Independent Project Analysis

IPA-MIMOSA OIIE Capital Projects Working Group Meeting #4 – 3/16/2021

Deborah J. McNeil (Independent Project Analysis, Inc.)
Dr. Matt Selway (University of South Australia)

OIIE Capital Project Working Group: 03-16-2021 Meeting Agenda

- Share the OIIE Capital Project Working Group Purpose
- Review Meeting #1-#3 Results
- Sub-team updates:
  - Cost Estimating
  - RFI/ RFI Response
  - Asset
- Better Understand the Deliverables
- Define OIIE Capital Project WG Next Steps

OIIE Capital Project Working Group Leaders

IPA

Deborah J. McNeil

Director, IPA Capital Solutions
And Digitalization
dmcneil@ipaglobal.com

Luke Wallace

Senior Consultant
lwallace@ipaglobal.com

MIMOSA

Alan Johnston

President, MIMOSA
ajohn@mimosa.org

Dr. Matt Selway

Research Fellow,
University of South Australia
Matt.Selway@unisa.edu.au

Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group

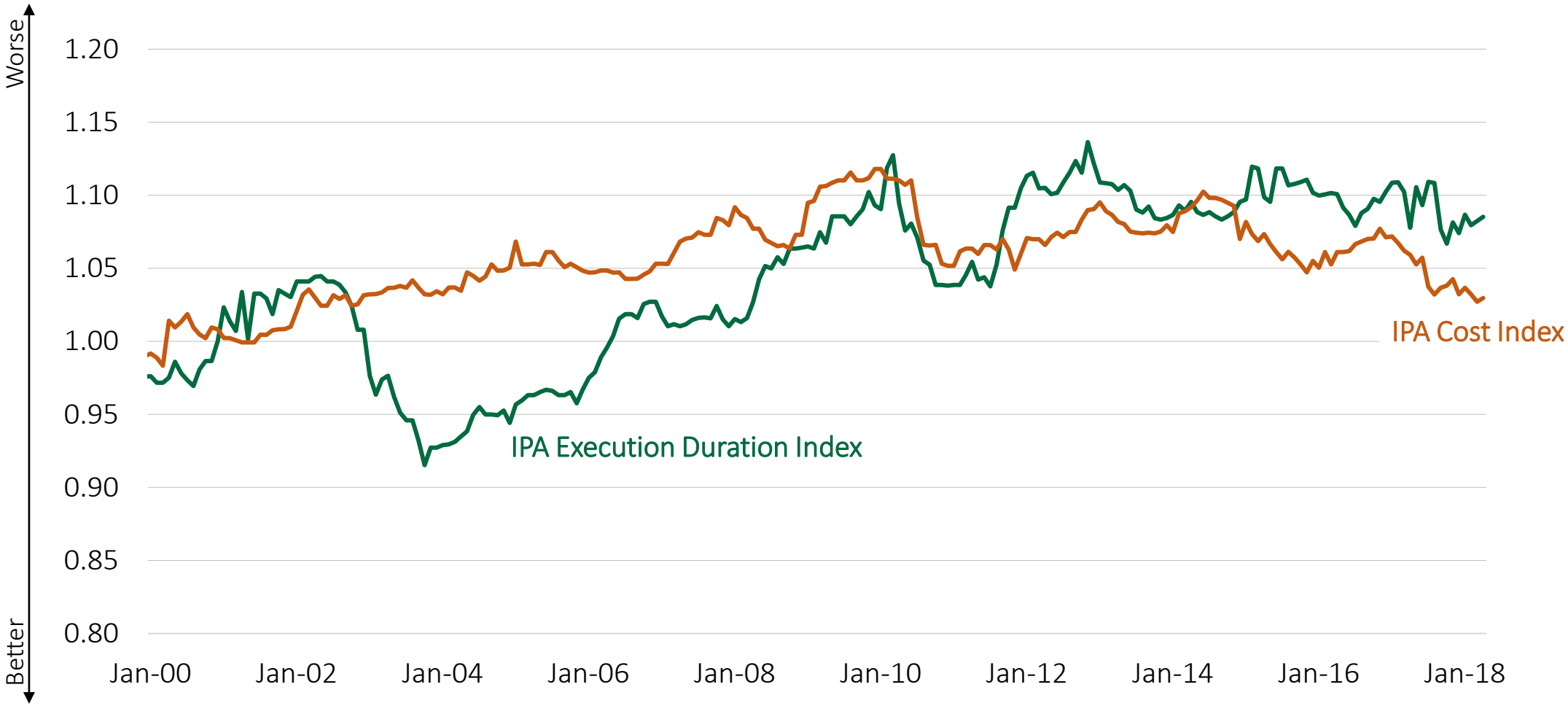
Independent Project Analysis (IPA) and MIMOSA (industry trade association dedicated to the development and adoption of information technology and information management standards) are proud to announce the formation of the ***Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group.***

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.

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 solution delivery to enable pragmatic industry digital transformation on a timely basis.

Capital Efficiency Has Not Improved in the Projects World

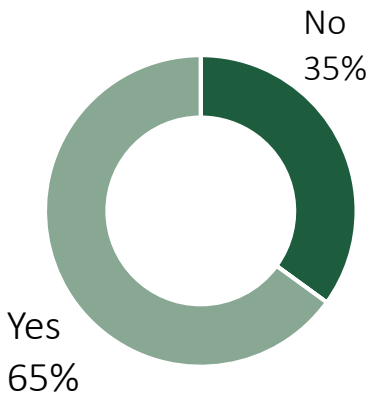
Is Digitalization the Answer?



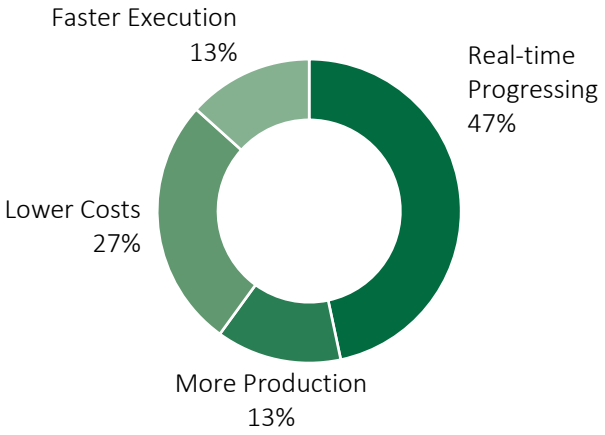
* Indices are inflation adjusted

Capital Projects Industry – Digitalization Status

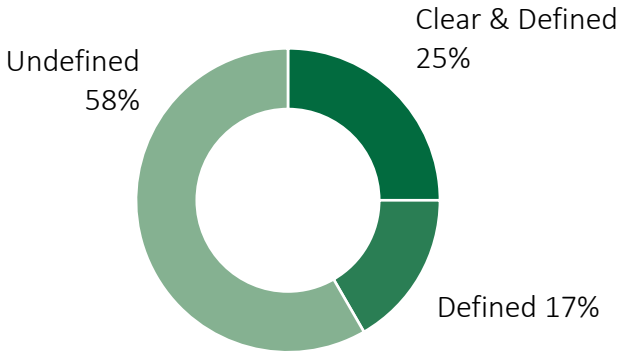
Digitalization Project Underway?



