Independent Project Analysis

IPA-MIMOSA OIIE Capital Projects Working Group Meeting #2

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Dr. Matt Selway (University of South Australia)

OIIE Capital Project Working Group: 12-17-2020 Meeting Objectives

- Share the OIIE Capital Project Working Group Purpose
- Review Meeting #1 Results - Highest Priority Needs
- Review the OIIE Methodology that will be used to gather Owner/ Industry input
- Breakout Groups
- Report Back
- Define OIIE Capital Project WG Next Steps

OIIE Capital Project Working Group Leaders

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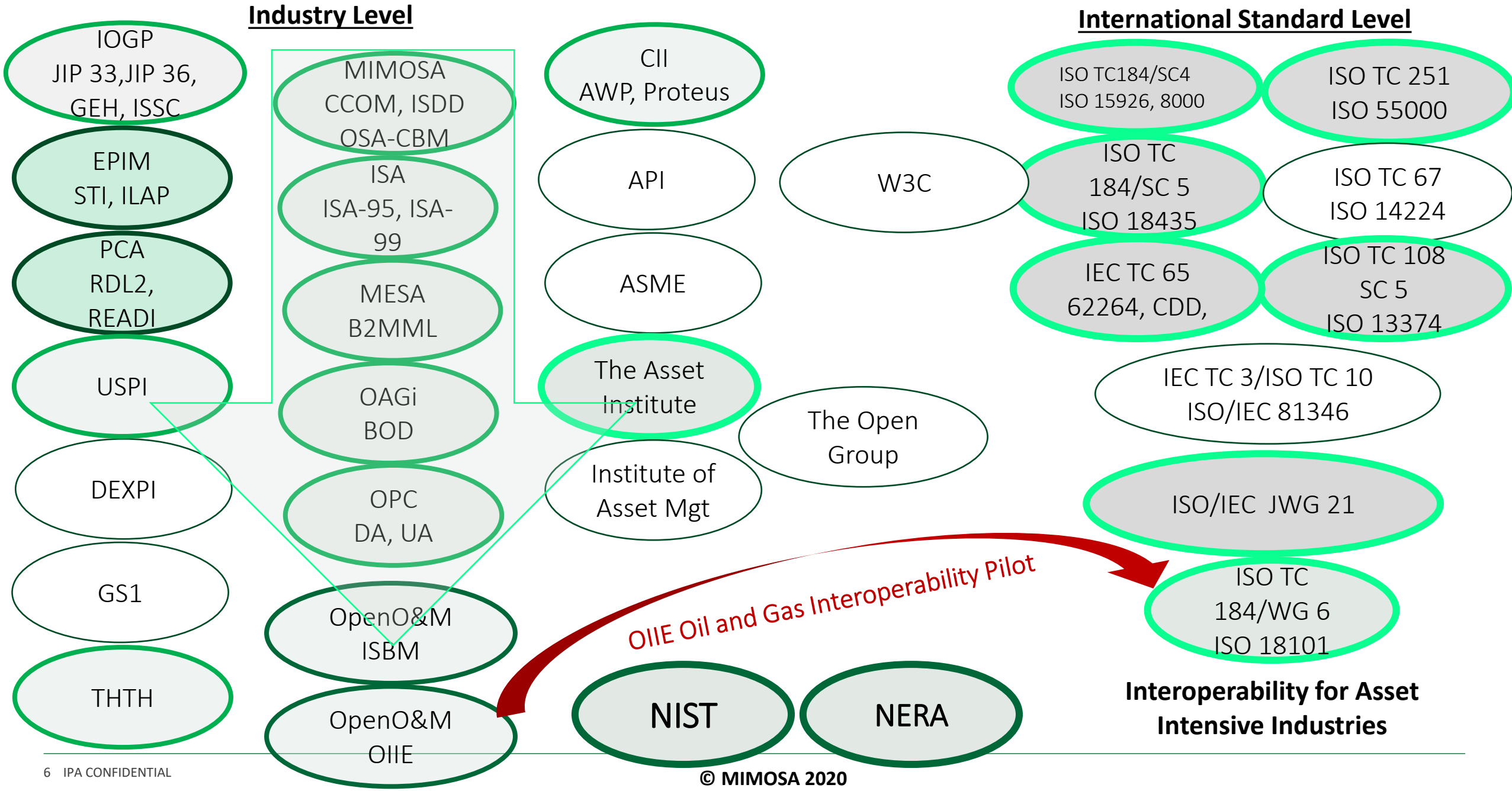
Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group

Independent Project Analysis (IPA) and MIMOSA (industry trade association dedicated to the development and adoption of information technology and information management standards) are proud to announce the formation of the ***Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group.***

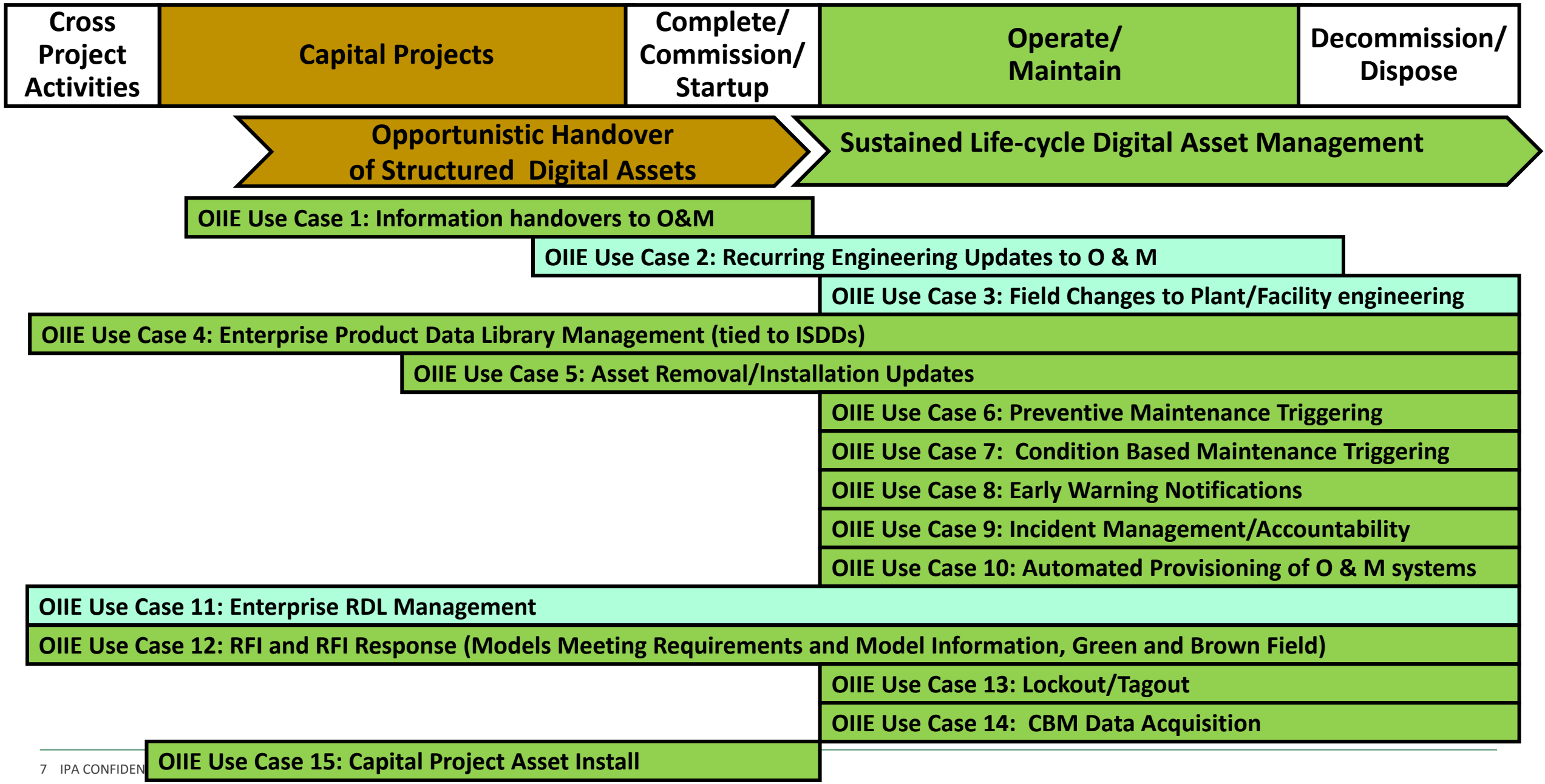
This working group will **meet periodically** to **help align the efforts of owner companies; engineering, procurement, and construction (EPC) firms; industry standardization organizations (e.g., IOGP/CIFHOS, ISA, MIMOSA) and international standards organizations (ISO, IEC, etc.).** All participants will work together to set the owner/EPC firm priorities for solution delivery to enable pragmatic industry digital transformation on a timely basis.

