Independent Project Analysis

IPA-MIMOSA OIIE Capital Projects Working Group Meeting #11 – 10/19/2021 Meeting Minutes

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OIIE Capital Project Working Group: 10-19-2021 Meeting Agenda

- Share the OIIE Capital Project Working Group Purpose
- Sub-team updates:
  - Cost Estimating
  - RFI/ RFI Response
  - Asset Installation
- OIIE Pilot Update
- Key Issue Discussion:
  - What are our 2022 Priorities?
- Define OIIE Capital Project WG Next Steps

Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group Purpose

This working group will meet monthly to help align the efforts of owner companies; engineering, procurement, and construction (EPC) firms; industry standardization organizations (e.g., IOGP/CIFHOS, ISA, MIMOSA) and international standards organizations (ISO, IEC, etc.).

All participants will work together to set the owner/EPC firm priorities for interoperability solution delivery to enable pragmatic industry digital transformation on a timely basis.

Meeting Slides For all Previous Meetings Can Now be Found on:
https://www.ipaglobal.com/event/digitalization-ipa-mimosa-oiie-capital-project-working-group-meetings/

Interoperability Definition: ISO TS 18101-1

Paragraph 3.1 - Terms and Definitions

interoperability

capability of two or more entities to exchange items in accordance with a set of rules and mechanisms implemented by an interface in each entity, in order to perform their specified tasks

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Note 1 to entry: Examples of entities include devices, equipment, machines, people, processes, applications, computer firmware and application software units, data exchange systems (3.2) and enterprises.
Note 2 to entry: Examples of items include services (3.7), information, material in standards, design documents and drawings, improvement projects, energy reduction programs, control activities, asset (3.5) description and ideas.
Note 3 to entry: In this context, entities provide items to, and accept items from, other entities, and they use the items exchanged in this way to enable them to operate effectively together.

[**SOURCE: ISO 18435-1:2009, 3.12, modified** — The word "respective" has been replaced with "specified", Notes 1 and 2 to entry have been modified and Note 3 to entry has been added.]

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2021 MEETING SCHEDULE

- November 4, 2020 – Meeting Minutes
- December 17, 2020 – Meeting Minutes
- February 16, 2021 – Meeting Minutes
- March 16, 2021 – Meeting Minutes
- April 20, 2021 – Meeting Minutes
- May 18, 2021 – Meeting Minutes
- June 15, 2021 – Meeting Minutes
- July 20, 2021 – Meeting Minutes | Recording
- August 17, 2021 – Meeting Minutes | Recording
- September 28, 2021 – Meeting Minutes | Recording
- October 19, 2021
- November 17, 2021
- December 21, 2021

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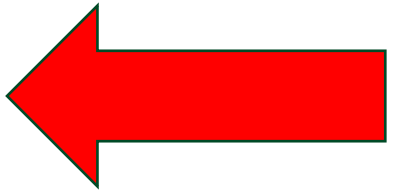

Sub- Team Report Outs

- Subteams 1&2 – Cost Estimating –
(Von Gusa/ Luke Wallace)

Will have two tiger team meetings and one large sub-team meeting before next Main group meeting

Work Progressing well – discussing update cycle
AACE – agreement to let us use the model
- sub-team access to full AACE document
- AACE MOU in progress (may take a while)

IPA/MIMOSA OIIE Capital Project Team Cost Estimating Sub-Team Tiger Team Charter

- The intent of this team's focused effort is to create a “strawman” of the industry good practice regarding the cost estimating process at a level of detail (granularity) to allow for identification of data and data management that can be improved (both internally to the company or industry and externally).
- At the same time these industry good practices need to be at the right level to allow for adoption across the industry and represent what your company’s, industry, group or other entity you are presently doing regarding practices and processes.
- Therefore, this group will be leveraging the individual team members and publicly available representations and existing industry good practices and processes to develop the strawman.

IPA/MIMOSA OIIE Capital Project Team Cost Estimating Sub-Team Tiger Team High Level Starting Point

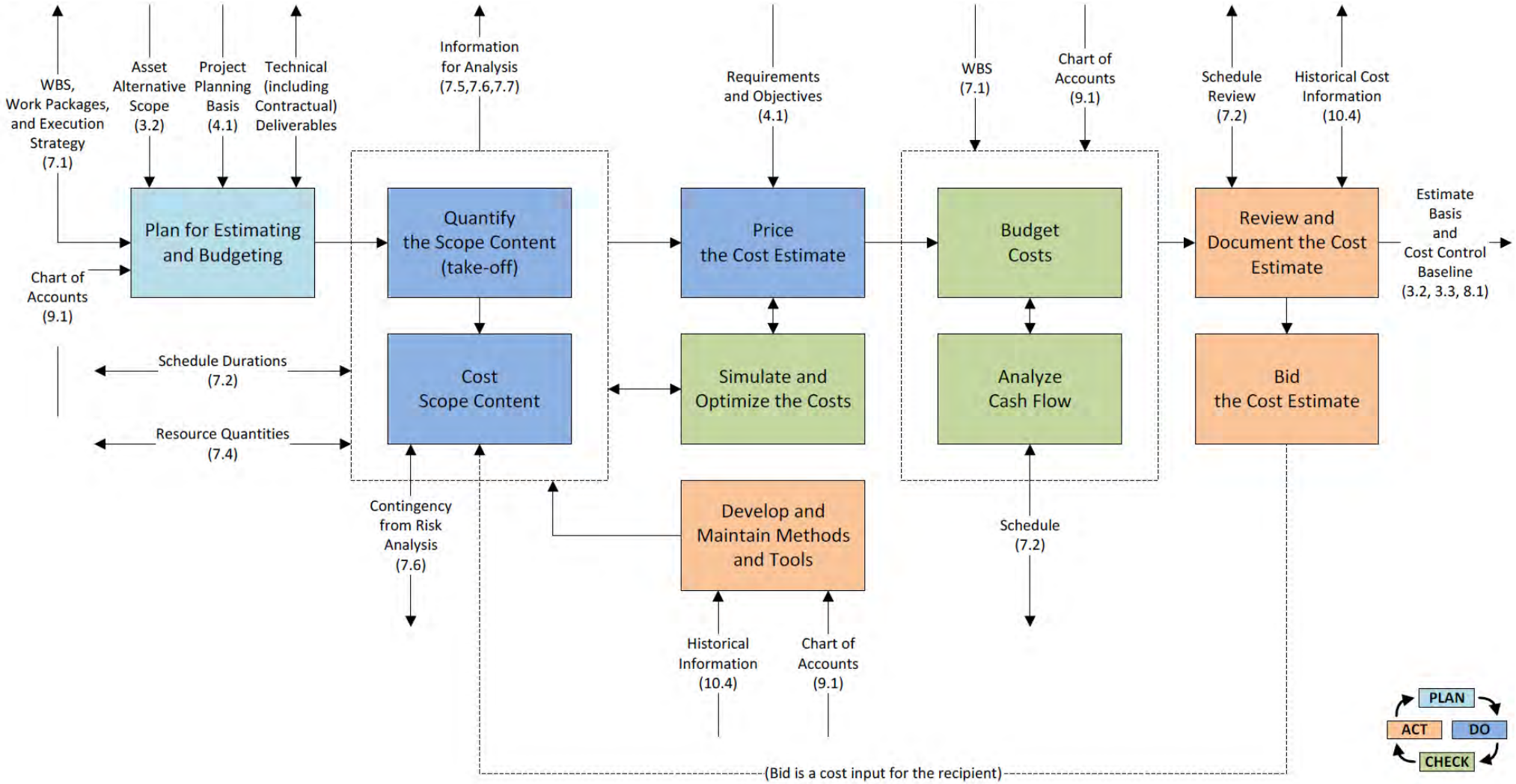

Figure 7.3-1 Process Map for Cost Estimating and Budgeting

Source: AACEi "Total Cost Management Framework, 2nd Edition, 2019"

IPA/MIMOSA OIIE Capital Project Team Cost Estimating Sub-Team Tiger Team Drill Down

Cost Code	Description			
	Cost Categories (Level 2)		CC	RC, OC, MC and EC
	Cost Groups (Level 3)			
1.	Construction Costs (CC)			
2.	Renewal Costs (RC)			
3.	Operation Costs (OC)			
4.	Maintenance Costs (MC)			
5.	End of Life Costs (EC)			
1.	Construction Costs (CC)		Cost Categories CC, RC and MC use the same Cost Groups	
2.	Renewal Costs (RC)			
4.	Maintenance Costs (MC)			
01.	Demolition, site preparation and formation Scope: All necessary advance or facilitating work to prepare, secure and form the site to enable substructure [construction | renewal | maintenance]			

Source: ICMS Coalition “Global Consistency in Presenting Construction and Other Life Cycle Costs, 2nd Edition, September 2019”

Cost Code	Description			
	Cost Categories (Level 2)		CC	RC, OC, MC and EC
	Cost Groups (Level 3)			
02.	Substructure Scope: All the load bearing work underground or underwater up to and including the following (including related earthwork, lateral support beyond site formation, and non-loadbearing components and services and equipment forming an integral part of composite or prefabricated load bearing work) and as illustrated in Part 4.2: • for buildings: lowest floor slabs, and basement sides and bottom including relatedwaterproofing and insulation • for roads, runways and motorways: sub-base to pavements • for railways: sub-base to rail track structures • for bridges: pile caps, footings, bases nearest ground level or water level if constructed inwater • for tunnels: external faces of structural tunnel linings • for tanks and the like underground: external faces of tanks • for tanks and the like above ground: bases supporting tanks • for pipelines underground: beds and surrounds to underground pipes • for pipelines above ground: bases to structures supporting pipes • for wells and boreholes: bases to structures supporting well heads • for dams and reservoirs: seepage ditch, drainage layer/blanket, drain channels, foundation,base, footings, cut-off wall, heel and toe • for mines and quarries: underground mines: bases to structures supporting shaft headgear;open pits: bases to structures; processes: bases to structures, tanks, and bases to major process equipment.			
03.	Structure Scope: All the load bearing work, including non-load bearing components and services and equipment forming an integral part of composite or prefabricated load bearing work, excluding those included in Substructure and Architectural works | Non-structural works.			
04.	Architectural works | Non-structural works Scope: All architectural and non-load bearing work excluding services, equipment, andsurface and underground drainage.			

Cost Code	Description			
	Cost Categories (Level 2)		CC	RC, OC, MC and EC
	Cost Groups (Level 3)			
05.	Services and equipment Scope: All fixed services and equipment required [to put the completed project into use for Construction Costs | to sustain the use after completion of construction for Renewal and Maintenance Costs], whether they are mechanical, hydraulic, plumbing, fire-fighting, transport, communication, security, electrical or electronic, excluding external surface andunderground drainage.			
06.	Surface and underground drainage Scope: All underground or external surface drainage systems excluding those insidebasement or underground construction.			
07.	External and ancillary works Scope: All work outside the external face of buildings or beyond the construction entity required to fulfil the primary function of the Project and not included in other Cost Groups.			
08.	Preliminaries | Constructors' site overheads | general requirements Scope: Constructors' site management, temporary site facilities, site services, and expenses,not directly related to a particular Cost Group, but commonly required to be shared by all Cost Groups.			
09.	Risk Allowances Scope: As defined in section 4.1 but related to [Construction | Renewal | Maintenance] Costs and not included in other Cost Groups.			
10.	Taxes and Levies Scope: As defined in section 4.1 and not included in other Cost Groups.			
11.	Work and utilities off-site Scope: All payments to government authorities or public utility companies to connect | keep connected public work and utilities to the site, or services diversions, to enable the Project, including related risk allowances, taxes and levies.			
12.	Post-completion loose furniture, fittings and equipment Scope: Those provided for the Project to perform its function close to or after completion ofconstruction, including related risk allowances, taxes and levies.			
13.	Construction | Renewal | Maintenance-related consultancies and supervision Scope: Fees and charges payable to Service Providers not engaged by the Constructors,including related risk allowances, taxes and levies.			

