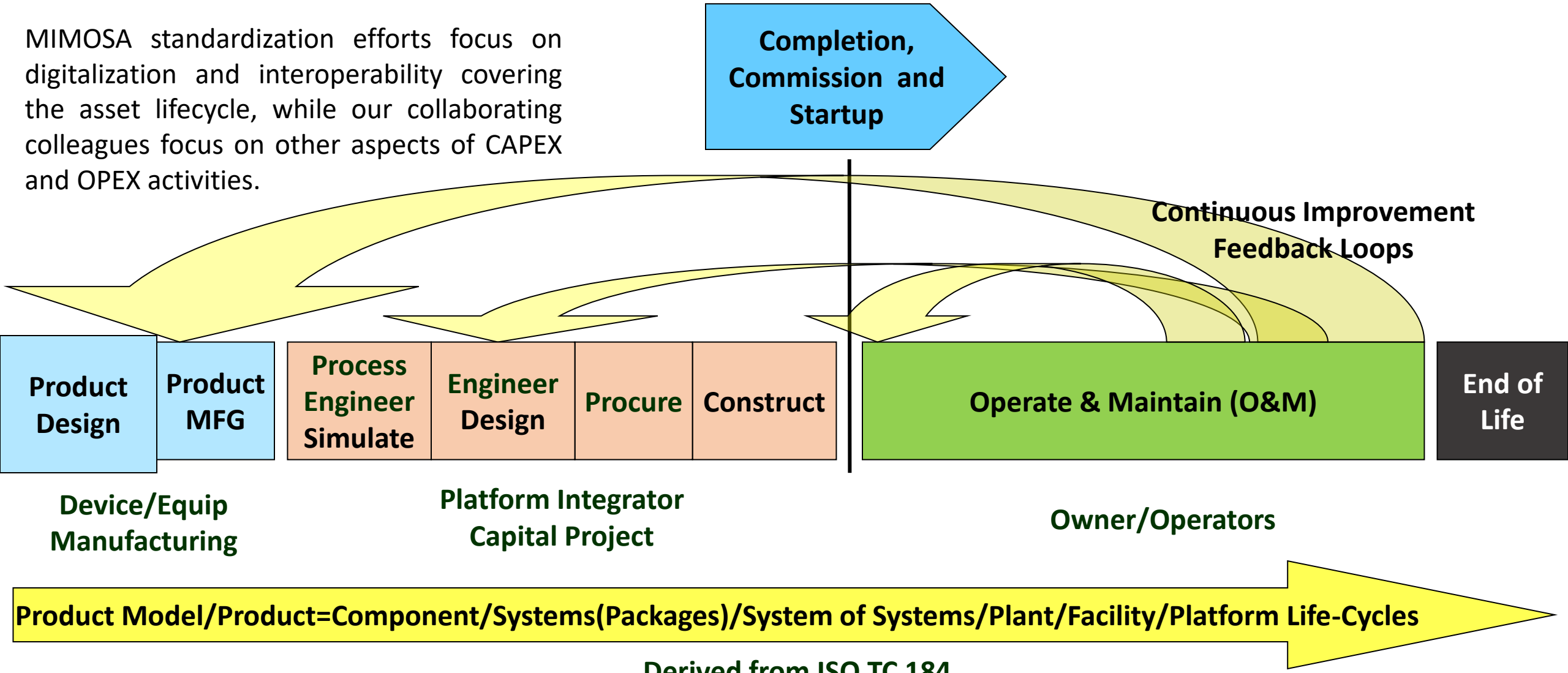
Full Asset Life-cycle Management

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.