What Problem Are We Trying to Solve?



Are Digitalization Objectives Clear?



Clear: Objective has direct link toward business goals

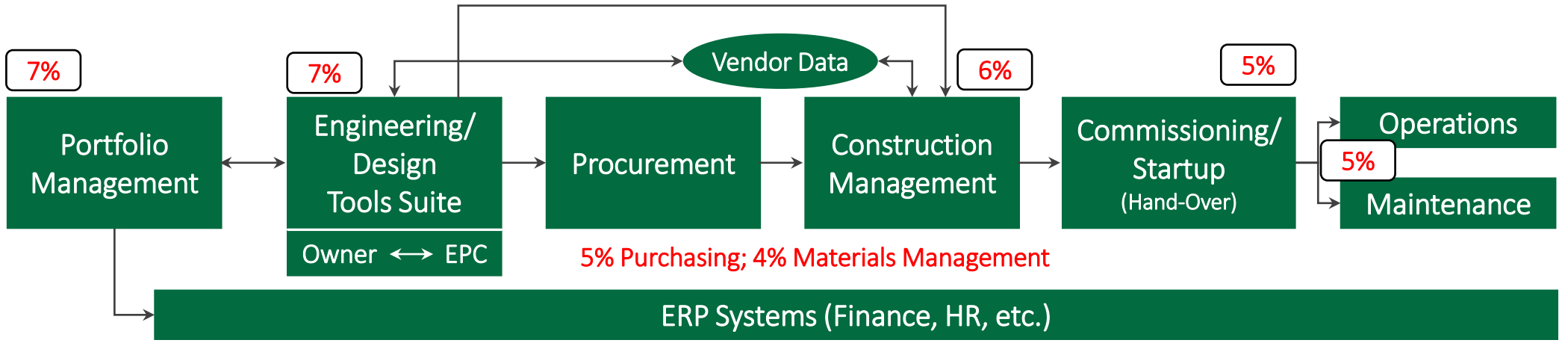
Defined: Outlined objective, but indirect links to business objectives

Undefined: No specific objectives yet identified

No common definition of what “Digitalization” means to the capital projects industry.

We are fragmented on our digitalization focus…

July 2020 survey - 185 Digitalization projects are dispersed across the entire project life cycle



Key Support Systems

8% Document Management	8% Project Controls	7% Performance Metric Systems	4% ERP Systems
7% Project Management	9% Data Management	7% Data Exchange/ Interfaces	5% Digital Twins

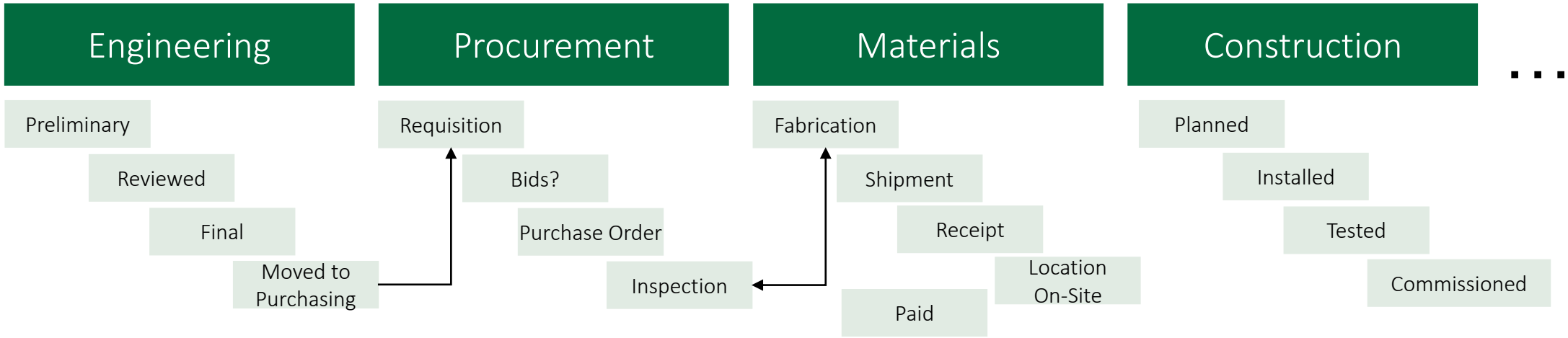
Fragmented In Digitalization Focus,
Fragmented In Standards Development Work

Why the “End to End” Focus ?

100 to 300 Software Applications In the Life Cycle

Facility Data (What am I going to build?)

Status Data (Where am I in the work process?)