Cost Code	Description			
	Cost Categories (Level 2)		CC	RC, OC, MC and EC
	Cost Groups (Level 3)			
3.	Operation Costs (OC)			
01.	Cleaning Scope: Periodic, routine and specialist cleaning of internal and external works.			
02.	Utilities Scope: Fuel, including gas, electricity, fuel oil solid and other fuel; water and drainageincluding water rates, effluents sewerage drainage and other charges.			
03.	Waste management Scope: Collection, compaction, removal and disposal and/or recycling general and toxicwaste from the constructed asset.			
04.	Security Scope: Physical security (such as access control, CCTV camera) including staff or contractors involved in providing security controls via remote support centres, to the constructed asset.			
05.	Information and communications technology Scope: Information communications systems (such as Public address and Communications cabling and IT support services built as a constructed asset, as well as technology used for monitoring assets (i.e. Building Management Systems) and physical sensors.			
06.	Operators' site overheads | general requirements Scope: Operators' site management, temporary site facilities, site services, and expenses, not directly related to a particular Cost Group, but commonly required to be shared by all Cost Groups.			
07.	Risk Allowances Scope: As defined in Part 4.1 but related to Operation Costs and not included in other Cost Groups.			
08.	Taxes and Levies Scope: As defined in Part 4.1 but related to Operation Costs.			
5.	End of Life Costs (EC)			
01.	Disposal inspection Scope: Inspections carried out in connection with demolition, dilapidations or othercontractual requirements.			
02.	Decommissioning and decontamination Scope: All post-occupation activities required to render the constructed asset ready for demolition.			

Source: ICMS Coalition "Global Consistency in Presenting Construction and Other Life Cycle Costs, 2nd Edition, September 2019"

IPA/MIMOSA OIIE Capital Project Team Cost Estimating Sub-Team Tiger Team Drill Down

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Source: ICMS Coalition “Global Consistency in Presenting Construction and Other Life Cycle Costs, 2nd Edition, September 2019”

Cost code	Description			Note
	Cost Category (Level 2)	CC	RC or MC	
	Cost Group (Level 3)			
	Cost Sub-Group (Level 4)			
1.	Construction Costs (CC)			
2.	Renewal Costs (RC)			
4.	Maintenance Costs (MC)			
	(CC, RC, and MC share the same Cost Groups below, so far as applicable. Those separated by '|' in [ ] are respective alternative terms.)			
01.	Demolition, site preparation and formation			
01.010	Site survey and ground investigation			
01.020	Environmental treatment			
01.030	Sampling of hazardous or useful materials or conditions			
01.040	Temporary fencing			
01.050	Demolition of existing buildings and support to adjacent structures			
01.060	Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)			
01.070	Tree transplant			
01.080	Site formation and slope treatment			
01.090	Temporary surface drainage and dewatering			
01.100	Temporary protection, diversion and relocation of public utilities			
01.110	Erosion control			
02.	Substructure			
02.010	Foundation piling and underpinning: 010 – mobilisation and demobilisation020 – trial piles and caisson 030 – permanent piles and caisson040 – pile and caisson testing 050 – underpinning			

Cost code	Description			Note
	Cost Category (Level 2)	CC	RC or MC	
	Cost Group (Level 3)			
	Cost Sub-Group (Level 4)			
02.020	Foundations up to top of lowest floor slabs: 010 – excavation and disposal020 – lateral supports 030 – raft footings, pile caps, column bases, wall footings, strap beams,tie beams 040 – substructure walls and columns 050 – lowest floor slabs and beams (excluding basement bottom slabs)060 – lift pits 070 – composite or prefabricated work			
02.030	Basement sides and bottom: 010 – excavation and disposal020 – lateral supports 030 – bottom slabs and blinding040 – sides 050 – vertical waterproof tanking, drainage blanket, drains and skin wall 060 – horizontal waterproof tanking, drainage blanket, drains andtopping slab 070 – insulation 080 – lift pits, sump pits, sleeves 090 – composite or prefabricated work			
03.	Structure			
03.010	Structural removal and alterations			

Source: ICMS Coalition "Global Consistency in Presenting Construction and Other Life Cycle Costs, 2nd Edition, September 2019"

IPA/MIMOSA OIIE Capital Project Team Cost Estimating Sub-Team Tiger DRAFT User Story Listing

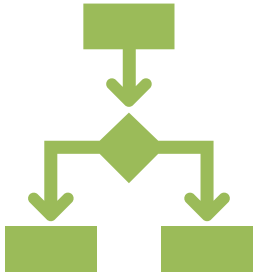
User Story Theme: **Cost Estimation**

	As an **Actor / Role** (Who - People & Systems)	I want to **Activity / Task / Goal** (What)	so that **Reason** (Why)	when **Triggering Event** (When - Optional)
1	Cost Estimation System	have database of past projects	AI can be realized/leveraged	new projects are planned
2	Estimator	perform a scope & estimate review	I can validate completeness and accuracy of the estimate	first draft or preliminary estimate
3	Gatekeeper	ensure completeness of scope definition	I can ensure the project has met objectives	Project gate review process FEL 1, 2, 3 reviews
4	Project/Lead Estimator	Material take-offs from the P&IDs pose the greatest level of accuracy (combination of parametric and expert judgement)	Parametric estimating is likely the best case scenario since it is data intensive and considered highly accurate (deterministic and probabilistic)	FEL 3 Stage Gate Review
Also Considered				
a	Estimator (Construction manager input)	workforce transperancy, relates to cost estimate, availability, quantity, productivity (internal or external)	predictibility and accuracy while building of cost estimate	creation of execution phase of estimate for successful installation
b	Estimator (Global Lead) Benchmarking	access accurate and standardized scope information for the purpose of building benchmark and estimate triggering vendors	when the need for an estimate arises	pro-active, IPA style cost modeling
c	Procurement	approved vendor list	expedite or shorten the cycle and reliable quotation	standard compliant
d	Procurement Leader	collect info and provide vendor costing info	I can provide up to date quotes	as the estimate is developed and scope identified

Subteam 3 – RFI/RFI Response- Capital Supply Chain (Karamjit Kaur)

Finalizing content on R

OIIE Purchasing Use Case



Identified OIIE Scenarios

Push Request for Business Information

Push Request for Catalog Information

Push Request for Technical Information

Publish Request for Quotation

Push Purchase Order

Detailing OIIE Scenarios

System Actors (MATERIALS, OEM PRODUCT, ..)

Data Content

Reference Types

System Interoperability Events

Data Formats

Infrastructural Components

Event Sequence

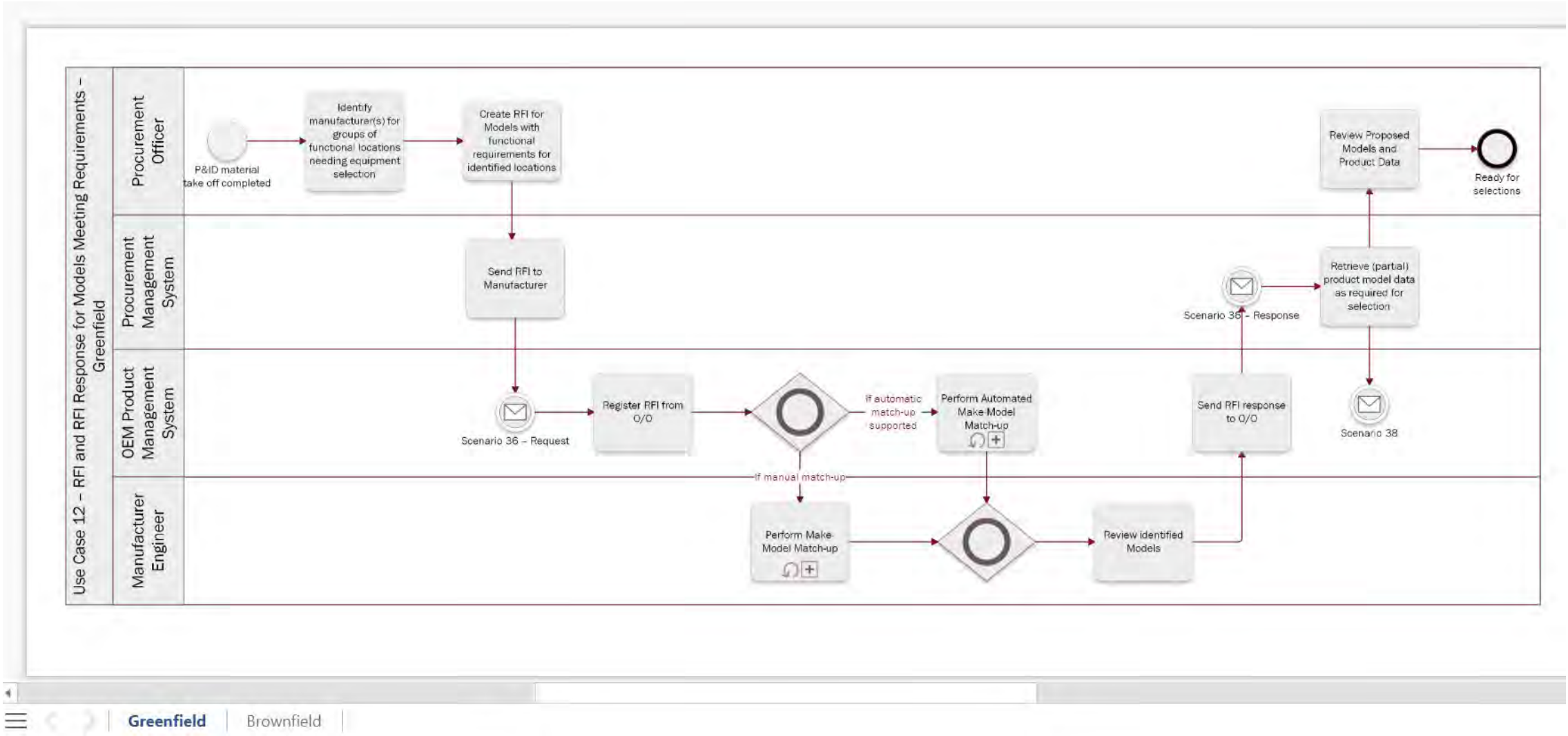
RFQ Header

- Project Details
- Note
- Issue Date
- Due Date
- Validity Period
- Billing Address
- Delivery Address
- Delivery Terms
- Payment Terms
- Currency Code (ISO 4217)
- Destination Country (ISO 3166)
- Partial Shipment Allowed Indicator
- Tax Exempted
- Catalogue Reference
- Contract Reference
- Document Reference(s)
- Total Amount
- Signature
- Line Count