Derived from ISO TC 184
Manufacturing Asset Management Integration Task Force Final Report (2008)

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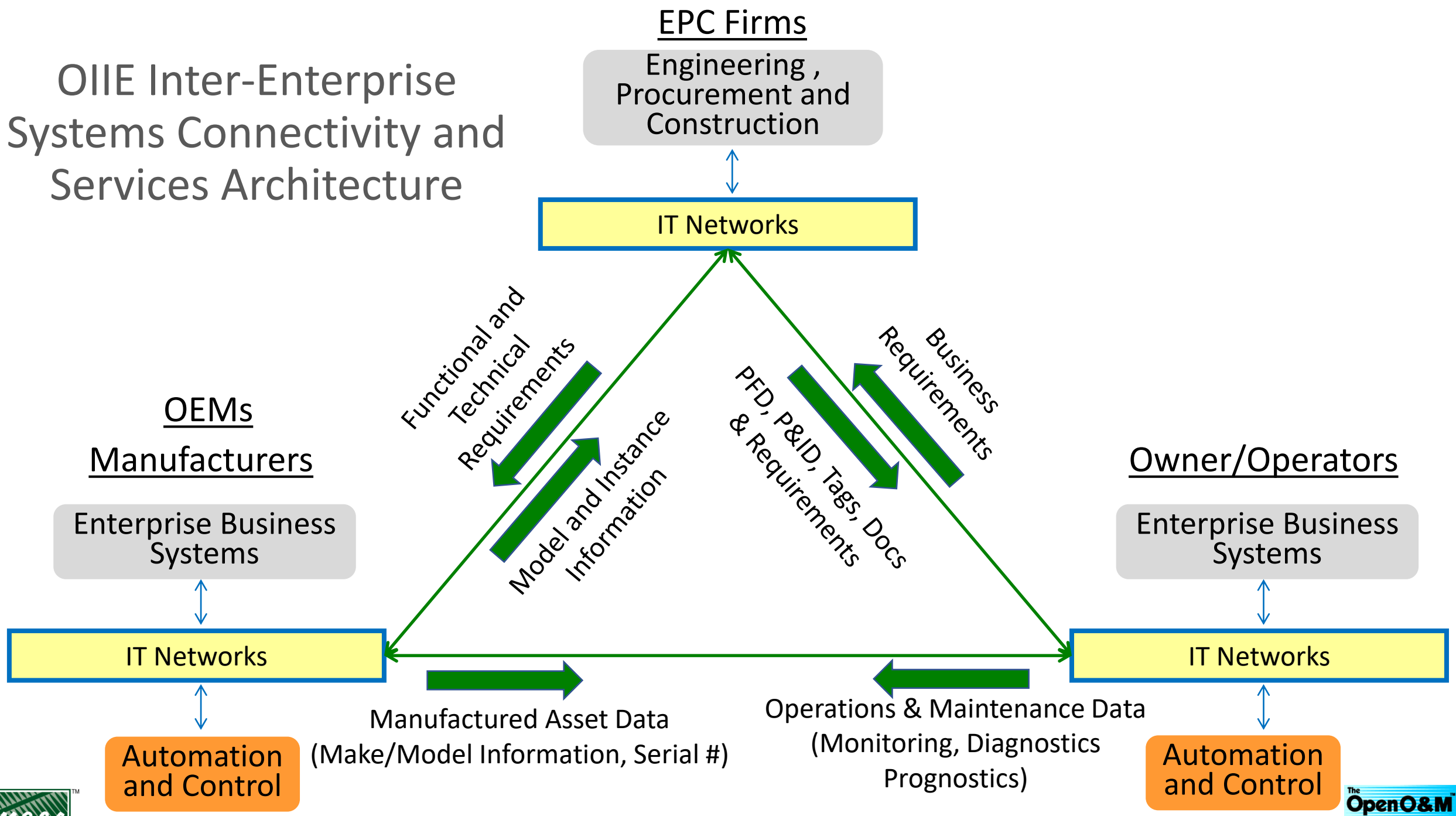
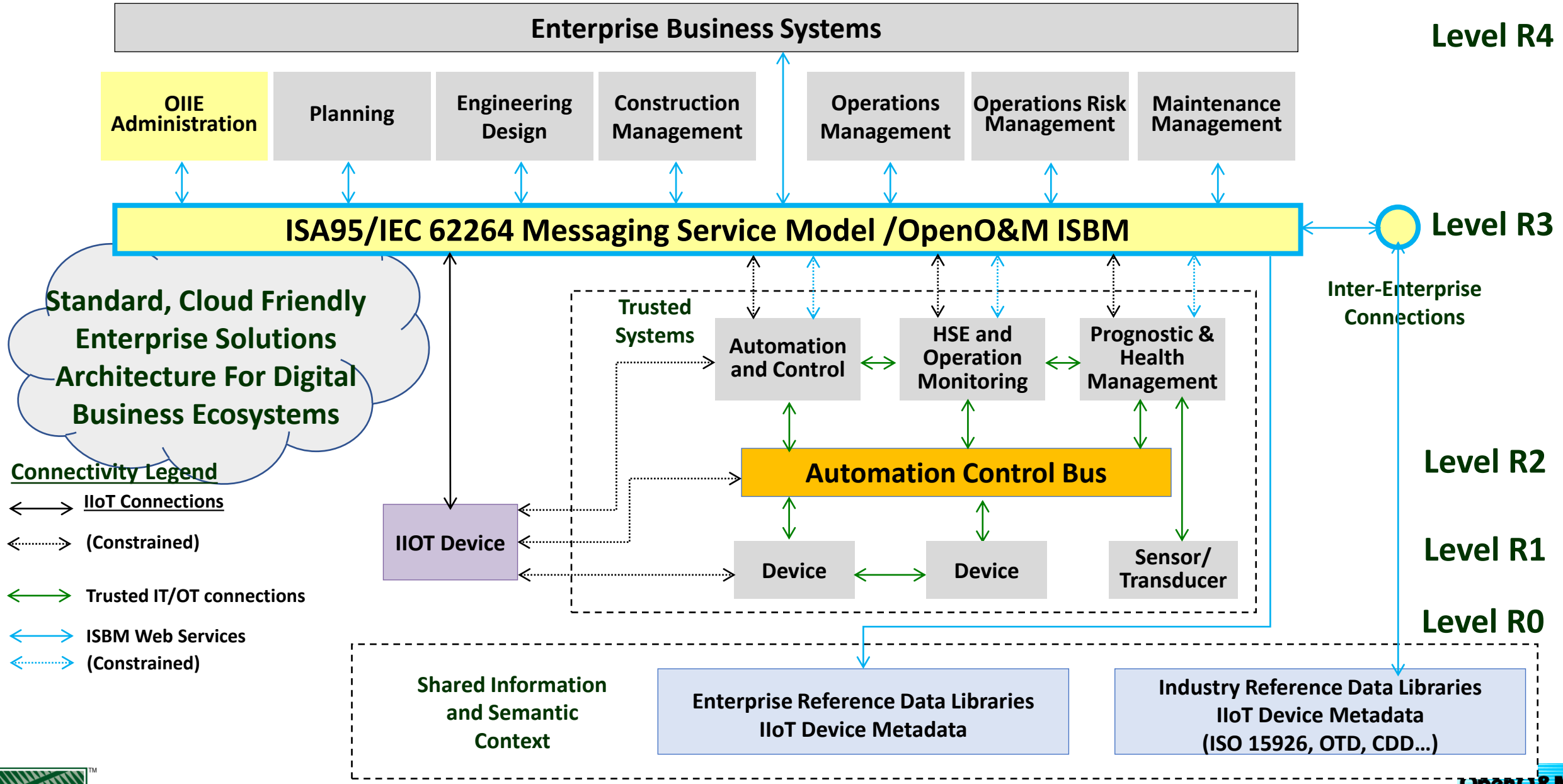
OIIE Inter-Enterprise Systems Connectivity and Services Architecture