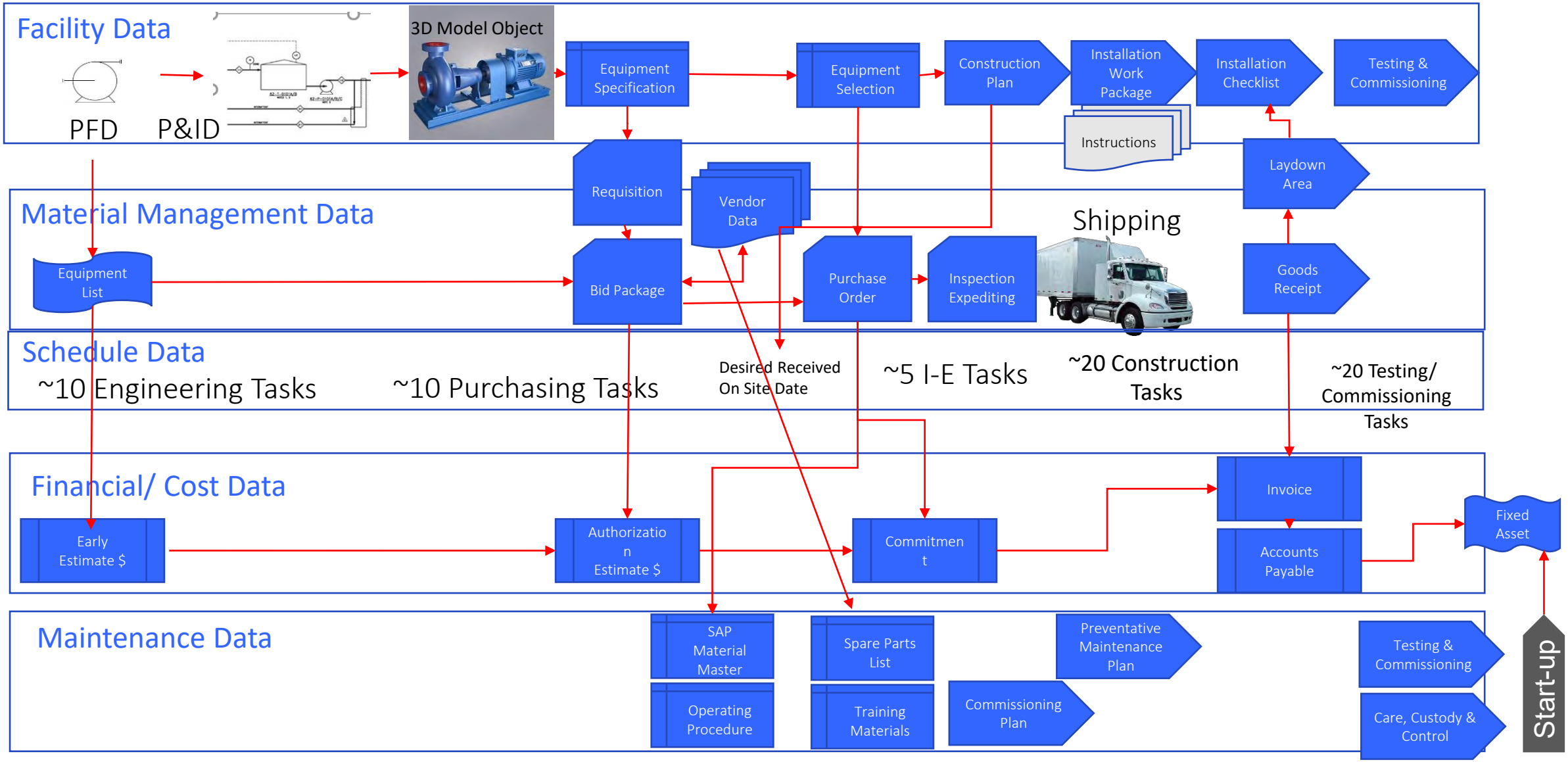


Financial Data ($)

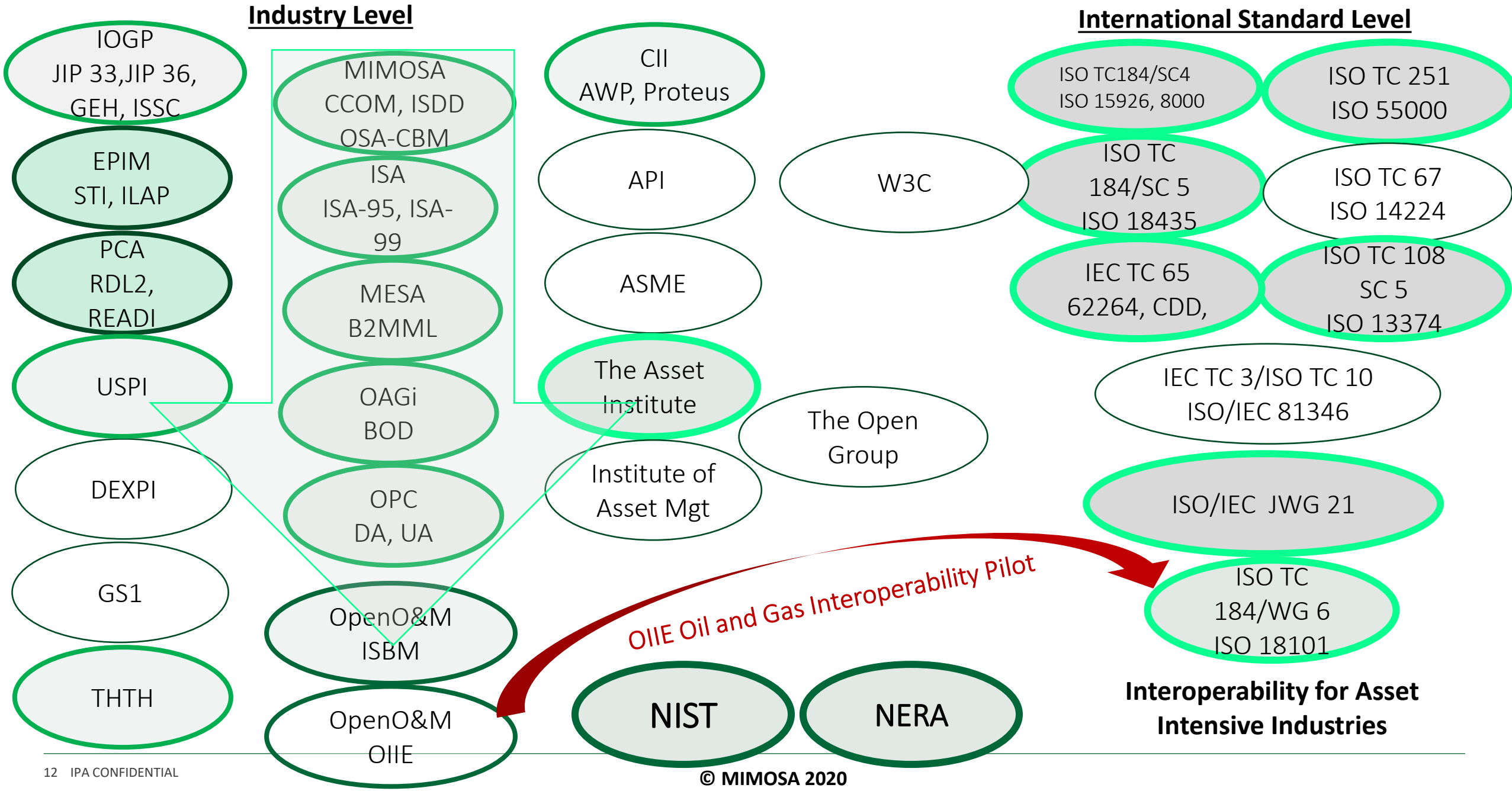
Operations and Maintenance

Performance Data (How am I doing against plan?)