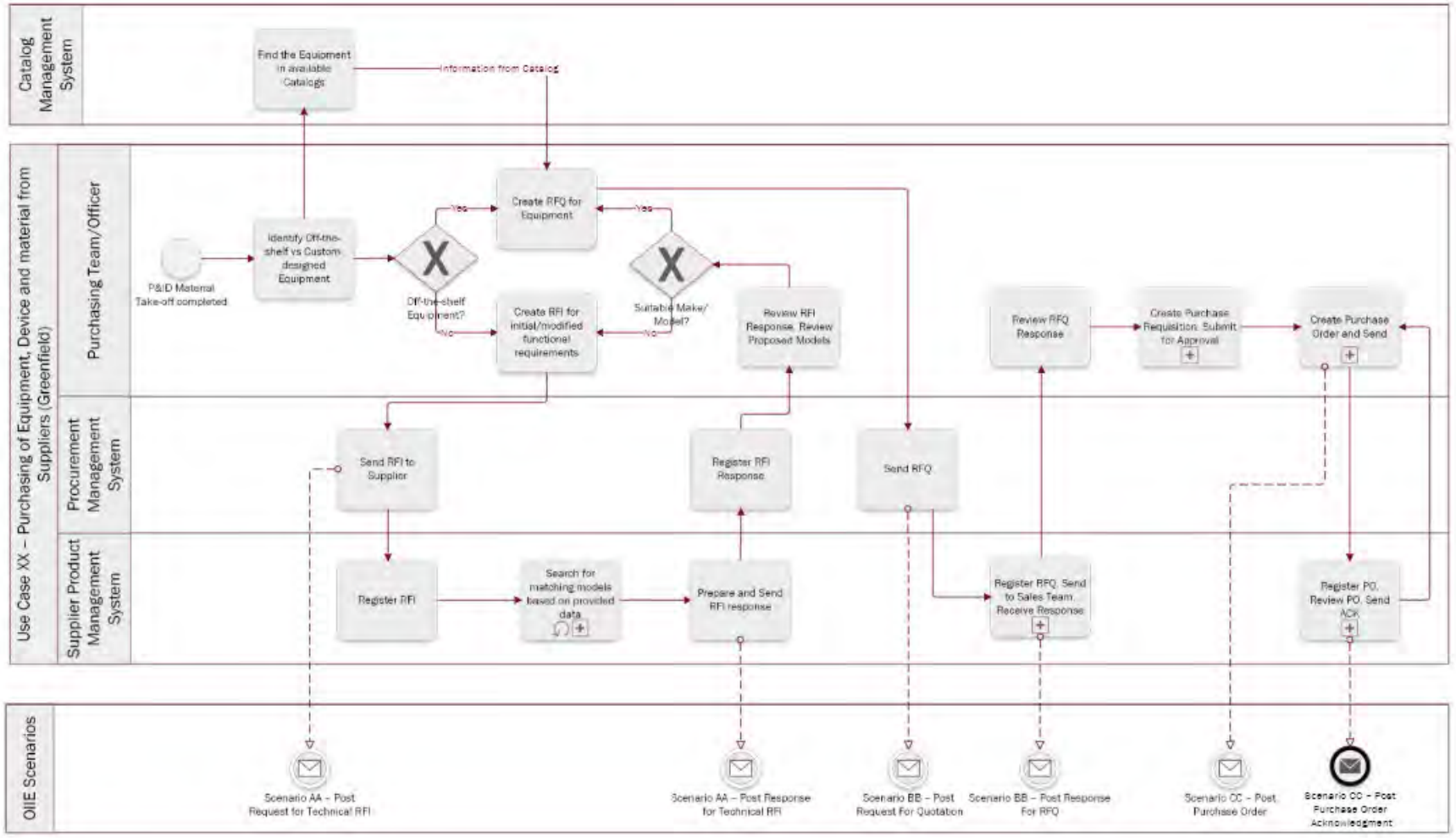
RFQ Line

- Item Number
- Tag Number
- Size/Measurements/Dimensions
- Quantity
- UoM
- Lead Time
- Unit Price
- Total Price
- Required Delivery Date
- Partial Shipment Allowed Indicator
- Delivery Address
- Optional Item
- Transportation Terms
- License Information
- Catalogue Reference
- Item Details

RFI/RFI Response Purchasing Use Case - Greenfield



RFI/RFI Response Purchasing Use Case – Brown Field



Subteam 4- Asset Installation – Capital (Matt Selway)

Putting together an example IWP minimum dataset perform mapping to issue and then track progress (Excel and CCOM)

Request: Owner to supply a real capital project IWP example Sample in https://www.coaa.ab.ca/library/advanced-work-packaging-summary/

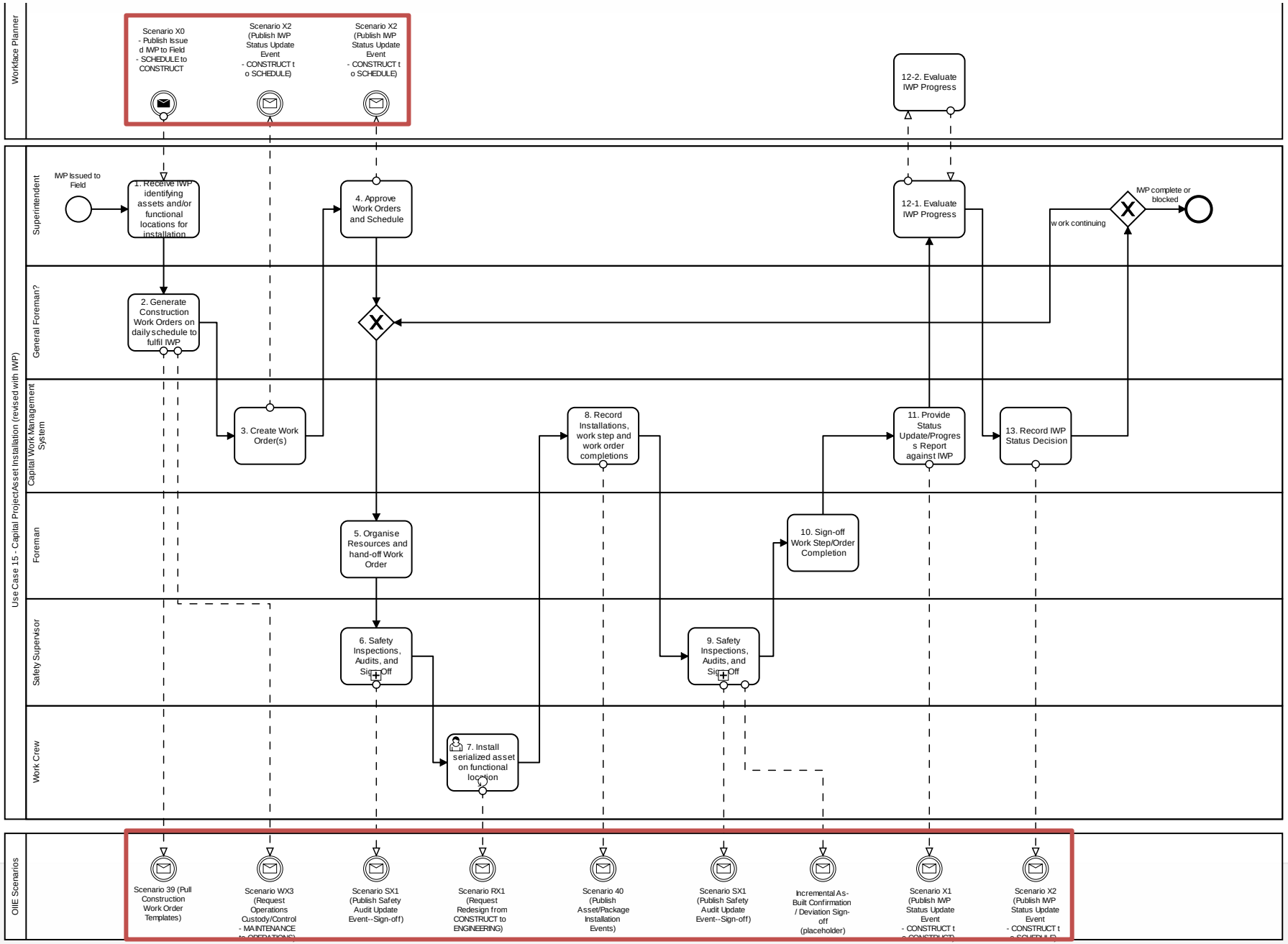
Back-End Sub Team Progress: Capital Asset Installation Use Case Update

Incorporating:

- IWP issuance as trigger;
- breakdown into daily work;
- scenarios for safety audits and sign-offs; and
- IWP evaluation and status updates

Identified large number of scenarios (system interactions):

- Taking 3 to pilot
- IWP Issuance to Field (entry point)
- IWP Status Updates (internal)
- IWP Status Updates (to scheduling/planning)



Back-End Sub Team Progress: Next Steps

- Continue detailing out IWP Issuance scenario
  - Key scenario as it provides the input into the Use Case
  - Incorporating relevant AWP data requirements
  - Mapping to MIMOSA CCOM
    - Work Requests, Work Orders, and their Work Steps; Documents and other related
    - Reference Data Mapping and Creation (where necessary)
  - Generate example data set for pilot

- Detail out the other 2 selected scenarios:
  - IWP Status Updates (construction-to-construction systems)
  - IWP Status Updates (construction-to-scheduling/planning systems)
  - These will be similar and should have good reuse

Open Industrial Interoperability Ecosystem (OIIE)™ OGI Pilot
Phase 3.3/3.4 Update
AT Johnston

Gaining Business Value Through Mutually Beneficial Collaboration

Industrial Digital Transformation in Asset Lifecycle Management using the Open Industrial Interoperability Ecosystem (OIIE) and OIIE OGI Pilot

OIIE Capital Project WG
October 19, 2021

Alan T Johnston

President MIMOSA- A 501(c)6 non-profit Industry Standards Developing Organization

Convenor ISO TC 184/WG 6 (Asset Intensive Industry Interoperability)

What are MIMOSA and OpenO&M?

- **MIMOSA was organized as a 501 (c) 6 not for profit industry association in 1997.**
  - MIMOSA is an Industry Standards Developing Organization that is recognized by ANSI and ISO.
  - MIMOSA develops and encourages the adoption of open, supplier-neutral standards enabling digital transformation for asset lifecycle management spanning plants, platforms, and facilities.
  - MIMOSA is funded by its members and project sponsors who include Operators, Suppliers and University Affiliated Research Centers.
  - MIMOSA has MOUs with multiple other industry associations to enable collaborative development of fit for purpose industry and international standards.
  - ➢ MIMOSA provides a Safe Harbor environment for mutually beneficial collaboration for digital transformation asset lifecycle management, spanning standardization activities that are otherwise often siloed.
  - ➢ MIMOSA manages the OIIE OGI Pilot to help industry participants understand how they can gain business value from standards-based interoperability by adopting the OIIE specifications they can see being used in the pilot to help solve business problems THEY are prioritizing, **sharing costs, risks, standards and benefits**.
  - www.mimosa.org

- **The OpenO&M Initiative was formed by a multi party MOU in 2007**
  - It includes ISA, MESA, MIMOSA, OAGi, and OPC Foundation
  - The Open Industrial Interoperability Ecosystem (OIIE) specifications arose from this collaboration
  - ➢ MIMOSA manages the IP developed by the collaborative team under the umbrella of the MIMOSA Anti-Trust and IP Rights Management Policies
  - www.openoandm.org

Business Value of Digital Transformation and Interoperability
For Engineering, Procurement, Materials Management and Construction