OIIE Intra-Enterprise Systems Connectivity and Services Architecture



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OIIE/OGI Standardized Use Case Architecture

Standardized Methodology to Define and Re-use OIIE Components

User Stories

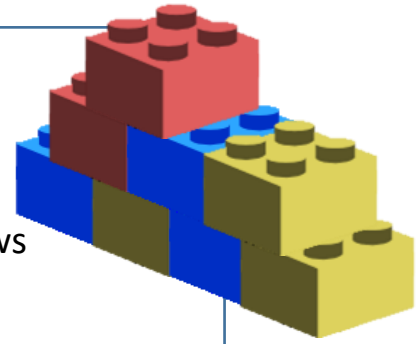
User Stories

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

Use Cases

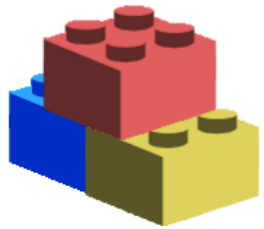
- Background
- Scope
- Preconditions
- Successful End Condition

- 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

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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

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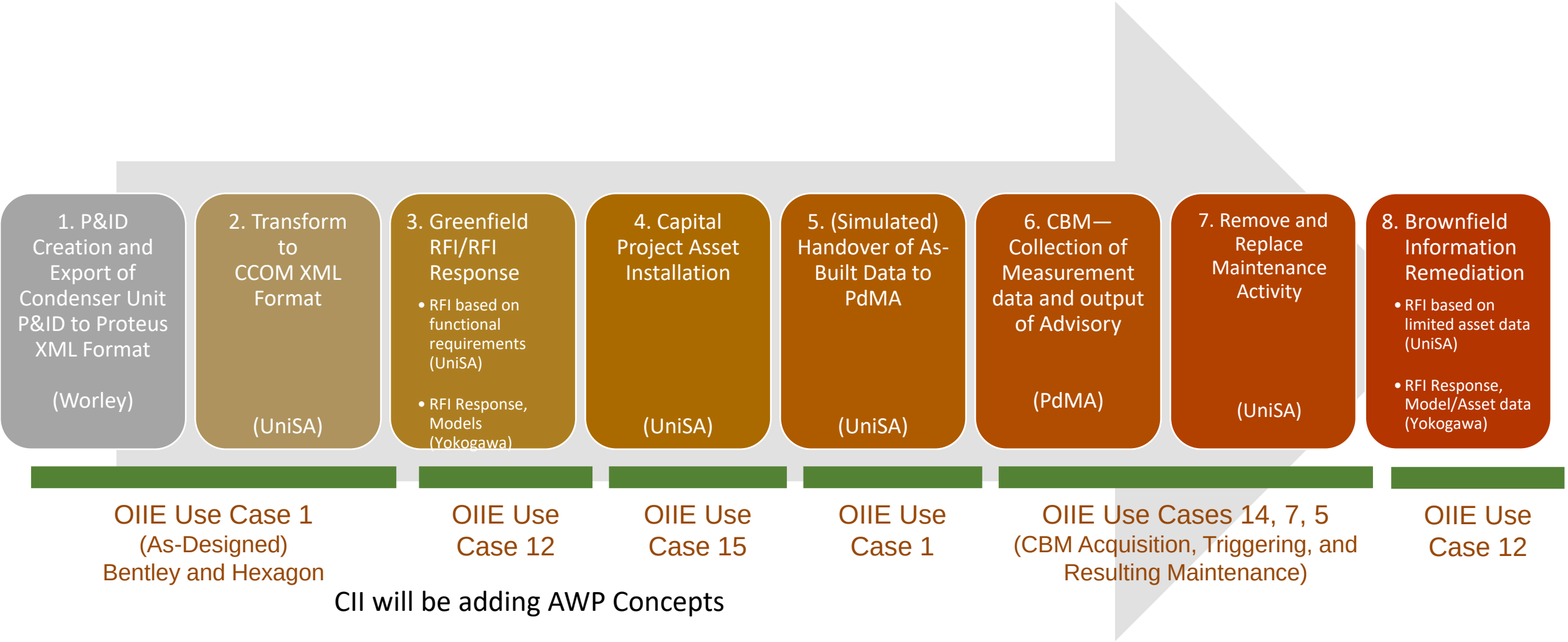
Build on Success from OIIE OGI Pilot Phase 3.1



CII will be adding AWP Concepts

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TECHNICAL SPECIFICATION

ISO/TS 18101-1

First edition
2019-06

Automation systems and integration — Oil and gas interoperability —

Part 1:
Overview and fundamental principles

Systèmes d'automatisation et intégration — Interopérabilité entre les industries du pétrole et du gaz —