Whether your company's digitalization goals are productivity improvements, capital efficiency, advanced work packaging, facility hand-off to operations, or digital twins, etc., **interoperability between the many players in the asset life cycle is a key success component.** Historically, **interoperability has been difficult to achieve** due to a lack of alignment throughout the industry between owner/operators, EPC firms, material and service suppliers, and subject matter experts. The IPA-MIMOSA hosted initiative **seeks to solve this issue** for the benefit of all industrial sectors moving forward.

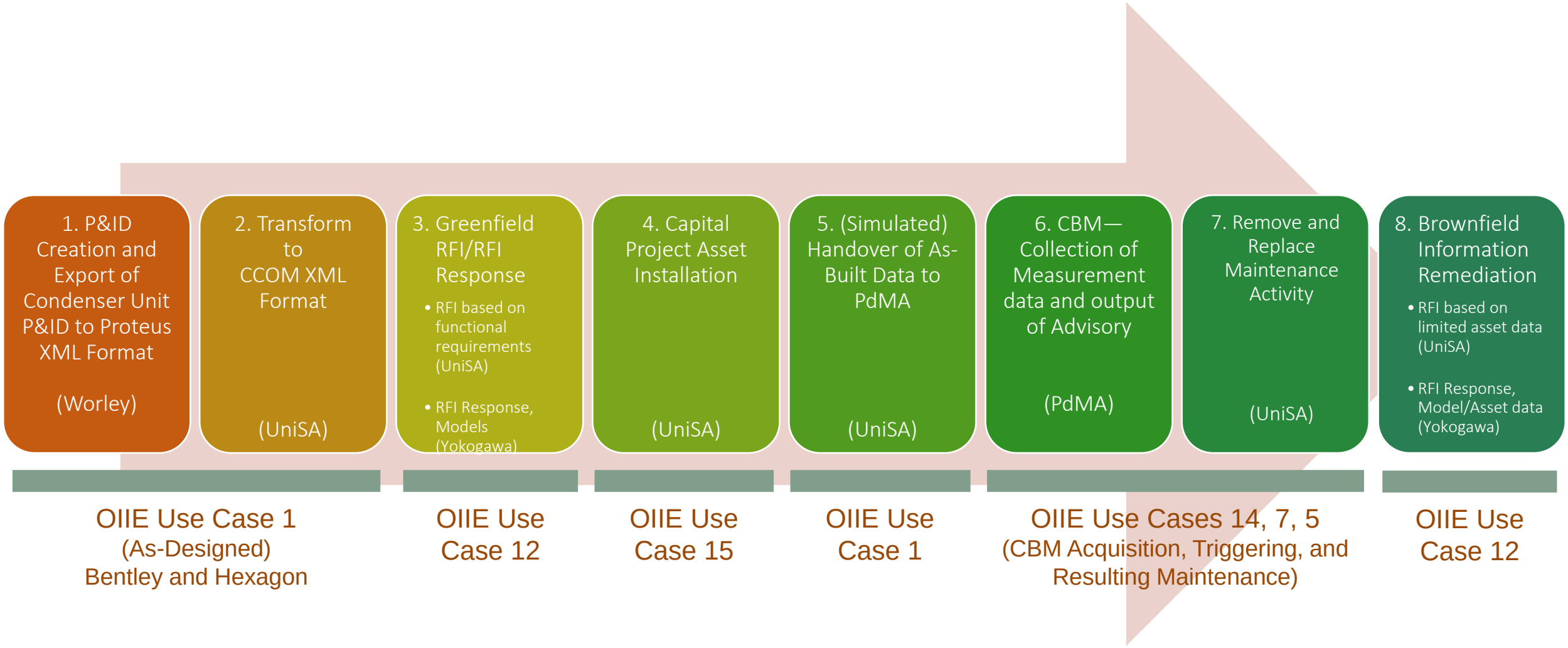
Interoperability for Physical Asset Management-Associations and Activities



Standard OIIE OGI Use Cases



Build on Success from OIIE OGI Pilot Phase 3.1



Standard OIIE OGI Use Case Methodology

User Stories

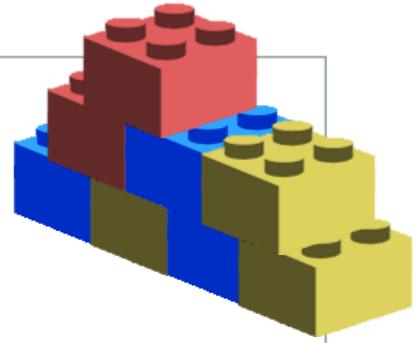
User Stories

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

Use Cases

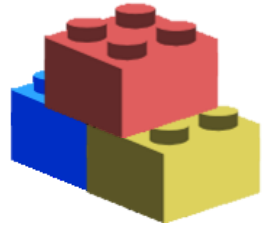
- Background
- Scope
- Preconditions
- Successful End Condition

- Actors
- Triggers
- Process Workflows
- Scenarios



Scenarios

- (System) Actors
- Data Content
- Data Formats
- Reference Data
- ISBM Configuration
- (OIIE) Events