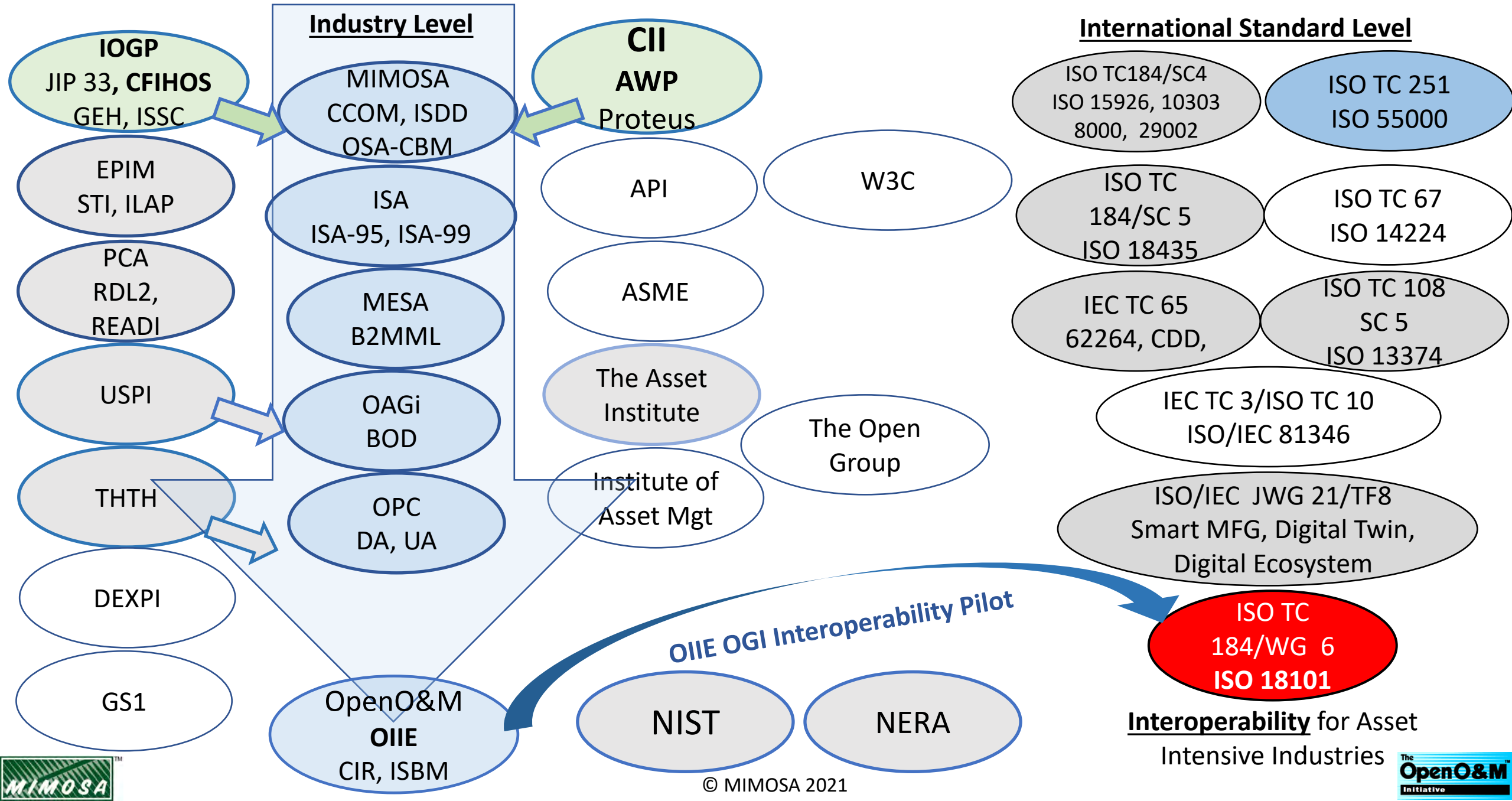
- **More accurate information**
  - Minimize reentry of data across a supply chains
  - Use mutually agreed reference data of known quality
  - Synchronization of Digital Twins with each other and with the physical/simulated realization thereof
  - Built in feedback loops for continuous improving across the asset lifecycle (Engineering, Design, Procurement, Construction, O&M)
- **More timely information**
  - Finer grained, object-oriented data/information exchanges rather than batch summaries
  - Event Driven Architecture
  - Operate at the appropriate speed of business (Sensor-based, Event-driven and Transaction Processing)
- **More secure information**
  - Supplier/Vendor-neutral Digital Ecosystem Solutions Architecture includes known levels of cybersecurity
  - Minimize emailing of spreadsheets and documents with sensitive information
- **Improved Enterprise and Operational Risk Management**
  - Interoperable and timely analytics (FEnEx CRC Project 1)
  - Spanning the full asset lifecycle
  - Formal Risk Models
  - Linking hypothetical risks to actual risks and consequences (physical and financial)

Removing Inefficiencies Results: Higher Quality, Faster, and Lower Costs and Risks

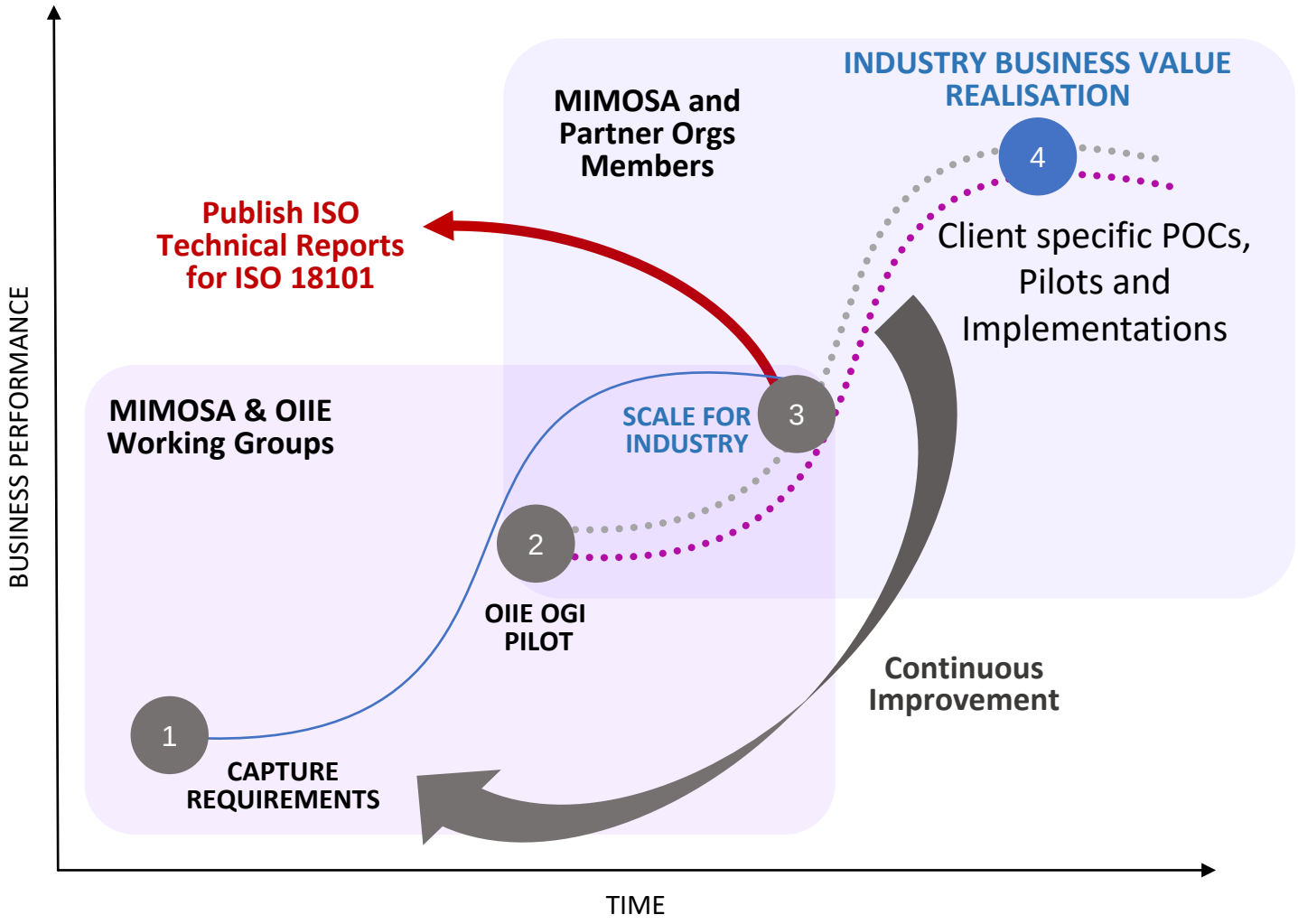
Use of Funds
Supporting OIIE Standardization Process
Overall OIIE and ISO 18101 R&D Program

- OIIE Use Case Development Methodology-Capturing Industry Requirements for Digital Transformation
- OIIE OGI Pilot – Validating OIIE Use Cases, OIIE Primary Component Specifications and Prototyping Software
- Leveraging the FEnEx CRC for AU Government Matching Funds
- Projected 2022 Expenses

Interoperability for Physical Asset Management-Associations and Activities



The OIIE R&D Program Drives Industry Digital Transformation and Business Value Realization Sharing Costs, Risks and Standards



4 **Industry Business Value Realization**

- Participant/Client Specific Solutions
- Client Ecosystem and Interdependencies
- Industry participants assemble their own interoperating OIIE systems of systems using intranets and extranets

3 **Scale for Industry**

Industry participants build supported implementations of OIIE elements for industry use in OIIE systems of systems

2 **OIIE OGI Pilot** (Currently Phase 3.3)

- Develop prototype OIIE use cases and software
- Validate use cases and software in industry pilot
- Publish version managed standards and specifications (use cases, scenarios, events…)

1 **Capture Industry Requirements**

Process of capturing industry user stories and prioritizing them for the OIIE OGI Pilot

OIIE/OGI Standardized Use Case Architecture

Standardized Methodology to Define and Re-use OIIE Components

User Stories

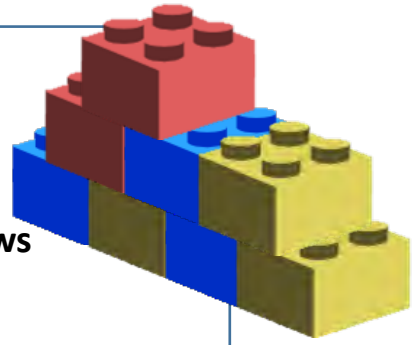
User Stories

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

Use Cases

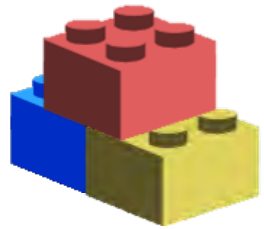
- Background
- Scope
- Preconditions
- Successful End Condition

- **Actors**
- **Triggers**
- **Process Workflows**
- **Scenarios**

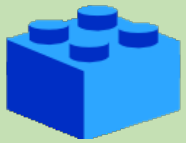


Scenarios

- 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

Standard OIIE/OGI Use Cases

Cross Project Activities	Capital Projects	Complete/ Commission/ Startup	Operate/ Maintain	Decommission/ Dispose

Opportunistic Handover of Structured Digital Assets

Sustained Life-cycle Digital Asset Management

- OIIE Use Case 1: Information handovers to O&M
- OIIE Use Case 2: Recurring Engineering Updates to O & M
- OIIE Use Case 3: Field Changes to Plant/Facility engineering
- OIIE Use Case 4: Enterprise Product Data Library Management (tied to ISDDs)
- OIIE Use Case 5: Asset Installation/Removal Updates
- OIIE Use Case 6: Preventive Maintenance Triggering
- OIIE Use Case 7: Condition Based Maintenance Triggering
- OIIE Use Case 8: Early Warning Notifications
- OIIE Use Case 9: Incident Management/Accountability
- OIIE Use Case 10: Automated Provisioning of O & M systems
- OIIE Use Case 11: Enterprise RDL Management
- OIIE Use Case 12: RFI and RFI Response (Models Meeting Requirements and Model Information, Green and Brown Field)
- OIIE Use Case 13: Lockout/Tagout
- OIIE Use Case 14: CBM Data Acquisition
- OIIE Use Case 15: Capital Project Asset Install
- OIIE Use Case 16: Purchasing (Subset of Procurement Process)

Yellow Use Cases in Phase 3.1, 3.2 , and 3.3

Salmon Use Case Newly Under Development in Phase 3.3+

Industrial Digital Transformation – 2021 and Beyond

A Pragmatic Solution: Standards-based Interoperability and the OIIE

OIIE R&D Program

Industry Requirements Driven OIIE Use Cases

OIIE OGI Pilot Program

Open Industrial Interoperability Ecosystem (OIIE)

ISO 18101

Supports/Standardizes

- Digital Twins
- Digital Services
- Systems of Systems
- Interoperability
- AI, Ontology, OTDs
- ID Management
- IIOT and Analytics
- Risk Mgt: Ops & Cyber

Model, Monitor and Manage

MIMOSA has helped lead the development of the Model Driven Architecture for Physical Asset Management Paradigm for 20+ yrs.