The Data Life of a Pump



Interoperability for Physical Asset Management-Associations and Activities



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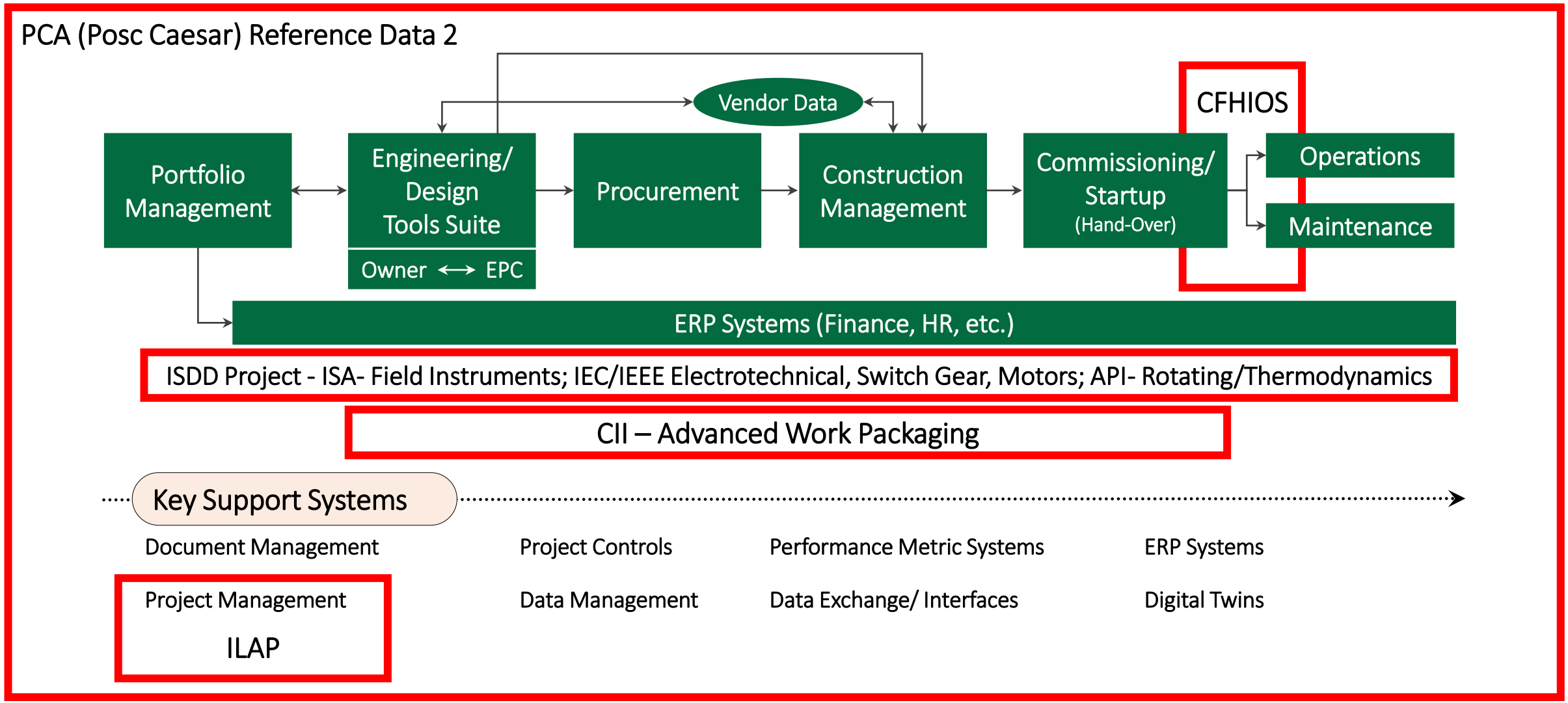
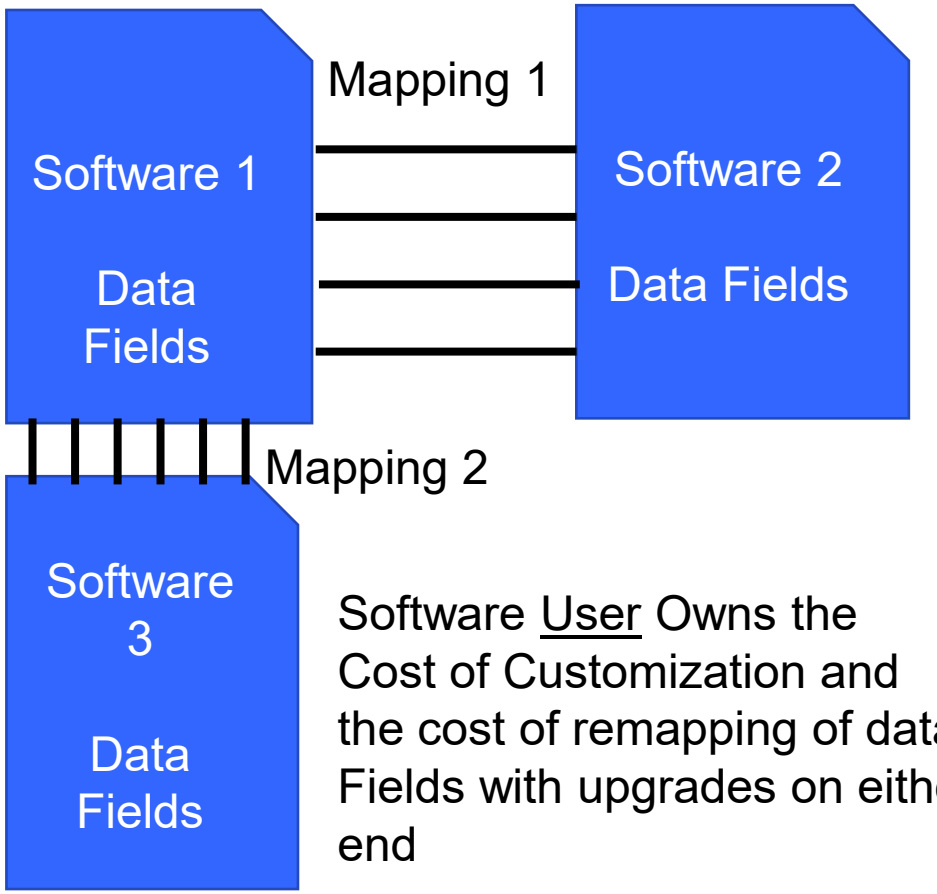
We are also fragmented on our vendor neutral data standards focus…