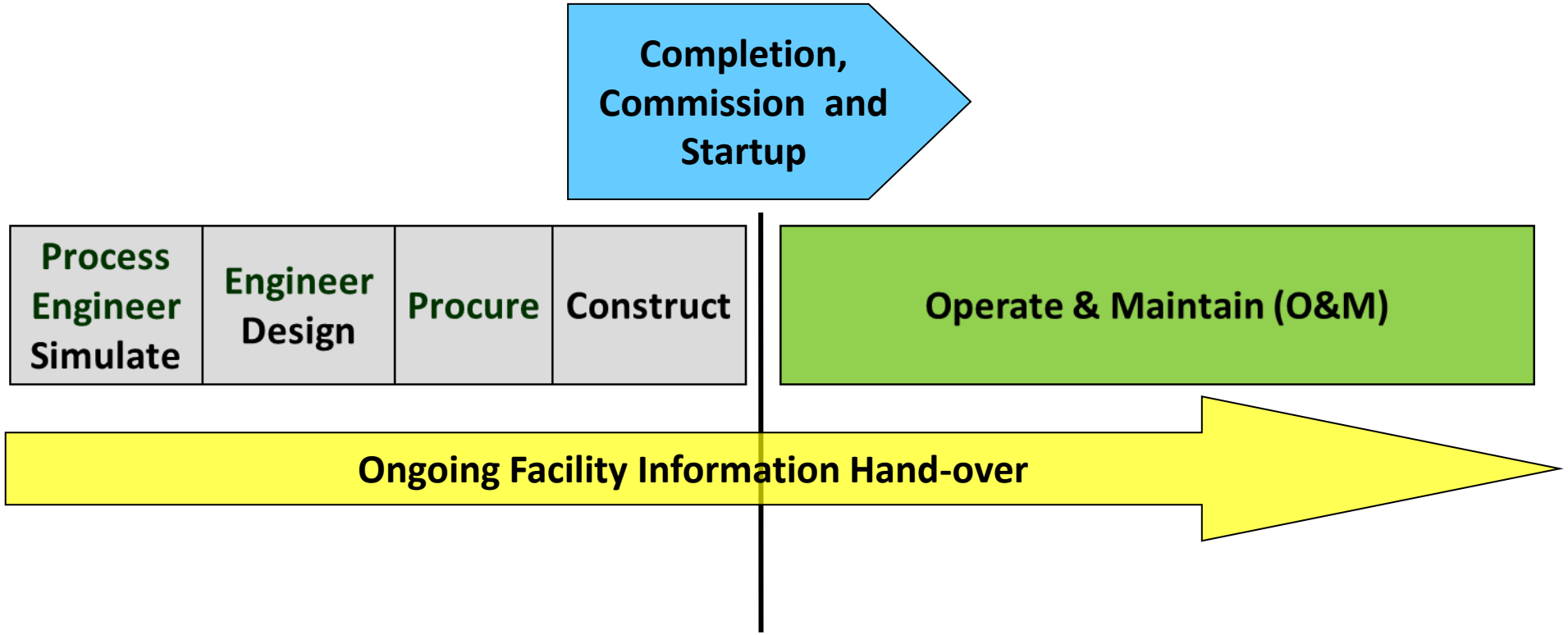


(OIIE) Events

- Individual Message Exchange
- Specific Data Content
- Required Data Processing
- Expected Response Event
- Reference implementation

Vendor Neutral Interoperability Standards

Using Chat – Biggest Opportunity / Challenge in each area



Think horizontally (Across Disciplines and Functions)
Think vertically (within a Discipline)

Kick-off Meeting: 11/14/2020 – Biggest Opportunity List

Process Engineering/ Conceptual Design/ Simulation	Detailed Design	Procurement	Construction	Commissioning and Start-up	Hand-over	Operate & Maintain
AI including HAZOP/HAZID, Contract Management etc.	an integrated data management flow that clearly identifies who is responsible for what data at what point at an attribute level	Asset data is setup in a manner that allows easy transfer into O&M systems.	4D and 5D modelling	As built information generation	Alignment between Electrical and Instrumentation deliverables.	3D Model update as constructed
brownfield as built data	break down material by construction package	Contractual data	ability for remote observation and verification of construction progress	Checklist and punch list tracker	All system and configuration settings	3d models for immersive training
completion commissioning	Cost and schedule	contingency manegementt	advance work packaging with fully integrated links to procurement data and fab shop data	Clear definitions between pre-commissioing-pre-commissioning-startup at system level.	Application of lessons learned to apply them n this phase	As built datasheets
Defining and committing on requirements (over different functions Business/operations/projects/etc)	Data aggregation	Contractor/Owner procurement responsibility	as built information	commissioning sequence and completion status	As built - PFD, P&ID, 3D	As built P&IDs
Defining Handover Requirements	Data Analytics and dashboards application in Project Control Management	contractual data	Backpass schedule setting engineering, procurement, and traffics and logistics schedule	commissioning spares	as-built data format	Asset information model
Engineering Design using OO requirements to develop appropriate OEMs to meet those requirements	data interface	Delivery schedule management dashboard	BIM	Completion and testing plan	asset tag	Baseline plant acceptance test records
Constructability	Data validation to identify single source of truth	Delivery schedule, inspection data, quality documents	Construction work package tracking	Consumables requirements	Civil Asset Integrity dataset	BOM completed and accurately input into ERP
Oil and Gas Projects - process engineering simulations produce Heat and Material balance. This H&MB data should be able to flow to hydraulics calculations.	Each O/O has its own standard	Detailed and Estimated MTOs for all disciplines	Contract preference	Design advice and Operating Procedures	Closeout and archiving of project data for O&M and for benchmarking against future projects	Cause effect troubleshooting guide
PFD data to detail engineering applications	Early Supplier/Vendor data and scope quantities as soon as possible.	each EPC has its own system	Contractor manpower productivity analysis	Digital twin	data alignment with operation systems	clear use cases from operations to identify data content in the digital asset
Plan activity data with previous experience of cost, time, resource and associated risks from learning.	early Vendor data, early involvement and early integration	Expediting data	CWA/CWP scope and sequence	Document as built status	definition of critical devices to be maintained	consistent material code hand-off into O&M systems
Preliminary equipment sizing data	Engineering specifications, Equipment list, engineering datasheets, vendor data	fabrication schedule	Data sharing across contractors	Early system scoping, Preservation, spare part.	Electrical relay settings	DCS soft tags data
problem occurs with the visibility and obtaining the information from the stake holders such as operability requirements and becoming a functional part of the project team...visibility to the stakeholders for information flow in both directions.	Equipment list , line list, especially for acquired assets	Inspection status data	Engineering deliverables in proper sequence to match the construction story board	Handover data completeness	getting maintenance to use tools for very quick turn around (24 hour or less) activities - managing data takes longer than the activity	Digital Thread / digital twin
Process Engineering Design Principles Handover for Ongoing Digital Twin operation and optimization	Feedstock, utilities and products parameters	Integration of vendor data into schedule and coordination with mod yard, site, etc.	Engineering not aligning and understood the concept of AWP	integrating data from engineering tools to construction tools - identifying data that is acceptable for planning and what is acceptable for constructability	ICS	Early Modularization chunks needs to be identified quite early in order to digitize the project engineering design
Process packages, P&IDs, Equipment lists, Instrumentation lists, specs, etc	Information verification by all project participants	Integration to CWP and Systemization within procurement dataset	Engineering, procurement and fabrication to lock in to AWP schedule	Loading vendor data into master files.	Integrating project information into master docs	finance depreciation
Sharing of Equipment and Instrument list early on to Construction, Commissioning and Maintenance	Integration of EPCm and construction contractor data	Material Procurement & Delivery Tracking System	For revamps - integration with work permitting systems	management of change	Manufacturing record book	handle risks
Simulation work passed through to process deliverables and communicated to other disciplines	legacy data reconciliation	performance guarantees	Fully integrated quality and fabrication validation	Managing simultaneous operations	Measurement of equipment	HAZOP/ LOPA
statusing data more effectively - what data can be shared earlier versus what needs to be finalized before pushing downstream	Management of Change of data	quality	Indirect Service Requirement	Operation and maintenance plans	Mechanical Integrity dataset	How can we tell it is safe to operate
Stream data management especially for projects that do not have a clean MEB. Having multiple tools to manage cases makes it very challenging to have a consistent data set to integrate downstream	MTO data consolidation	Quantity Based Work Package for specific scope	Inspection test plan observations	Operator Simulations	move from paper based to digital handover (3D Model)	how to idle an equipment safely
transparent and ease of information flow between owner, engineering, procurement, potential equipment supplier, owner, etc	Networked data, consistent, connected and common basis.	Subs information	installed quantity data that is visualized	preventive maintenance	Project close-out data	including project workflow data to master O&M documents
	No clear requirement statement to begin	supply chain resiliency	Material allocation status	providing construction status data to commissioning	SAP connections	IOW
	objective progress measurement of engineering design by linking to class library attribute population	Timely data	Material availability, resource availability	Punch point management	sensors and edge computing tied to ICS	Lessons Learned and Best Practices
	Oil & Gas - systemization, Constructability, Vendor Data.	vendor qualification	Materials Management, Material receipt and PMI	Punchlist and safety action close-out status	spare strategy	Operate Training Requirement
	One big challenge in the engineering design is when we (the owner) creates a 3D model in the FEL3 phase this model is in general lost in the next phase (detail engineering phase) because the EC in charge of this phase is unable to recover all our data.	Warranty management	Physical progressing	service contracts	tag to document relationships in place	Operating performance versus design and opportunities for continuous improvement for the current asset, for future enhancements and for future projects.
	Package equipment data		pre commissioning	System completion status with 3d model and P&ID markups	warehouse plan	OT Cybersecurity requirement
	progress visibility		quantity surveying	training		Power System Analysis
	QA/QC		Reliable planning based on the previous productivity, all data	Updated 3d model		process safety management
	RFI or endorsement of deliverables ... including contractors		Resources requirement and forecast	vendor data		quality of Data handed-over - consistency of TAG to Equipment Serial Number
	Spare Part Data requirements		RFI processing	Verifying As-Built data for completeness and correctness without physical field verification		understanding what the actual minimum data requirements are for M&O to do their daily work and identifying that consistently across different sites and businesses
	standards requirements		safety assessments, SHE Data			Virtual Walkthroughs for receiving operations
	Startup and operational spares		Strategic decisions around modular or offsite preassembly.			
	Translating design data to reliability models and future plans for CSU, operations and maintenance digital twins		System completion status with 3d model and P&IDs			
	Vender data, material and equipment lists, data flow through the contractors and owners seamlessly		Systemization & priorities			
	Vendor and Contractor data		Timely and accurate Material Status report			
	Vendor data,, Equipment, piping, and instrumentation specifications		turnover requirements			
			Visualization and Constructability			