Industry Standard Digital Ecosystem Components

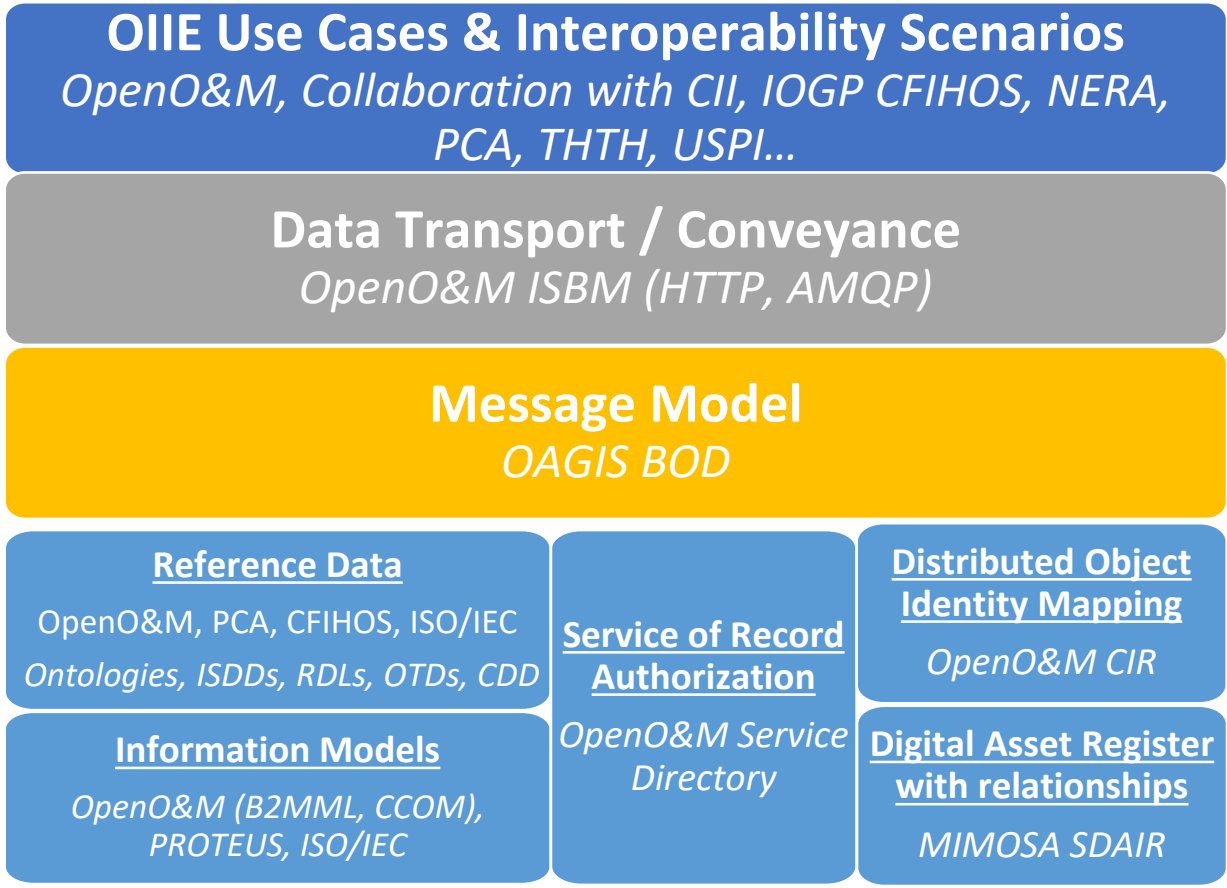
- **Standard OIIE Use Cases, Scenarios & Events**
- **Standard OIIE Digital Services Definitions**
- **Standard OIIE APIs (OpenO&M ISBM)**
- **Standard OIIE Registers and Services Directories**
- **Standard Data Models (MIMOSA CCOM, PROTEUS…)**
- **Standard Message Models**
- **Standard Reference Data**
- **Standard OIIE Adaptors**

OIIE Primary Components

The OIIE prescribes the use of open, supplier/vendor-neutral standards for several important components, including:

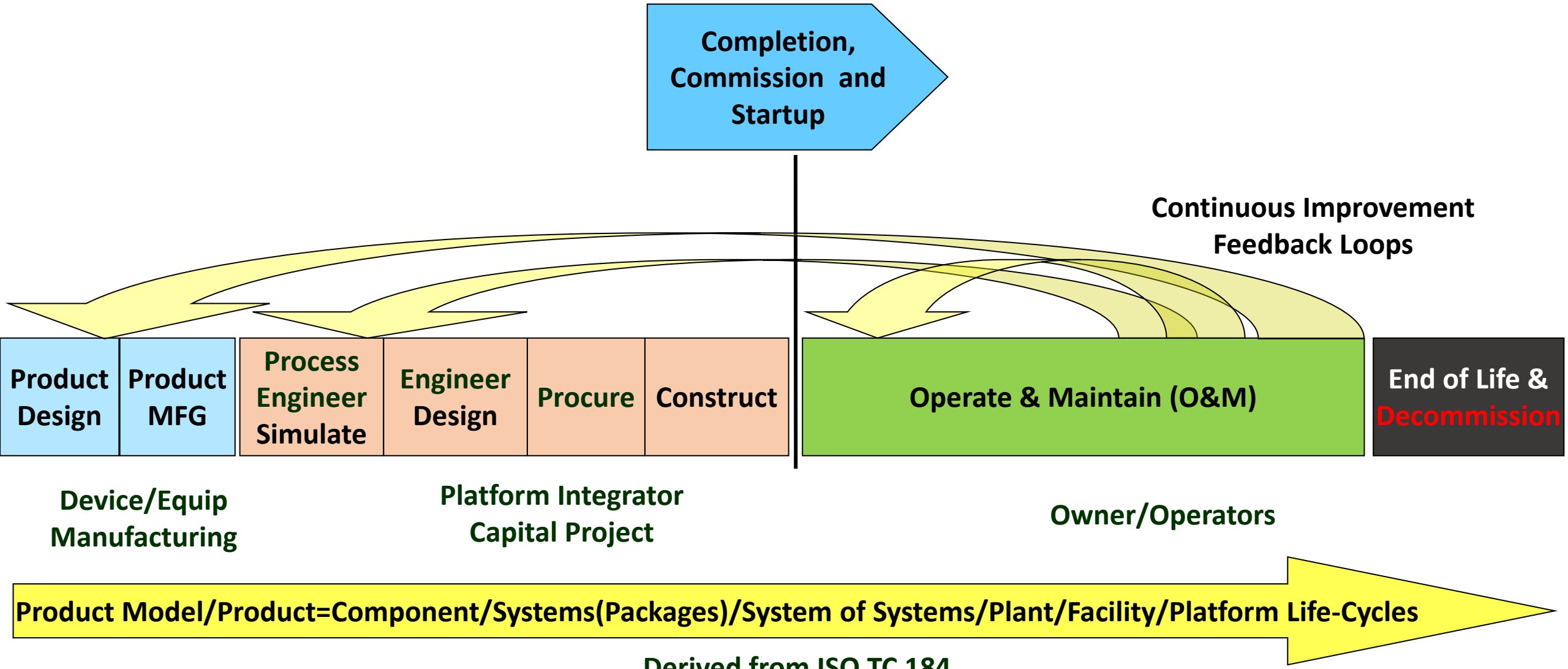
- An **information message/service bus** to provide supplier/vendor-neutral middleware-based data transport/conveyance
- **Information and message models** for the representation of messages and digital services inputs/outputs
- **Reference data** for consensual interpretation of information
- A **service directory** to register ecosystem applications, manage service of record, and exchange service endpoint and transport configuration
- An **object registry** that maintains identifier mappings between internal application identifiers and canonical identifiers used as part of standard information models
- An **asset interoperability register** containing identifiers for all physical and logical assets and an unlimited number of relationships between them, including both full networks and breakdown structures.

All of the standard specifications are services/performance oriented, following the "black box" model from the systems engineering community. You can build them any way you wish, but they must function as prescribed.



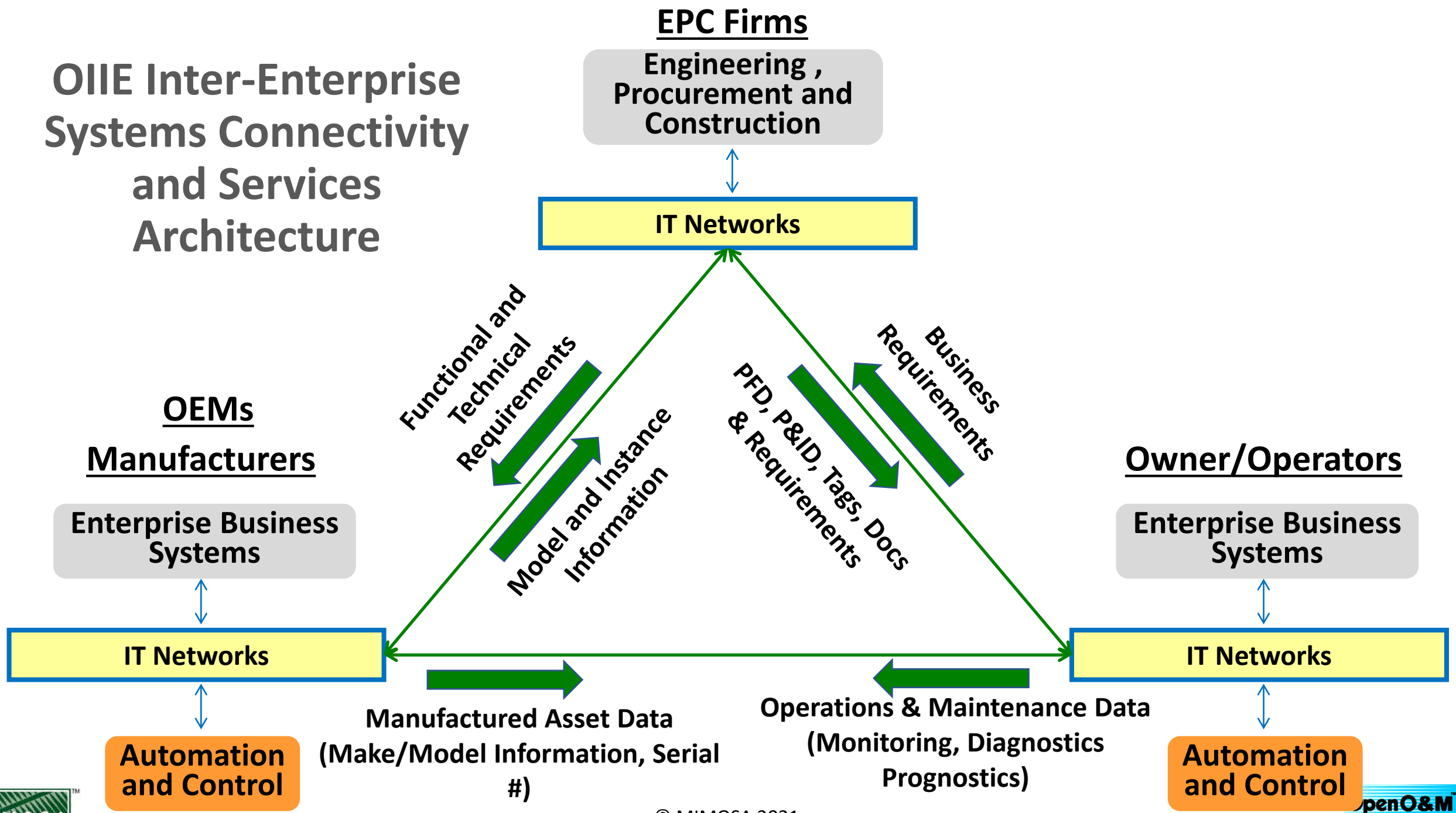
Standardization of the above components and OIIE Adaptors allows industries to reduce costs developing, testing and supporting components using COTS or Open-Source models.