Current Reference Data Focus



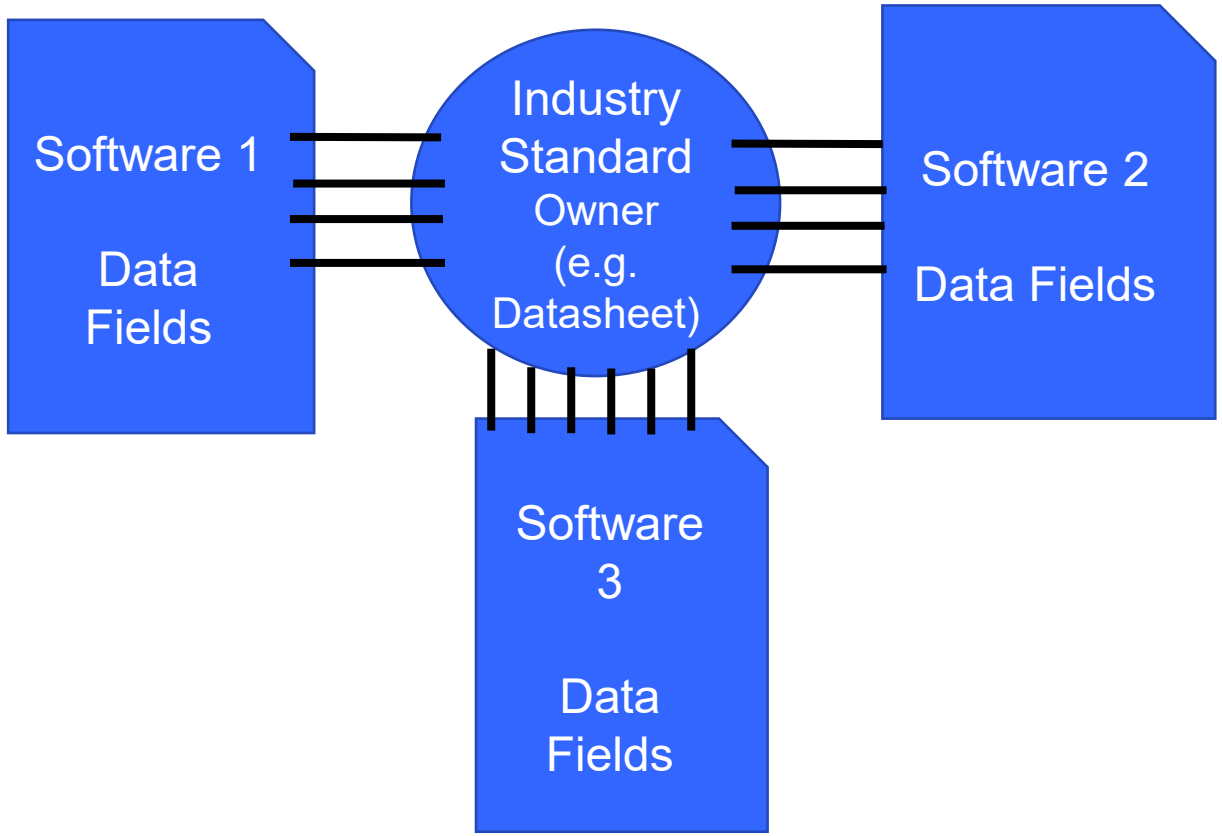
Data Movement- ISDD Approach

Data Exchange



Software User Owns the Cost of Customization and the cost of remapping of data Fields with upgrades on either end

ISDD Approach



Each Software Developer owns the cost of upgrade remapping to the Standard

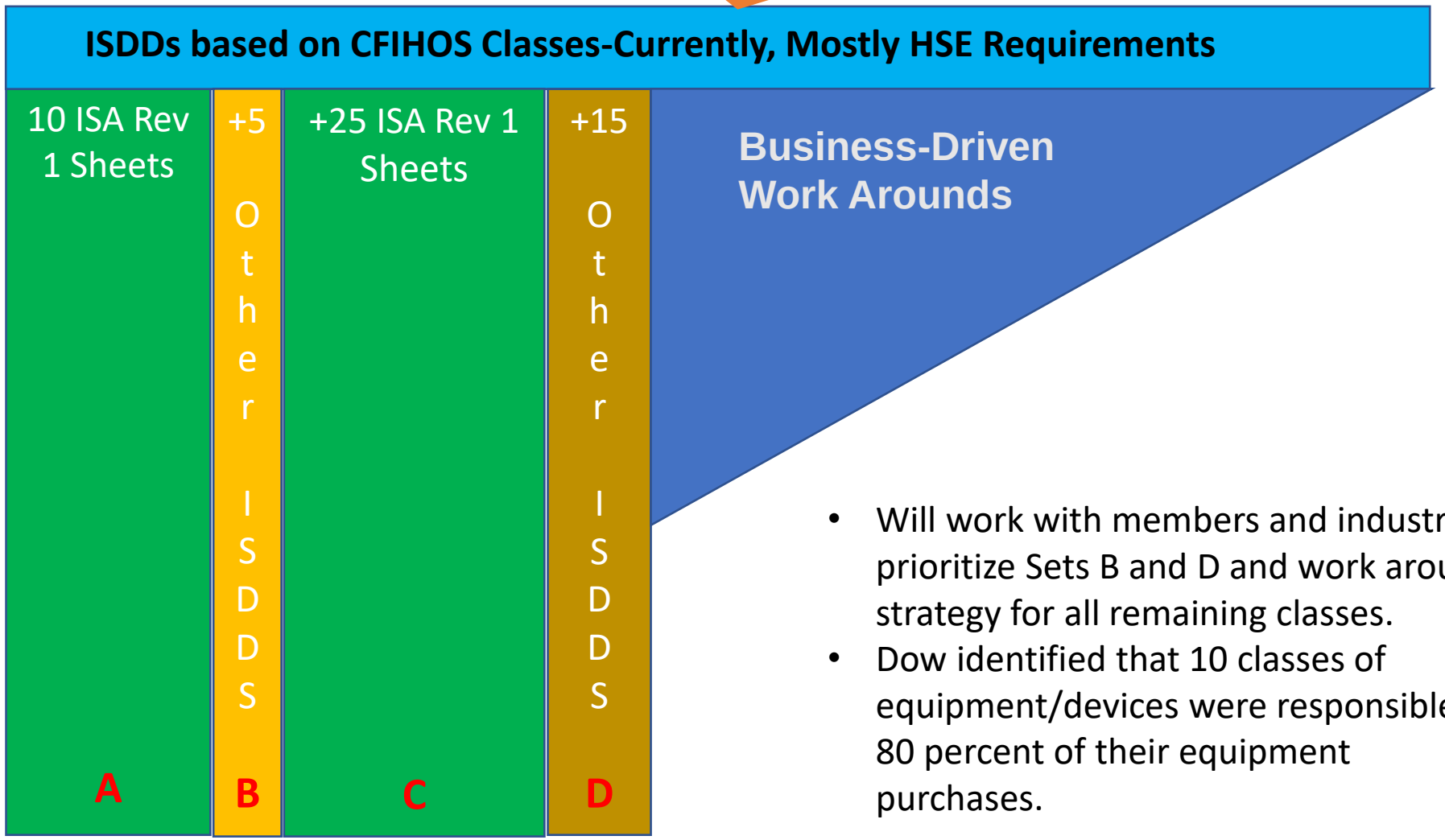
ISDD Build and Use Plan

Initial Analysis Complete for CFIHOS 1.4.1 RDL
Anticipate major set of ISDDs before end of March