Over 180 Opportunities for Improved Interoperability within the capital Project work process were identified.

Gathering Input on 3 Use cases

Breaking into 4 Breakout Groups:

Front-End - Cost estimating group 1
Front-End - Cost estimating group 2
Middle - RFI/ RFI Response (Greenfield project)
Back end - Capital Project Asset Installation

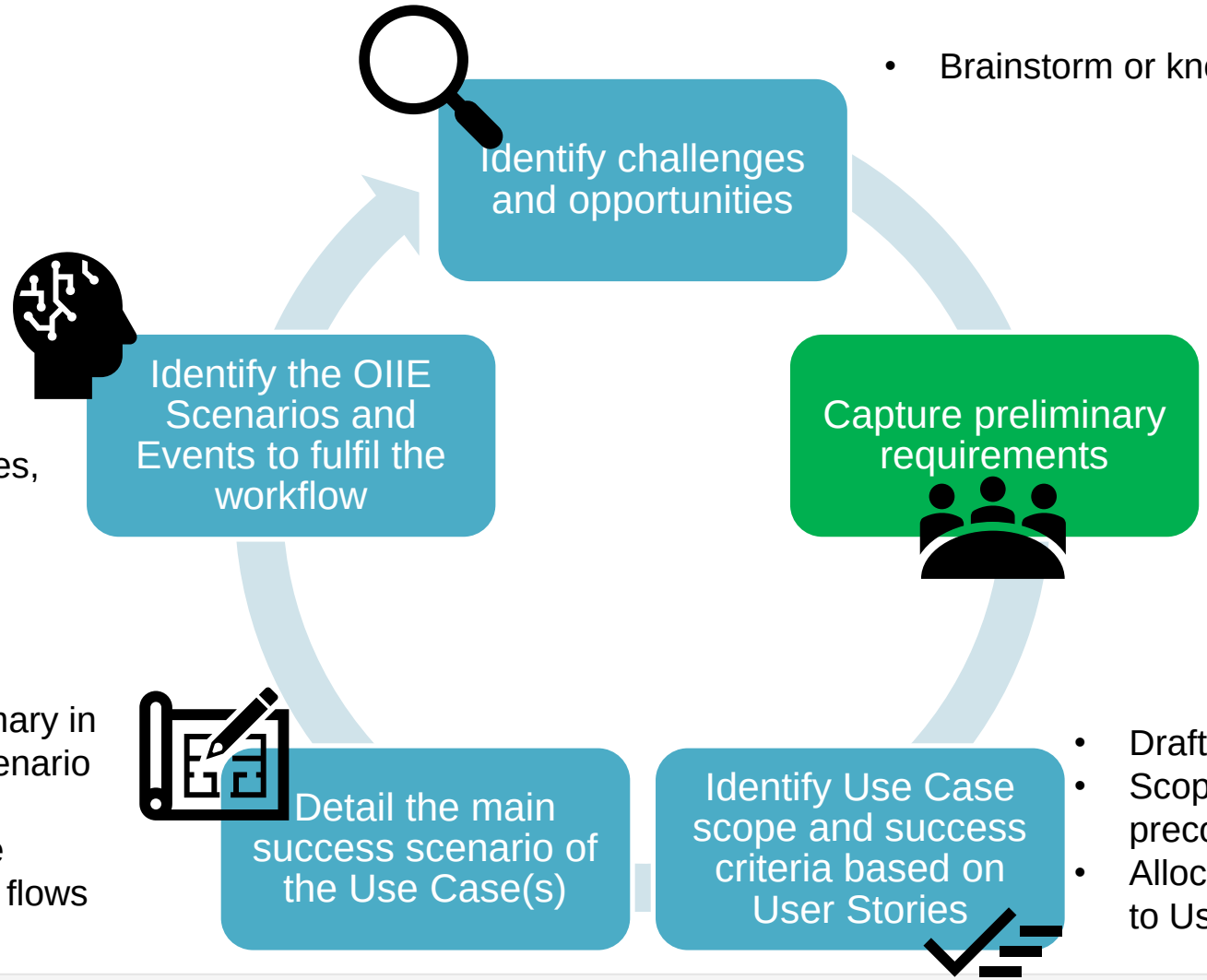
Open Standards for
Physical Asset Management