Partie 1: Vue d'ensemble et principes fondamentaux

Reference number
ISO/TS 18101-1:2019(E)

© ISO 2019

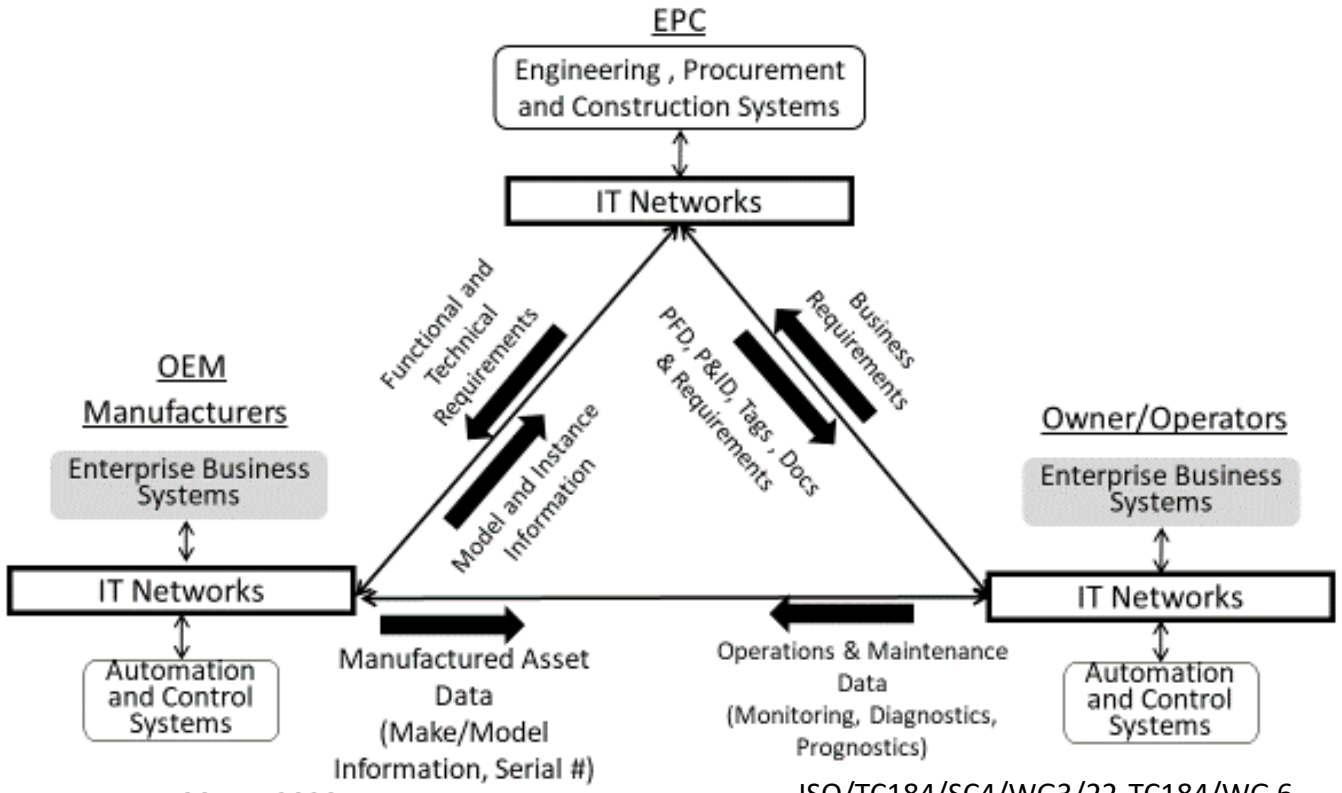
ISO TS 18101-1 Foreword
Paragraph 6

"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."