Numbers of Properties on ISDs

All properties needed for digitalization

- ISA- 150-350
- API- 100-900*



- Will work with members and industry to prioritize Sets B and D and work around strategy for all remaining classes.
- Dow identified that 10 classes of equipment/devices were responsible for 80 percent of their equipment purchases.

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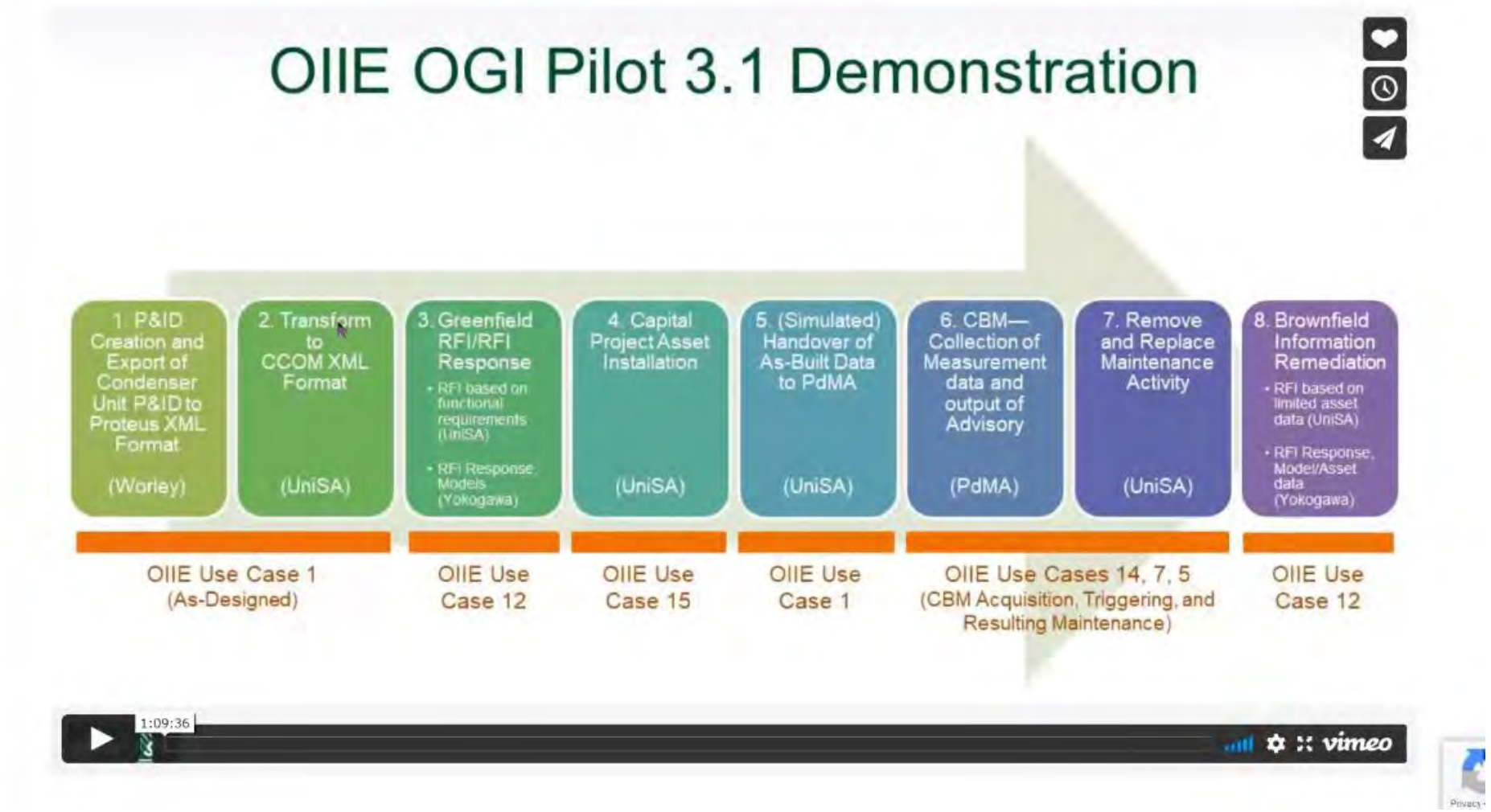
On the MIMOSA.org Website



Activities To Date

~57 Owner Companies
Across Multiple Industries

Begin Monthly Meetings

Kick-off 11-4-20

Participation	#
Invited	380
Registered	218
Attended	103

- Charter Review
- Challenge Description
- Methodology Overview
- Initial Opportunity Identification

Meeting #2 12-17-20

Participation	#
Invited	380
Registered	79
Attended	34

- Detailed Methodology Presentation
- Detailed Brainstorming Breakouts
- *180 Opportunities ID'd*

Meeting #3 2-22-21

Participation	#
Invited	380
Registered	188
Attended	111

- Detailed Methodology Presentation
- *Began work on Top 3 Opportunities* (Breakouts)

Sub-Team Meetings 3/9/21

Participation	#
Invited	290
Registered	111
Attended	40

- *Continued work on Top 3 Opportunities in Sub-teams*

Meeting #4 3-16-21

Participation	#
Invited	290
Registered	138
Attended	

So Far

IPA-MIMOSA OIIE CPWG 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.