OIIE User Story Elicitation

Matt Selway
(University of South Australia)

December 17, 2020
IPA-MIMOSA OIIE Capital Project Working Group- Meeting #2

OIIE Use Case Development Process



- Brainstorm or known industry issue

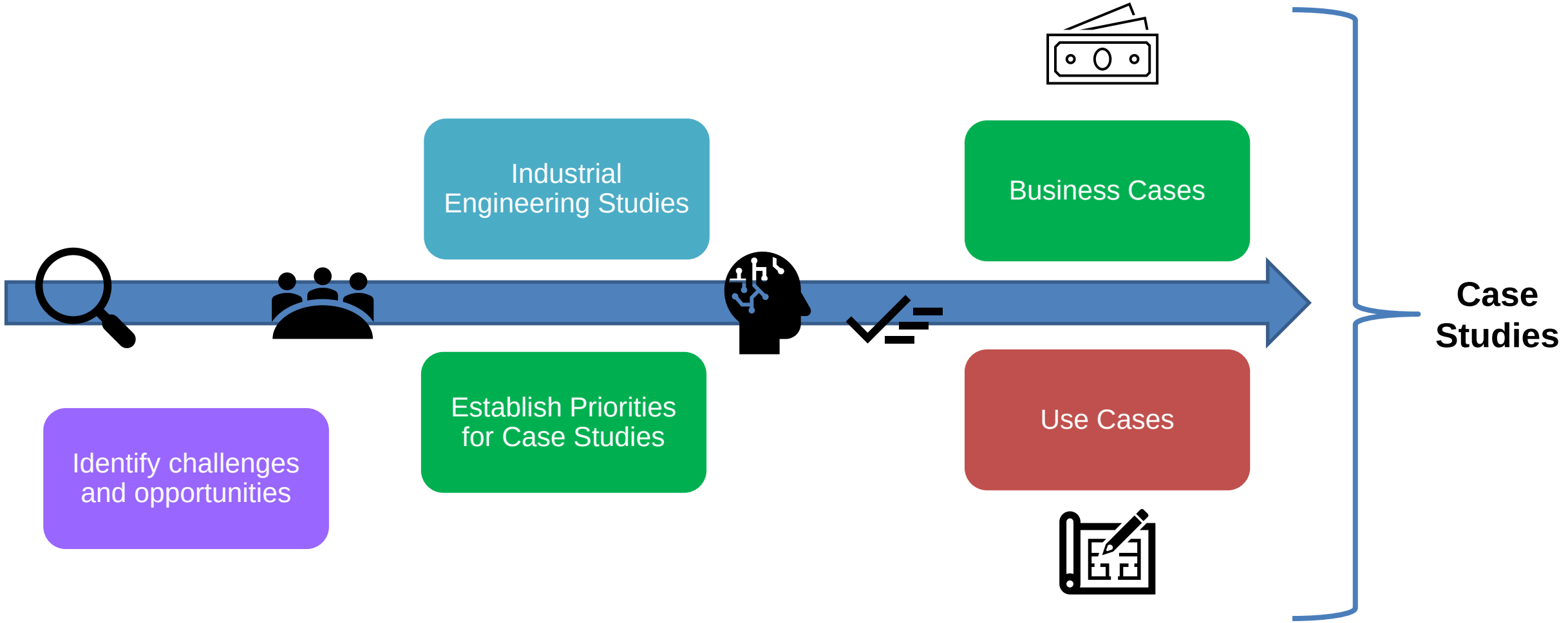
- What are the business functions to be executed?
- Who, what, when, where, why?
- Elicit through User Stories

- Draft Background context.
- Scope, success criteria, triggers, and preconditions of the Use Case
- Allocate business functions, interactions to Use Cases within bounded scope

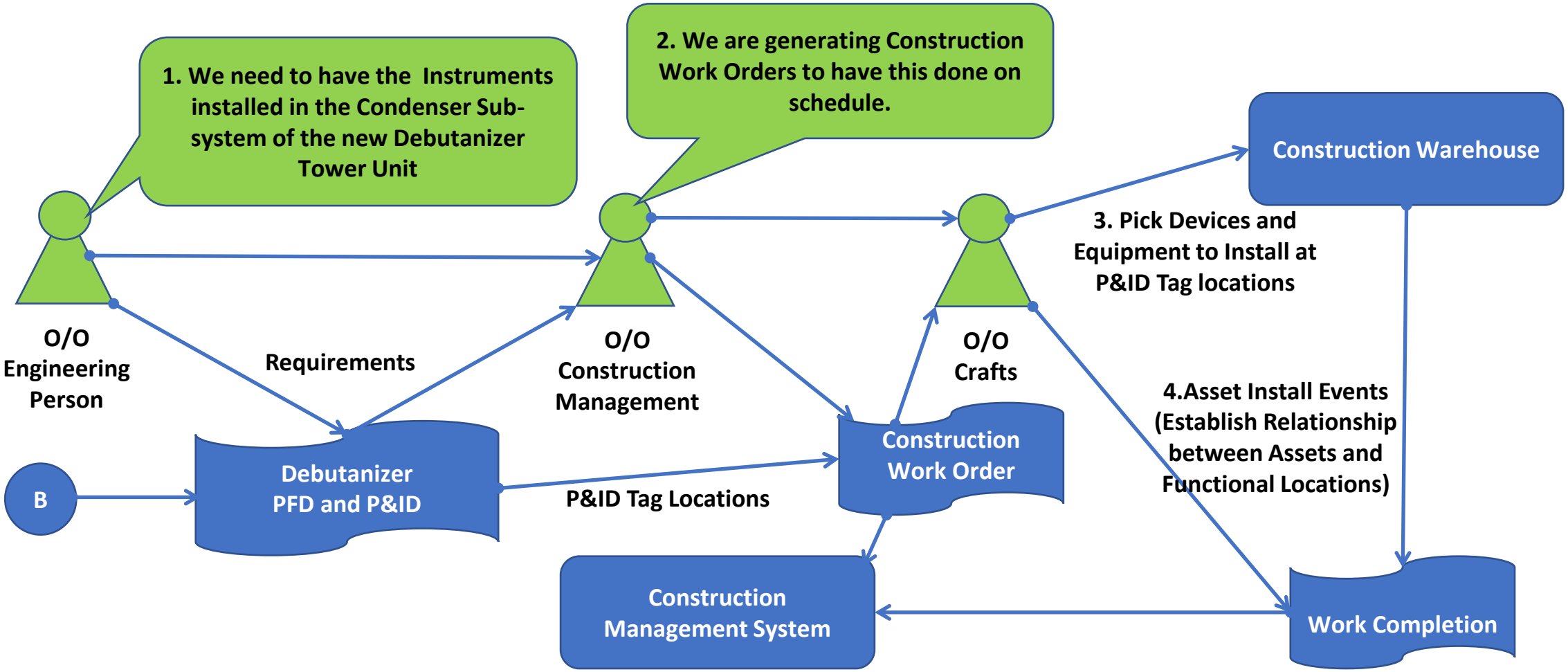
- Capture user story summary in formal Main Success Scenario (BPMN)
- Write up textual narrative
- Identify major alternative flows

- Performed by technical team in parallel
- IT and domain experts
- Begin detailing technical requirements
- Standards, data, messages, protocols, mappings

OIIE Case Studies and Enabling Activities



User Story Example:
Capital Project Equipment/Device Installation



User Story Elicitation

We want to capture:

Who are the actors or beneficiaries?