Full Asset Life-cycle Management

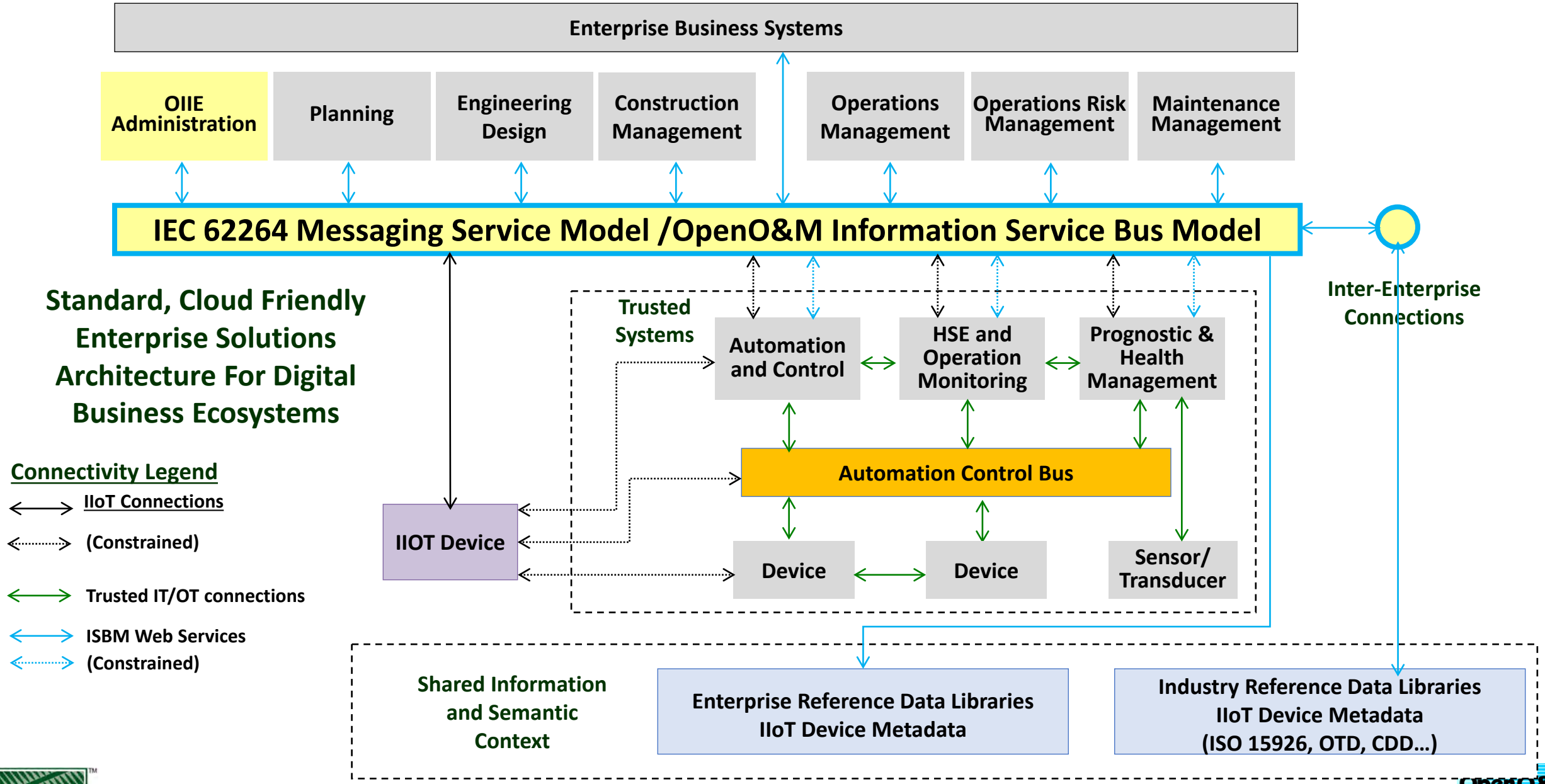


Derived from ISO TC 184
Manufacturing Asset Management Integration Task Force Final Report

OIIE Inter-Enterprise Systems Connectivity and Services Architecture

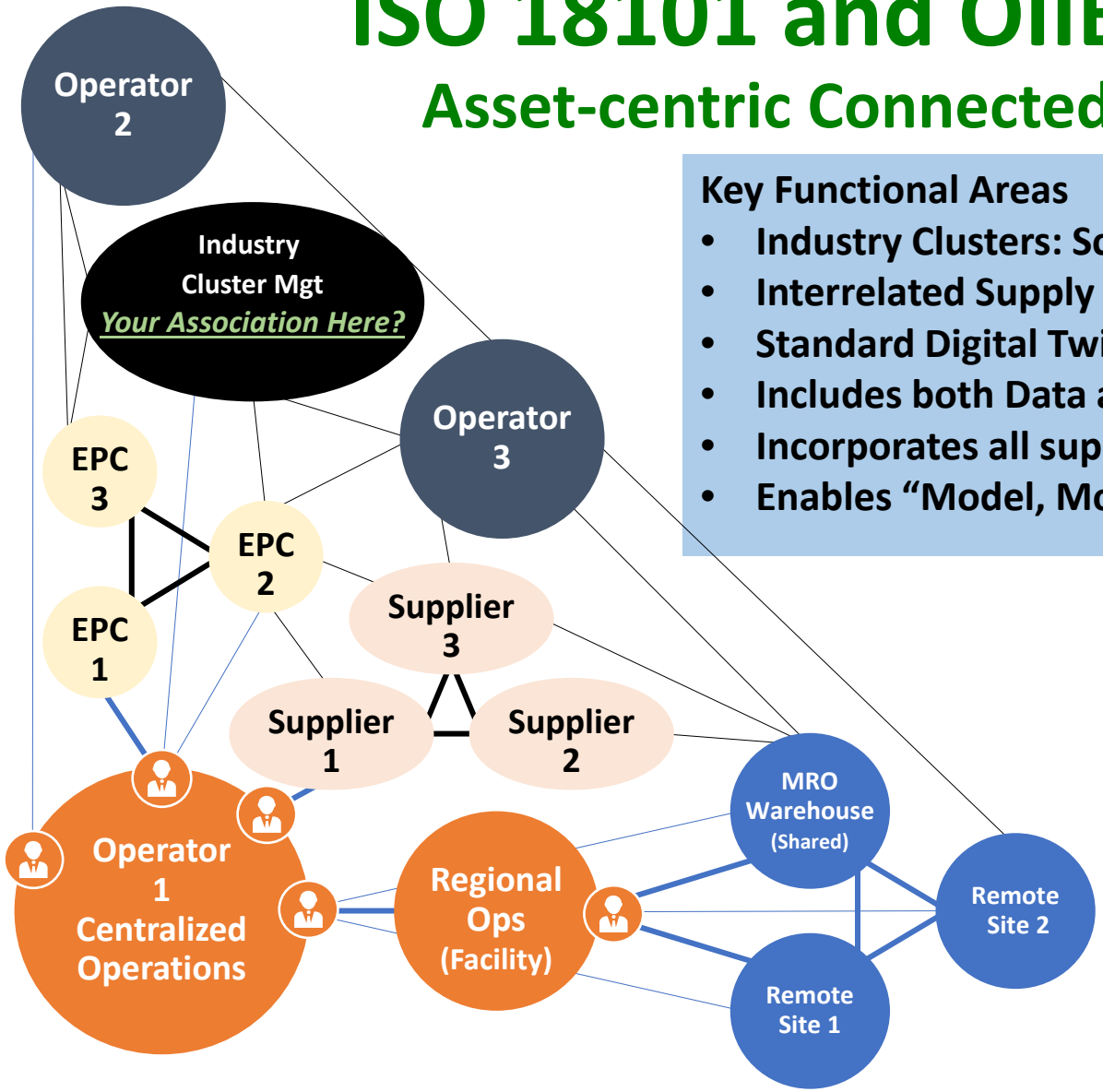


OIIE Intra-Enterprise Systems Connectivity and Services Architecture



ISO 18101 and OIIE Interoperability Framework

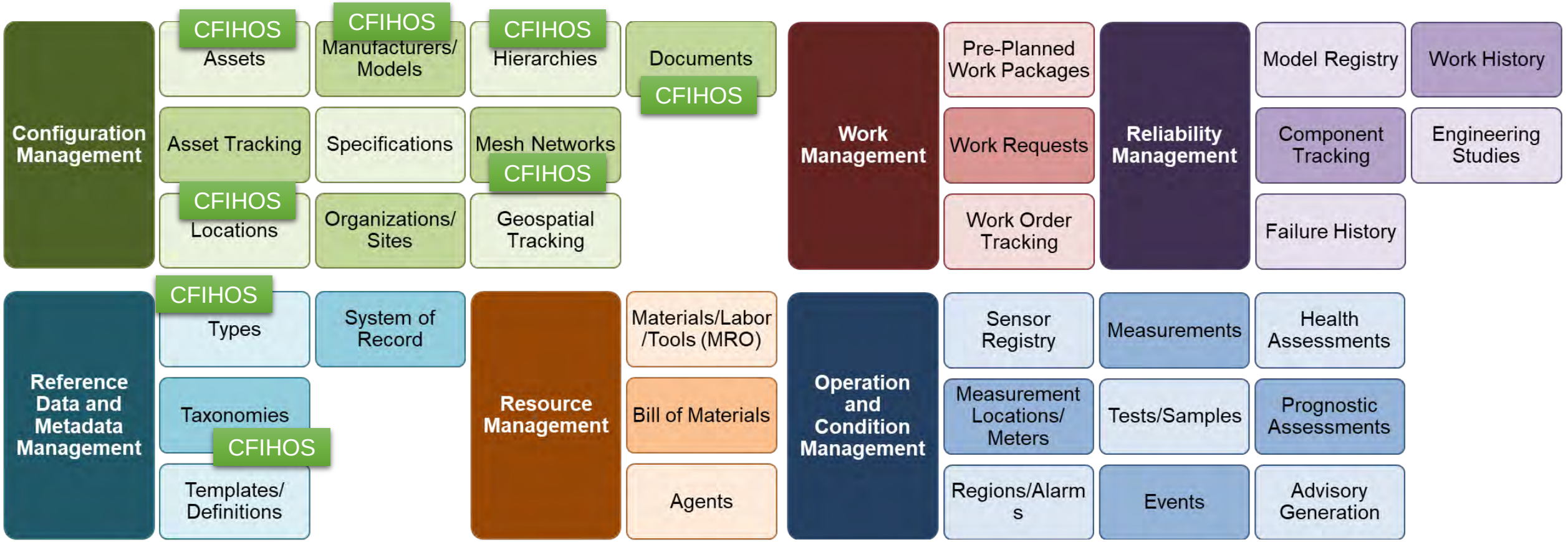
Asset-centric Connected Digital Ecosystems – Industry Clusters



Key Functional Areas

- Industry Clusters: Scalable "Virtual Hubs" without hub and spoke architecture liabilities
- Interrelated Supply Chains – CAPEX and OPEX
- Standard Digital Twins (synchronized across the lifecycle)
- Includes both Data and Required Documents
- Incorporates all supplier classes (Hardware, Software, Services, Digital Services)
- Enables "Model, Monitor and Manage" paradigm for Asset Lifecycle Management

Model Information Scope
CFIHOS and MIMOSA CCOM



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 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

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

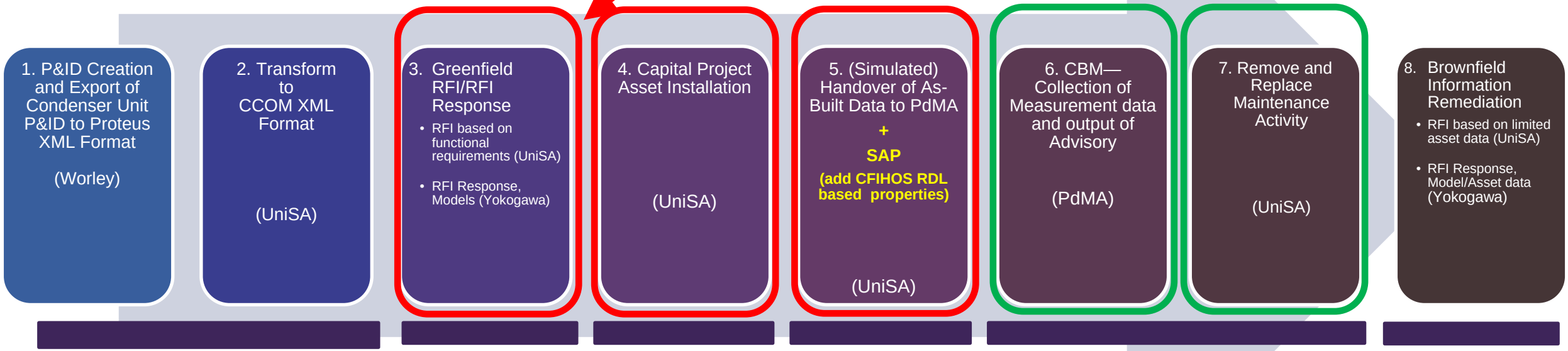
RP4: Market & Sector Development

OIIE OGI Pilot Phase 3.3 - Starts Adding AWP (IWP) and CFIHOS

The plan is to update 2 existing OIIE Use Cases and inserts a new OIIE Use Case focused on Purchasing, then follow the existing OIIE Use Cases shown here.