Based on Frequency of Input:
Selected First 3 Business Use Cases to Start with…

Standard OIIE OGI Use Case Methodology

User Stories

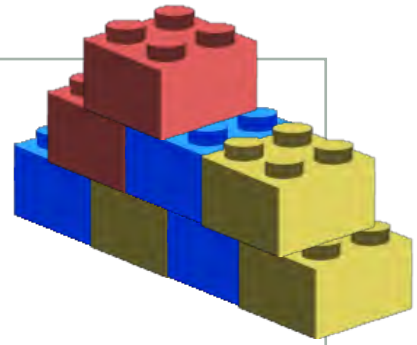
User Stories

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

Use Cases

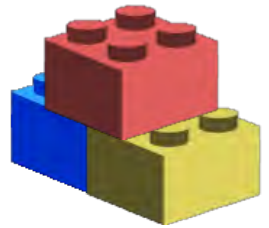
- Background
- Scope
- Preconditions
- Successful End Condition

- 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

Four User Sub-Teams Have Been Formed

Early Project → Mid Project → Late Project

Sub-Teams 1 and 2

Early Approval Processes

- ✓ **Cost Estimating**
- Basic Engineering & Simulation

Sub-Team 3

Supply Chain/Procurement

- ✓ **RFI/RFI Response**
- Purchasing

Sub-Team 4

As-Built Digital Twins

- ✓ **Capital Project Asset Installation**
- AWP CWPs and IWPs?

Sub- Team Updates

MIMOSA

Open Standards for
Physical Asset Management

OIIE Use Cases:
From Opportunity to Pilot

Matt Selway
(University of South Australia)

March 16, 2021

IPA-MIMOSA OIIE Capital Projects Working Group—Meeting #4

Working Group Aim: Digital Transformation

As the OIIE Capital Projects Working Group,

we need to identify, prioritise, align, define, and pilot/validate OIIE Use Cases

so that we can realise industry digital transformation, improve efficiency, and deliver value for Capital Projects

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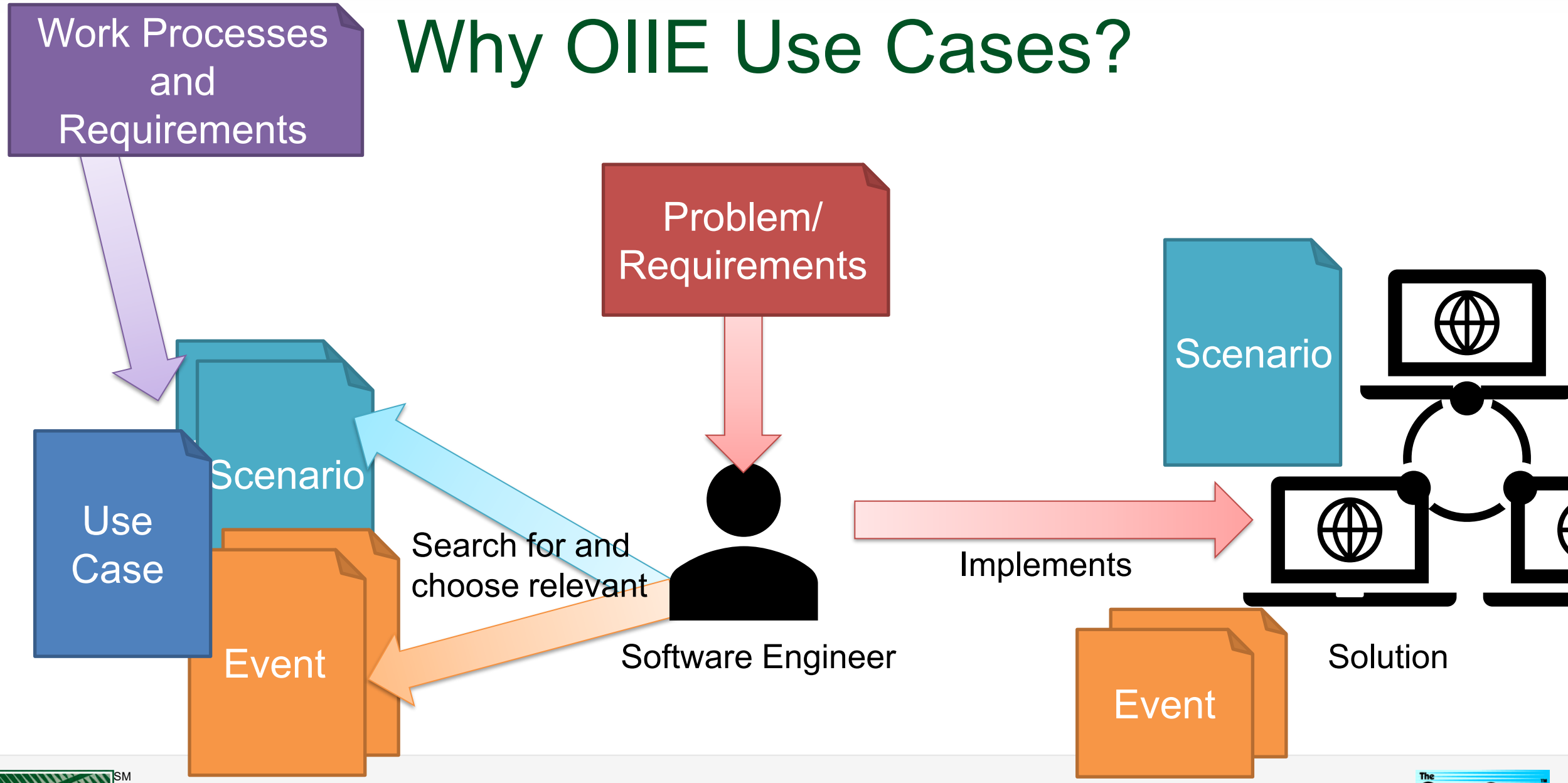
Why OIIE Use Cases?