User Story Elicitation

We want to capture:

What are the tasks or goals?

User Story Elicitation

We want to capture:

When do the tasks/goals (need to) occur?

User Story Elicitation

We want to capture:

Where do the tasks/goals (need to) take place?

User Story Elicitation

We want to capture:

Why is it important or beneficial?

User Story Statements

Help guide the identification of activities and requirements:

As an <actor>, I want/need <activity / task / goal>
so that <reason / benefit>
[when <event / triggering condition>].

User Story Statements

Help guide the identification of activities and requirements:

As an <actor>, I want/need <activity / task / goal>
so that <reason / benefit>
[when <event / triggering condition>].

- The “when” clause is optional
- The “activity” may include the “where” it (needs to) occur

User Story Statement Examples

- As an O/O Construction Manager,
  I need to generate Construction Work Orders to a schedule
  so that equipment installation can be performed on time
  when provided with necessary sub-system requirements.

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- As a Construction Management System, I need to monitor & manage the progress of Construction Work Orders
  so that the status of equipment installations can be updated in the digital twin
  when provided with work completion updates by the installer.

User Story Statement Mapping

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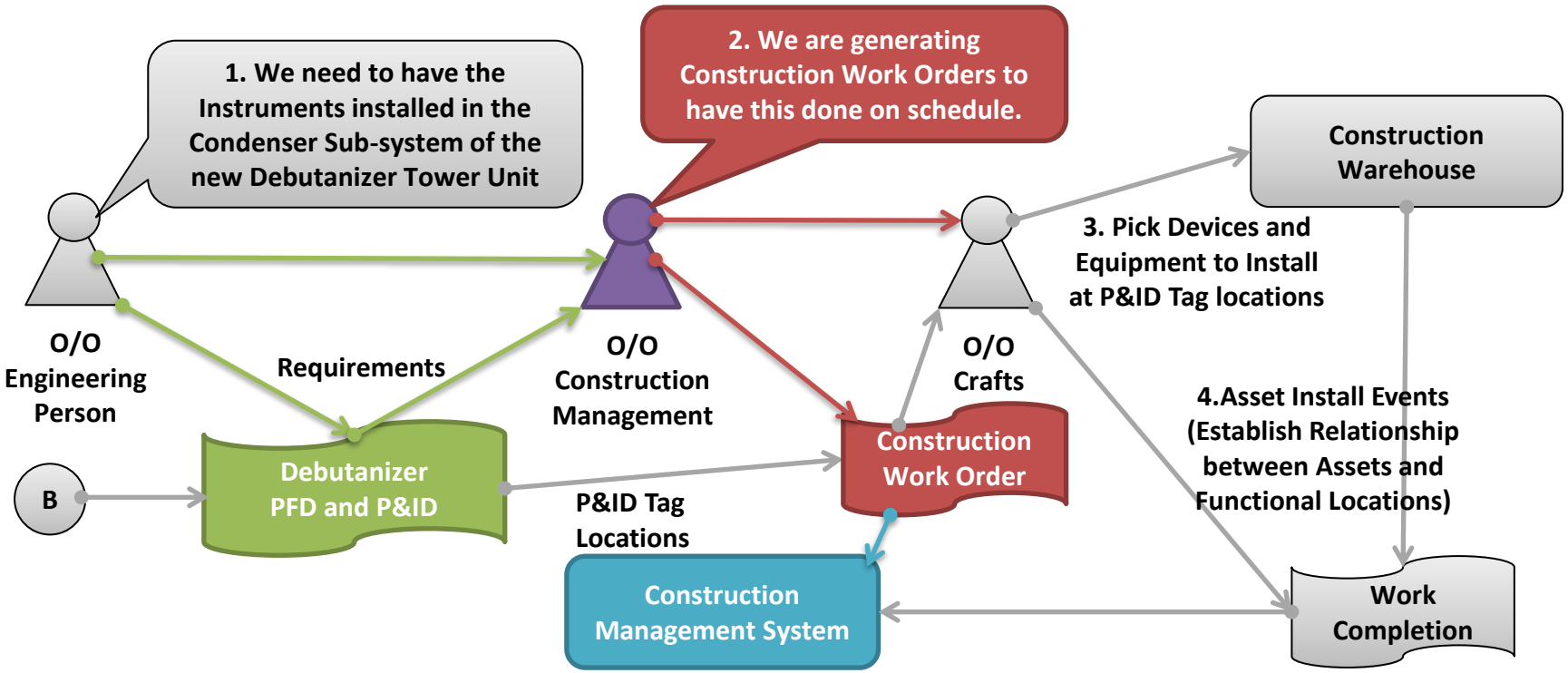

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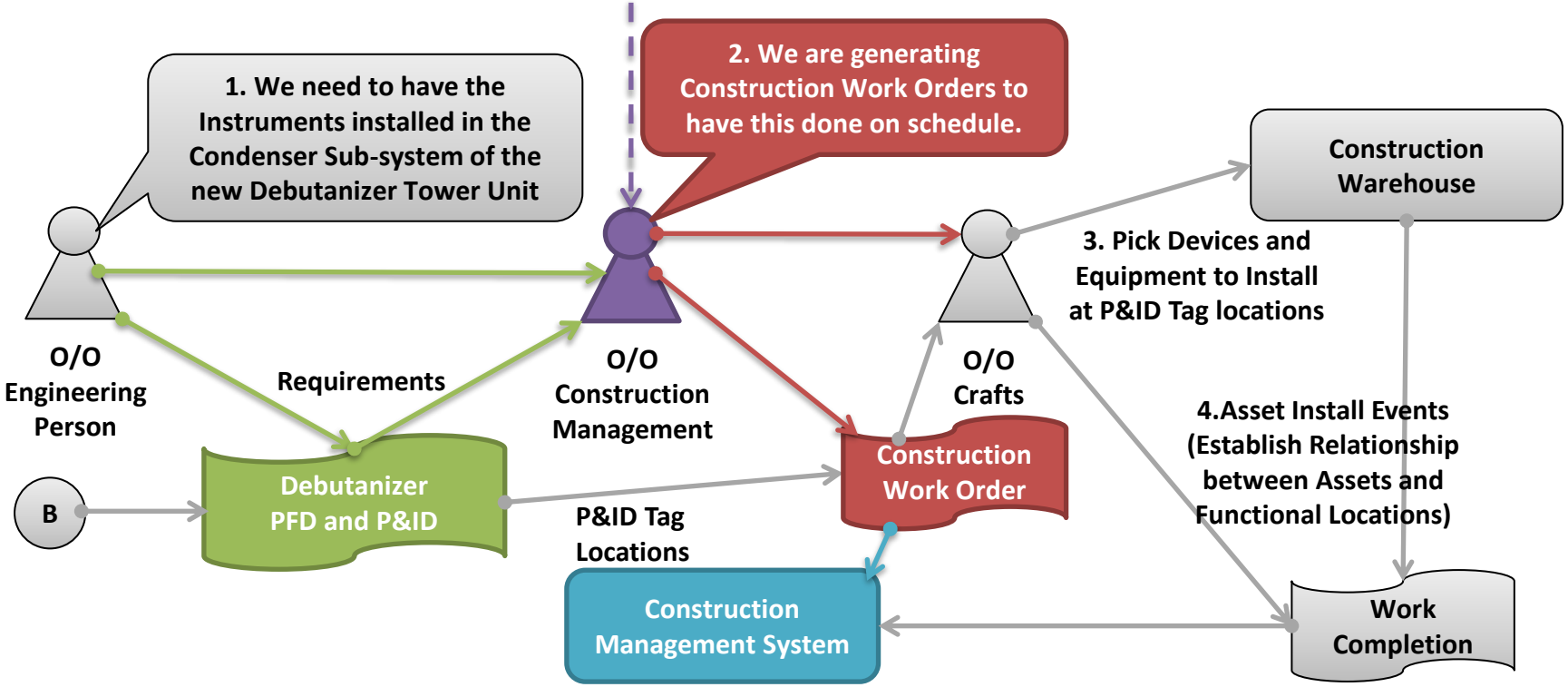