Relevant CFIHOS RDL is being added along with AWP requirements for IWPs.

Insert New OIIE Use Case
1. Purchasing
IEEE Std 841/IOGP - JIP33 S-733D
Low Voltage Electric Motor and ISA Spec Instrument



OIIE OGI Pilot 3.3 Sprints

Sprint 1 (June 2021) Tasks	Status
1. Purpose of CFIHOS RDL for pilot	Completed
4. Generate CFIHOS RDL based ISDD for Motor	Completed
3. Review CFIHOS RDL based ISDD for Diff. Press Trans.	Awaiting CFIHOS review

Sprint 2 (July 2021) Tasks	Status
7. New OIIE Use Case for Purchasing	Reassigned to Sprint 5
8. Extend OIIE Use Case 15 with IWP	Reassigned to Sprint 5

Sprint 3 (Aug 2021) Tasks	Status
9. Extend OIIE Handover Use Case for CFIHOS ISDDs	Reassigned to Sprint 4
10. Demo extended OIIE Use Case 1	Reassigned to Sprint 4

Sprint 4 (Sep 2021) Tasks	Status
5. Generate JIP 33 based ISDD Motor	To be completed by end of Oct
9. Extend Use Case 1 for CFIHOS ISDDs	To be completed by end of Oct
10. Demo extended OIIE Use Case 1	To be completed by end of Oct

Sprint #	Backlog Tasks		Task Short Description
Sprint 5 (Oct 2021)	6.1	7	6.1 ISBM 2.1 Specification update (AMQP) 7. New OIIE Use Case for Purchasing 8. Extend OIIE Use Case 15 with IWP 11. Implement provisioning of SAP for CFIHOS ISDDs
	11	8	
Sprint 6 (Till Mid-Nov 2021)	6.2	12	6.2 Service Directory 2.1 Specification update 12. Implement ISBM 2.1 specification

OIIE OGI Pilot 3.4 Sprints

Sprint #	Backlog Tasks		Task Short Description
Sprint 1 (Nov 2021)	14	15	14. Development of initial capability model, FEnEx CRC 15. CFIHOS/AWP based contract handover requirements preparation
Sprint 2 (Dec 2021)	13	16	13. Implement Service Directory 2.1 specification 16. Partial prototype CFIHOS/AWP based contract handover requirements

Sprints Backlog

Tasks (1 sprint = 4 weeks)	Duration Estimate	Responsible	Reviewer
1. Determine purpose of CFIHOS RDL within pilot scope	1	CFIHOS MIMOSA JWG	
2. Analyse CFIHOS RDL 1.4.1 – Generate Summary of Metrics	1	MIMOSA	CFIHOS
3. Review initial ISDD for Differential Pressure Transmitter (DPT) generated based on CFIHOS RDL	1	CFIHOS	
4. Generate and share ISDD for Motor based on CFIHOS RDL	0.25	MIMOSA	CFIHOS
5. Generate and share ISDD for JIP 33 S-733D Low Voltage Electric Motor	1	MIMOSA	CFIHOS
6. Specifications update for Inter-enterprise RFI/RFI Response pilot 6.1 ISBM 2.1 specification update (AMQP) 6.2 Service Directory 2.1 specification update (Capabilities and Cluster)	 2 1	MIMOSA	OpenO&M JWG
7. Documenting new proto OIIE Use Case for purchasing	1-1.5	MIMOSA	IPA MIMOSA JWG
8. Extending OIIE Use Case 15 for capital projects asset installation by adding IWP aspect	1-1.5	MIMOSA	IPA MIMOSA JWG
9. Extending OIIE Use Case 1 for information handover by adding CFIHOS ISDDs	0.25	MIMOSA	CFIHOS MIMOSA JWG
10. Demo updated OIIE handover Use Case 1 with CFIHOS ISDDs for agreed classes	0.5	MIMOSA	CFIHOS MIMOSA JWG
11. Implement provisioning of SAP for CFIHOS ISDDs	1	MIMOSA	CFIHOS MIMOSA JWG
12. Implement ISBM 2.1 specification	2	MIMOSA	OpenO&M JWG
13. Implement Service Directory 2.1 specification	1	MIMOSA	OpenO&M JWG, FEnEx CRC Participants
14. Development of initial capability model towards Service Directory update, under FEnEx Analytics Project	1	MIMOSA	OpenO&M JWG, FEnEx CRC Participants
15. Determine requirements for CFIHOS/AWP based contract handover requirements	0.25	MIMOSA	CII-MIMOSA JWG, CFIHOS
16. Implement partial prototype of CFIHOS/AWP based contract handover requirements	0.5	MIMOSA	CII-MIMOSA JWG, CFIHOS

Getting Started - OIIE Australian WG Workshops Plans

Upcoming Training for OIIE Use and Development (Reusable OIIE Workshops)

Workshop	Q&A Session	Concept	Implementation
Workshop 1	**3rd Nov, 11:30 am ACDT**	• OIIE Use Case Architecture Overview • OIIE Infrastructure Components Overview • OIIE User Stories Overview	• Implement basic 'Hello World User Story' • Project Set-up; ISBM adaptor libraries • Publish 'Hello World' message • Subscribe
Workshop 2	17th November	• OIIE Event specifications & BODs • OIIE Scenarios specification • OpenO&M ISBM Overview	• Channel Management overview and implementation • Revisit 'Hello World' Publish-Subscribe example with channel management details
Workshop 3	8th December	• OIIE Use Case specification • OIIE Use Case examples • Publish-Subscribe(OIIE Use Case 5) • Request-Response(OIIE Use Case 12)	• Request-Response operations • Example OIIE Use Case implementation
Workshop 4	2nd February	• OpenO&M SDAIR • OpenO&M Service Directory • OpenO&M CIR	• Example of each specification in context of OIIE Use Cases • Example of checking the ISBM configuration ('configuration discovery service')

OIIE OGI Pilot Phases (3.x Series)

Phases of the **OIIE OGI Pilot** incrementally develop, improve and validate OIIE Use Cases which are used to capture requirements and interoperability solutions specifications defining the OIIE.

- **Phase 3.3 (2021)** – Now-Updating 3 existing OIIE Use Cases and add Purchasing Use Case
  - Initial alignment with existing CFIHOS RDL, CII AWP/IWP work and OIIE Australian WG (**New and updated OIIE Use Cases**)
  - Added new example asset class for general industries (Street lamp Assembly, Fixture, LED Bulb)
  - Developed mock application for mobile PM/CBM/WM – Triggering of Work Request following PM inspection
  - Capturing requirements for Managed Industry Clusters **(Initial Example-Energy Clusters)**
  - Working with ISA for shared OpenO&M/OIIE Services Directory Specification and ISBM 2.1 Update (Clusters)
- **Phase 3.4 (2021-2022) – Planning for Next Phase (2021 - Q4 Start)**
  - **Digital Handover based on CFIHOS 1.4.1 using CFIHOS provided Schema and RDL? (OIIE Digital Exchange Services)**
  - **Digital Supply Chain Management using the OIIE – with CII SCM CBA? (OIIE Digital Exchange Services)**
  - **More AWP/CWP/IWP using the OIIE- with CII AWP CBA?**
  - **Cross-Sector alignment for Critical Infrastructure Risk Management (Asset Intensive plus BIM sharing OIIE)?**
  - **OIIE Adaptor SDKs (.NET and Jakarta)**
  - Firm up OIIE Managed Clusters specifications/implementations
  - Include more requirements established with OIIE Capital Projects WG, OIIE Australian WG, FEnEx CRC, CFIHOS, and CII
  - Generate Technical Report to be used as input for ISO 18101
  - **Help members prepare for Production Pilots and implementations in 2022**

2022 Projected Expenses

Fixed Expenses			
ANSI US TAG Fees	$ 6,000.00		
Bank Fees	$ 300.00		
Communications Svcs	$ 1,000.00		
SAP Licences-Core ERP,PM,MM, Cloud Appliance Library Svc	$ 8,000.00		
Professional Services	$ 9,000.00		
		$ 24,300.00	
Variable Expenses			
FEnEx CRC **Minimum for matching funds**	$ 50,000.00		Minimum Funding 1 Pilot Phase and Single CRC Project (Interoperable, Risk Based Analytics
Travel and Meeting Expenses **Minimum (5)**	$ 12,500.00		2 International, 3 Domestic (MIMOSA, CII, CFIHOS, ISO, ISO/IEC, ARC, IMC)
		$ 62,500.00	
Minimum Total Expenses		**$ 86,800.00**	
Optional Expenses to Maintain Scope, Pace and Quality			
Additional FEnEx CRC Conributions for matching funds	$100,000.00		Fully Funding 2 Pilot Phases, Possible Added CRC Project
Additional Travel and Meetings Expenses	$ 25,000.00		Funding normal level of travel for coordination meetings (MIMOSA, CII, CFIHOS, ISO, ISO/IEC, ARC, IMC)
Marketing and Misc	$ 25,000.00		
		$150,000.00	
Total Expenses to fund 2 Pilot Phases, normal travel and meetings		**$236,800.00**	

Source of Funds
Supporting OIIE Standardization Process
Overall OIIE and ISO 18101 R&D Program

- Membership Dues
- Pilot Sponsorships
- Conformance Testing (Planned)

Current MIMOSA Membership Dues

- Operators are asked to make the largest contributions as they gain the most benefits
  - Large Operators – 25K$ per year
  - Medium Sized Operators – 10K$ per year
  - Single Site Operators – 5K$ per year
- Suppliers
  - Large Suppliers – 10K$ per year
  - Mid Sized – 5K$ per year
  - Small Suppliers – $500.00 per year

Many Collaborations- Please Join Us

- OIIE Australia Working Group
  - NERA Sponsored for Australian Industry
  - ISO mirror committee formed-Joining TC 184 as P Member
  - OIIE AU WG R&D Instance, STD Endpoints –Now
  - ➢ SMEs, Accademia, Operators

- OIIE Capital Project Working Group
  - Facilitated by IPA
  - Global, Capital Projects Focus
  - Workshops Ongoing
  - ➢ Preliminary Collaboration in Phase 3.3 OIIG OGI Pilot

- OIIE O&M Working Group, OpenO&M Initiative
  - Collaboration on the OIIE Primary Component Specifications
  - ISA leading Operations Management Stream
  - ISA Datasheets for ISDDs- 1st Set Pending ISA Review
  - Meetings Ongoing

- CII/MIMOSA Interoperability JWG (University of Texas)
  - Developing OIIE use cases including requirements developed by CII
  - Initially focused on Advanced Work Packaging (AWP)
  - Meeting series now doing joint analysis prior to joint development
  - ➢ Preliminary Collaboration in Phase 3.3 OIIG OGI Pilot