WG6–Asset Intensive Industry Interoperability ISO 18101 Standardization Concepts and Features

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
- OIIE 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 OIIE 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

FUTURE ENERGY EXPORTS
Cooperative Research Centre

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

Future-proofing Australia's energy exports through industrial-scale innovation

Current Partner Organisations:

FUTURE ENERGY EXPORTS
Cooperative Research Centre

Australian-Based Global Companies

Chevron
ITM POWER Energy Storage | Clean Fuel
HYUNDAI HEAVY INDUSTRIES CO.,LTD.
wood.
SAMSUNG HEAVY INDUSTRIES

Australian Companies

ANERGY TRANSFORMING WASTE
Australian Gas Infrastructure Group
beach
CO2CRC
ENVIRONMENTAL CLEAN TECHNOLOGIES LIMITED
ETP
HORIZON POWER
MINERAL RESOURCES
origin

Government, Regulatory & Peak Bodies

GOVERNMENT OF WESTERN AUSTRALIA
Government of South Australia
Queensland Government
appea
Asset® Institute
MIMOSA

Australian Research Capabilities

THE UNIVERSITY OF WESTERN AUSTRALIA
QUT
Curtin University
University of South Australia
SWINBURNE UNIVERSITY OF TECHNOLOGY

International Collaborators

東大先端研 Research Center for Advanced Science and Technology The University of Tokyo
ANSTEEL
科腾® Keteng