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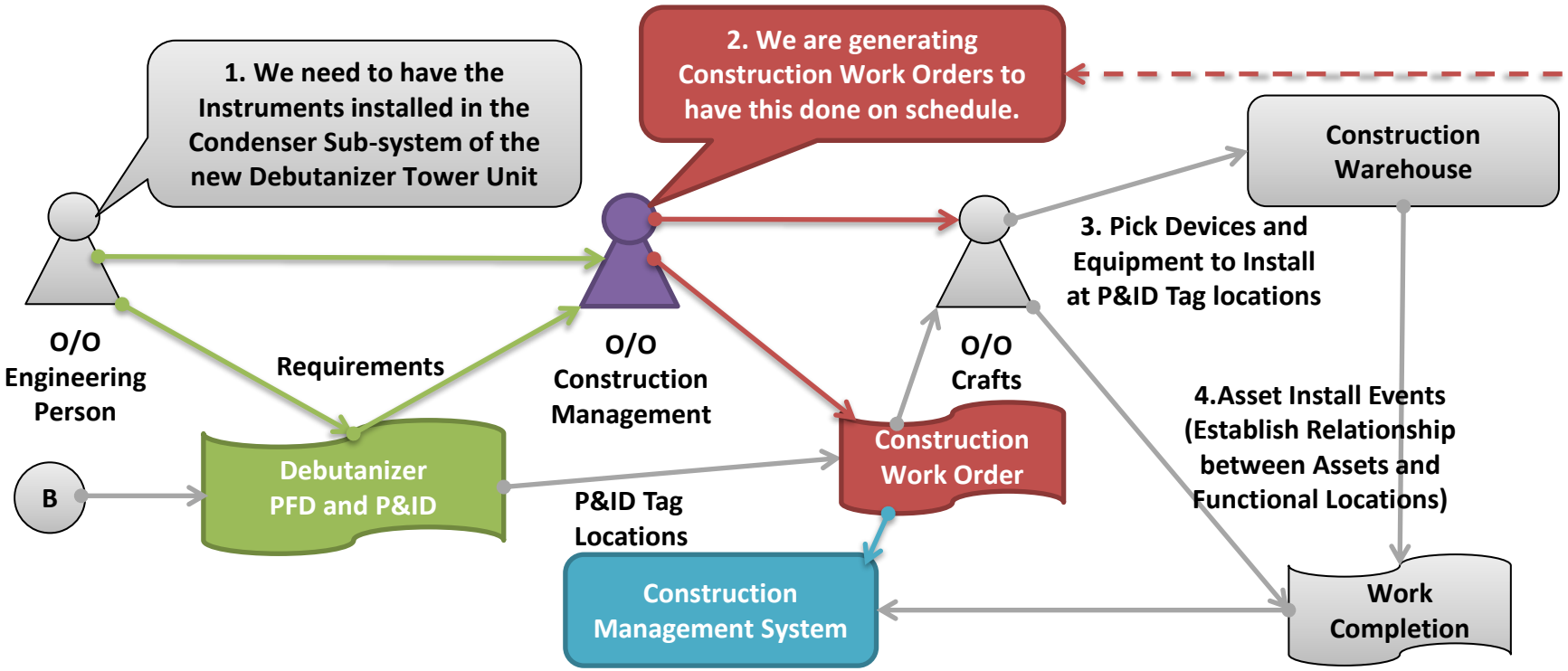

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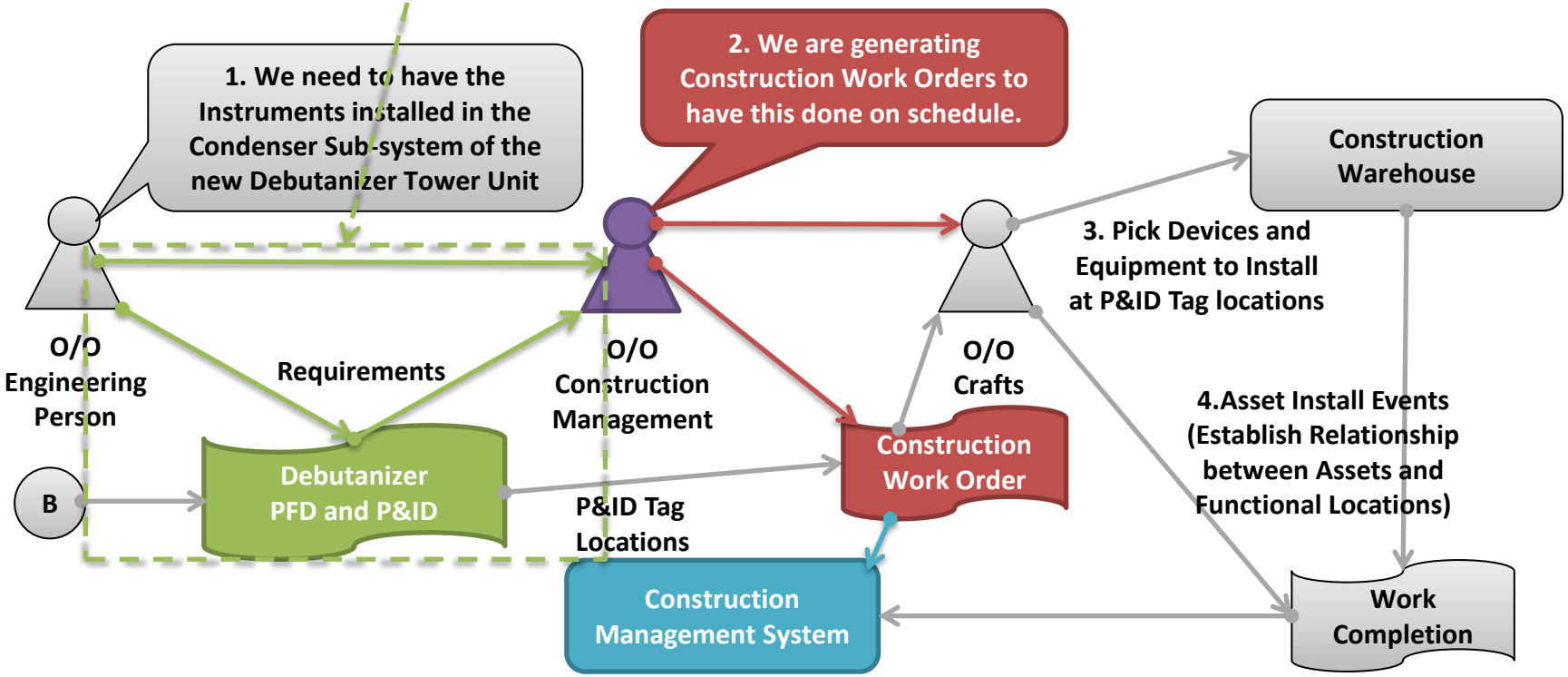