- IOGP CFIHOS/MIMOSA Joint Working Group
  - Use of OIIE/ISO 18101 interoperability/digitalization framework
  - Help coordinate OIIE Use Case Development in related industry sectors
  - Conversion of CFIHOS RDL V 1.4.1 to Co-branded ISDDs
  - ➢ Preliminary Collaboration in Phase 3.3 OIIG OGI Pilot

- Future Energy Export Cooperative Research Centre-AU, JP, KR, US
  - Industry Operators, Suppliers and Academic Members
  - MIMOSA is the member SDO
  - Digital Technologies and Interoperability Program
  - ➢ Matching funds for approved R&D projects including OIIE OGI Pilot
  - ➢ 1st Project -Interoperability for Analytics (Including AI)-Ongoing
  - ➢ OIIE Interoperability Lab at University of South Australia

Key Websites

- MIMOSA - https://www.mimosa.org/
- OpenO&M - https://openoandm.org/

- Asset Institute - https://www.assetinstitute.com/
- FEnEx CRC - https://www.fenex.org.au/
- National Energy Resources Australia - https://www.nera.org.au/NERA-projects
- OIIE Interoperability Lab - https://www.unisa.edu.au/research/industrial-ai/our-research/the-australian-oiie-interoperability-laboratory/

Subteam 5 -- Prioritization and Value Case Definition – D. J. McNeil

Sub-Team Updates as of 9/21/21

Subteam 5 -- Prioritization and Value Case Definition – enablers –
Deb McNeil
Goal- to stay focused on right priorities- identify economy of scale areas

- ✓ See August 2021 Meeting Minutes for where $ and time are actually spent on Industry Projects and current industry average performance

- ❑ October Meeting – 2022 Priorities

Key Issues- 2022 Priorities

IPA-MIMOSA 2022 Planning

2021 Activities
Cost Estimating Framework
Purchasing (RFI/RFI Response)
Asset Installation
Pilot 3.3

2022 Plans

Cost Estimating

- Complete Use Cases for 3.5 Pilot

RFI/ RFI Response

- Complete Use Cases for 3.4 Pilot; Define 3.5

Asset Installation

- Complete Use Cases for 3.4 Pilot; Define 3.5

Pilot 3.4

Phase 3.4 (2021-2022) – Planning for Next Phase (2021 - Q4 Start)

- Include more requirements established with OIIE Capital Projects WG, FEnEx CRC, CFIHOS, CII, and **NOW AACE**
- Cross-Sector alignment for Critical Infrastructure Risk Management
- Generate Technical Report to be used as input for ISO 18101
- Shared Costs, Risks and Benefits – Requirements from Members and Sponsors are Prioritized
- Alignment with FEnEx CRC Project on Interoperable Analytics provides matching funds for R&D/Testing
- Prepare for internal Production Pilots and Production Use in mid 2022 and beyond

Optional Priorities for OIIE OGI Pilot Phase 3.4 and Beyond

- IPA-MIMOSA OIIE Capital Project Use Cases
  - Cost Estimating
  - Supply Chain (Capital RFI/Purchasing)
  - Asset Installation
- CFIHOS 1.4.1 Based Handover –
  - Critical Path items for end of 2021?
- Supply Chain Management Digital Transformation
  - Critical Path items for Q1/Q2 2022?
- AWP/CWP/IWP for Capital Projects
  - Critical Path items for Q2/Q2 2022?
- BIM/IFC and OIIE Convergence
  - Relative importance for different industry sectors?

Next Steps

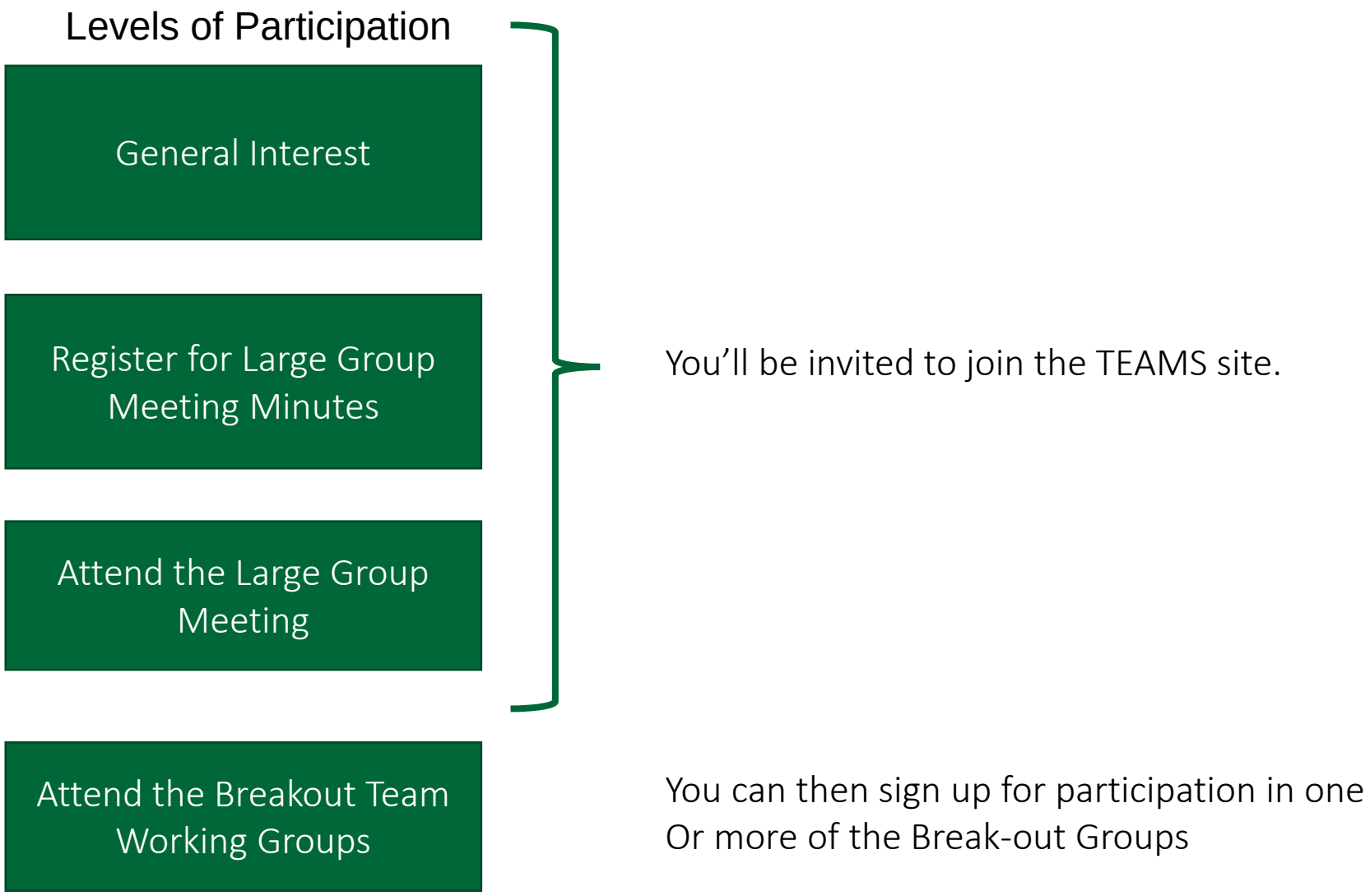
Check-

Access to MIMOSA TEAMS work area –

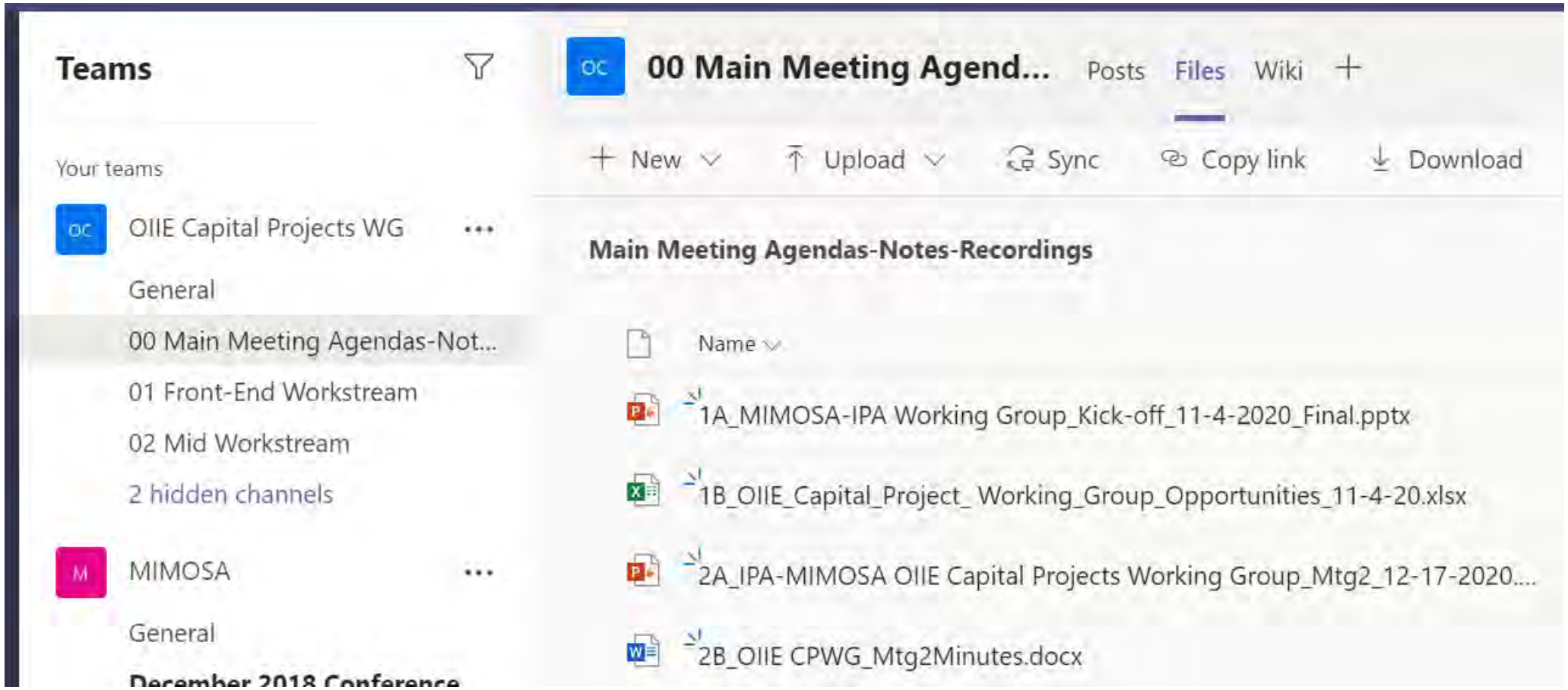
Anyone needing an invitation contact Matt Selway:

Matt.Selway@my.unisa.edu.au

IPA – MIMOSA OIIE CPWG



Join us on TEAMS and let's get to work…



Next Steps:

1. Identify Members willing to share your digitalization journey
2. Register on IPA Website:

https://www.ipaglobal.com/event/digitalization-ipa-mimosa-oiie-capital-project-working-group-meetings

a) If not already a member, you will be invited to the MIMOSA TEAMS workspace to continue development of the Use Cases

b) Please participate in the sub-team meetings to generate the industry input to the Pilot Project and the Industry Standards work
(each sub-team will set it's own meetings)

c) Contact Alan Johnston (atjohn@comcast.net) to get more info on MIMOSA membership and access to the solutions already in place for your company to use

d) The Main Team will meet once a month on the 3rd Tuesday from 7 to 8 am EDST to report on progress, share industry knowledge, set priorities and continue the knowledge sharing and dialog.

If you need new meeting invitation – please email dmcneil@ipaglobal.com or Register on the IPA Website

THANK YOU