$127M
Total partner contributions

$39M
Committed partner cash

183
Committed in-kind FTEs

$40M Federal Funding Approved 3/2020

Structure

FUTURE ENERGY EXPORTS
Cooperative Research Centre

Chair

CEO

COO

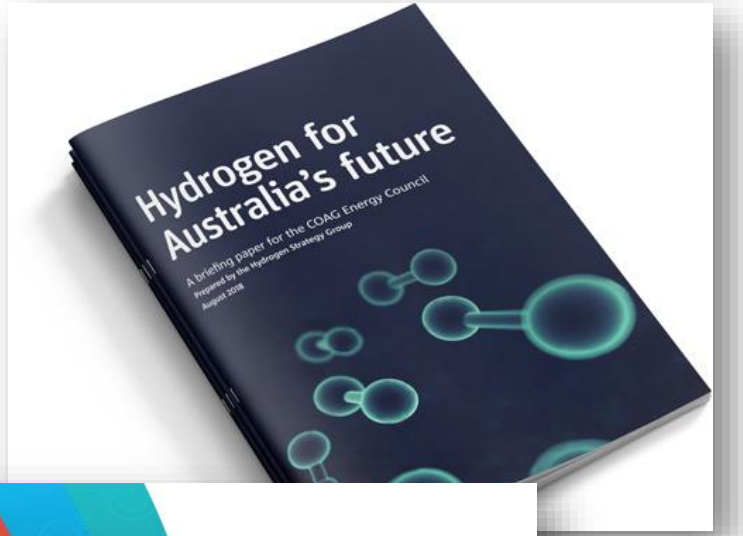
Research Director

RP1: Efficient LNG Value Chains

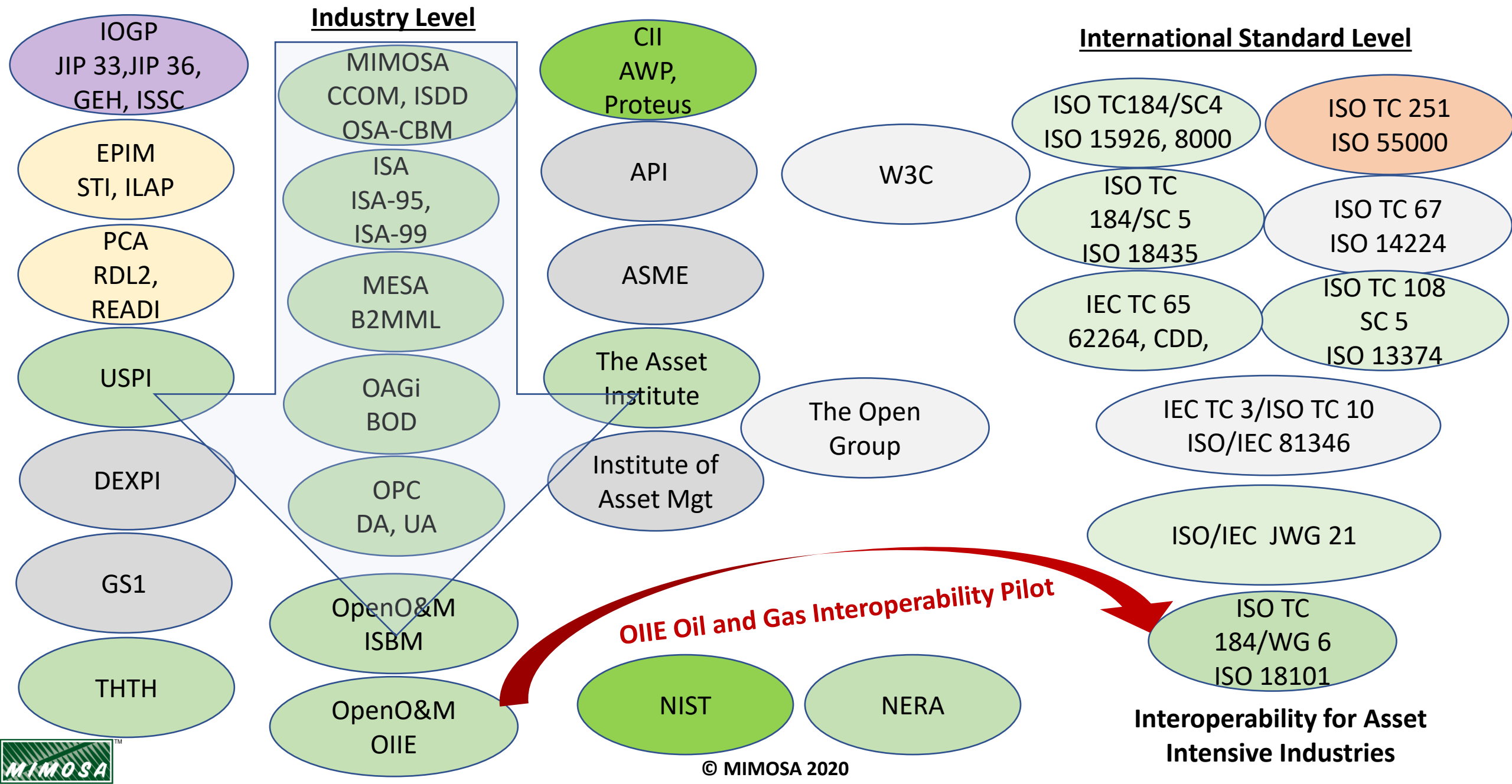
RP2: Hydrogen Exports & Value Chains

RP3: Digital Technologies & Interoperability

RP4: Market & Sector Development



Interoperability for Physical Asset Management-Associations and Activities



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ISBM 2.0

Implementation Specification for ISA-95 Message Service Model

OpenO&M Specification

2020-03-06

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Status

This specification was last revised and approved by the OpenO&M ISBM Joint Working Group on the above date. Check the Latest Version for possible later revisions of this document.

This document is considered stable and may be used as reference material or cited as a normative reference from another document.

The latest stable version of the editor's draft of this specification is always available on the MIMOSA ISBM Git repository [https://github.com/mimosa-org/isbm].

If you wish to make comments regarding this specification in a manner that is tracked by the OpenO&M ISBM Joint Working Group, please submit them via the public bug database [https://github.com/mimosa-org/isbm/issues]. You can alternatively contact MIMOSA directly [http://www.mimosa.org/contact] and arrangements will be made to transpose appropriate remarks to the public bug database. All feedback is welcome.

Latest Version

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

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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.

A New Collaborative White Paper from MIMOSA and OAGi

Published June 15, 2020

Editor: Yan Lu, NIST

Last Updated: 2020-06-15

Version: 1.0

Status: Published

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IIoT Message Modeling for Enterprise Integration and Interoperability

A Whitepaper from OAGi and MIMOSA

The OpenO&M Initiative

New Release Press Contact: Jenny Bien jenny.bien@cii.utexas.edu	*New Release* Press Contact: Alan Johnston atjohn@mimosa.org

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.

New Joint Release from CII and MIMOSA

Dated Jul 1, 2020

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

- 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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