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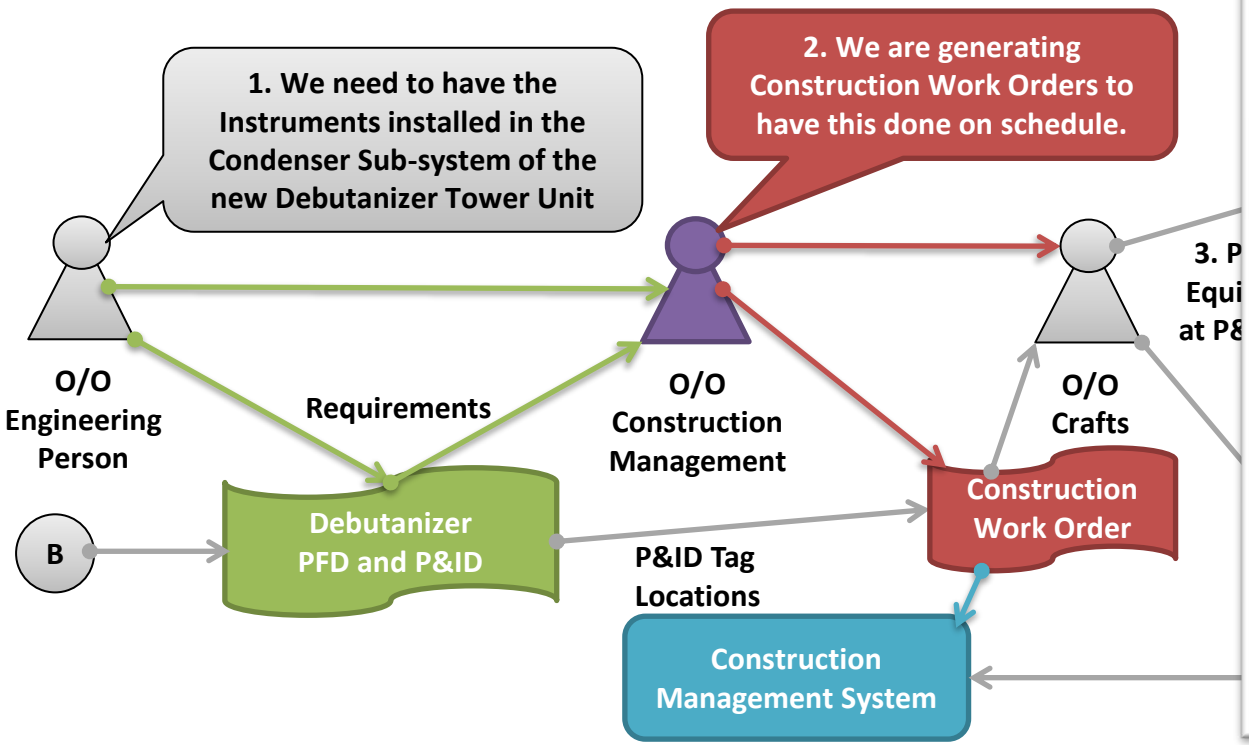


OIIE Use Case 15 – Capital Project Asset Installation

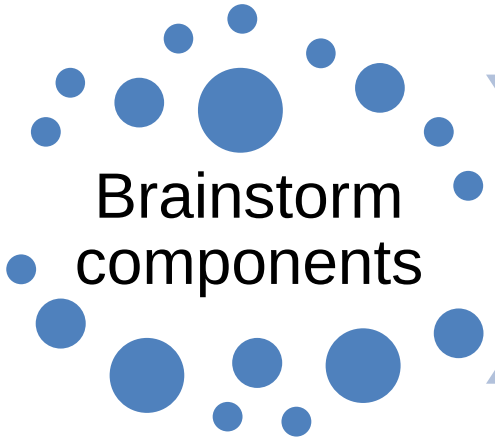
This Use Case describes the process for updating Construction systems with installations of serialized assets: on both an individual and group/package basis. The updates originate from a Capital Work Management System (CWMS) that has successfully completed a work order for asset installation/commissioning.

Background

During the construction of a plant or complex facility, it is important to keep accurate track of the uniquely identified physical assets installed in each functional location as the plant/facility is constructed. Maintaining this 'As-Built' information on an event-driven basis is essential in maintaining accurate asset configuration information in the Digital Twin. This information can then be provided to O&M systems during information handover (Use Case 1) or may be propagated to O&M systems on an event-driven basis.

One factor that differentiates asset installation during construction versus installations that occur during the operation of a plant, is the large number of assets that may be installed at the same time. These batch installs may occur for the installation of many identical assets or groups/packages of assets. Moreover, the installations may be performed by the EPC, O/O, contracted out, or a combination. Therefore, there is a need to adequately manage these packages of work in a consistent and reusable fashion as well as the resulting configuration changes. Improved management and exchange of work-flow and 'As-Built' information during construction will lead to improvements in quality, reliability, etc. throughout the life of the plant.

User Story Brainstorming



Brainstorm components

- Actors / Roles (people and systems)
- Activities / Goals (for each actor)
- Reasons (for each Actor-Activity)
- Triggering Events (for each Actor-Activity)

Sequence Statements

Determine the order that the activities are performed

Group Statements

Find logical groupings of activities that make up a User Story or User Story Frame

Identify Use Cases

Determine scope of one or more Use Cases

Gathering Input on 3 Use cases

Breaking into 4 Breakout Groups:

Front-End - Cost estimating group 1
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Back end - Capital Project Asset Installation

Report Outs

Front-End - Cost estimating group 1

Front-End – Cost estimating group 2

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Next Steps:

1. You will be invited to a MIMOSA TEAMS workspace to continue development of the Use Case

2. Please participate in the smaller team meetings to generate the industry input to the Pilot Project

3. 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

4. Larger (this) team will meet once a month to report on progress, share industry knowledge, set priorities and continue the dialog

THANK YOU

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