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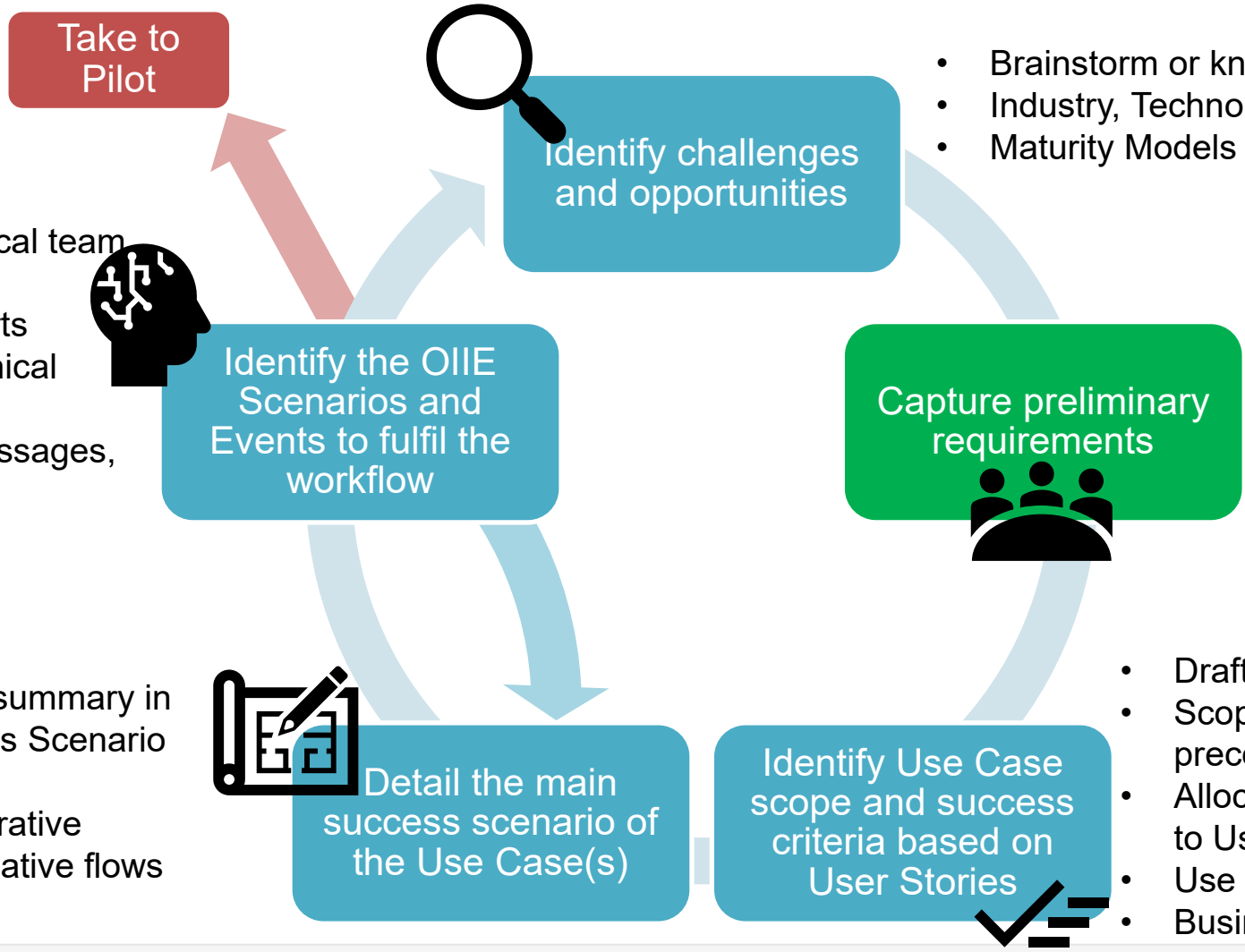
OIIE Use Case Development Process



- Brainstorm or known industry issue
- Industry, Technology trends
- Maturity Models

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

- What are the business functions to be executed?
- Who, what, when, where, why?
- Elicit through User Stories
- Methodologies
- Use Case Library
- Business Value Opportunity

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

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

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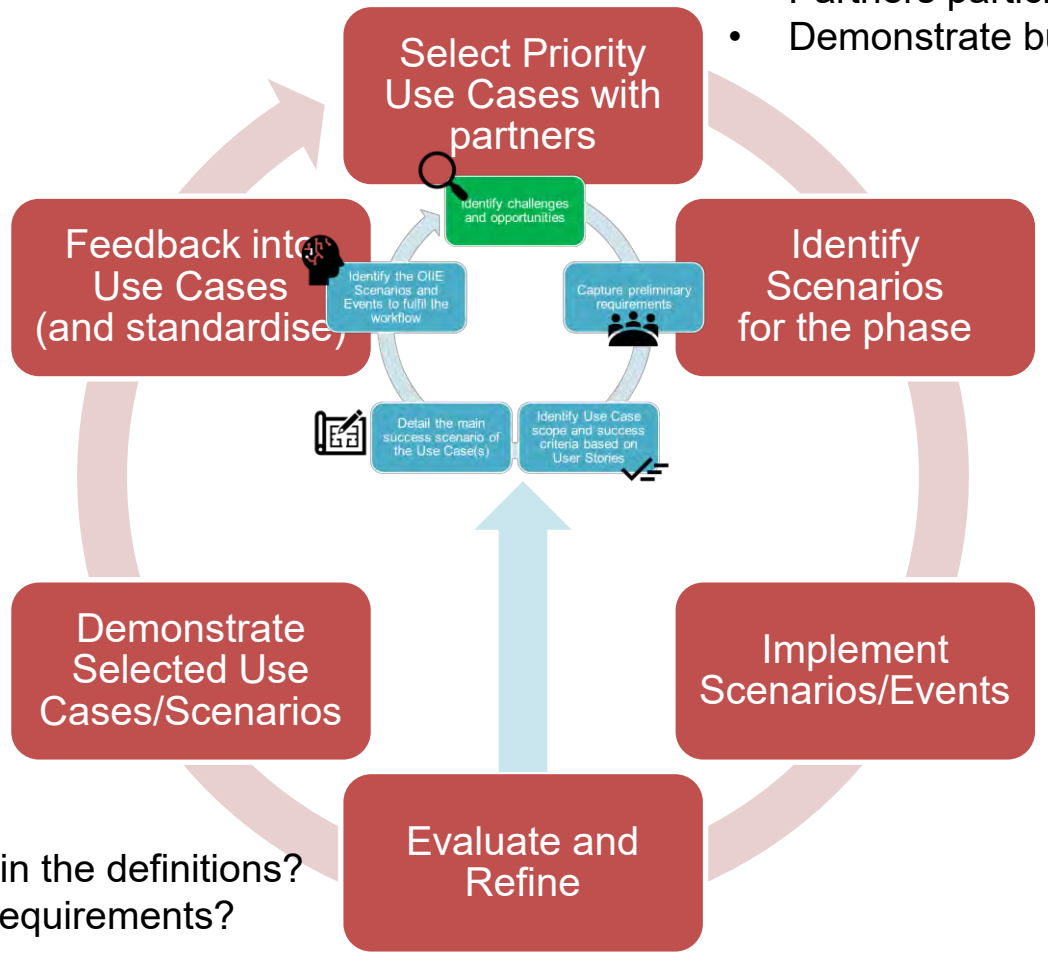
OIIE Use Case Piloting Process

- Partners participate in pilot
- Demonstrate business and industry value

- Gap Analysis
- Identify Future Priorities
- ISO 18101



- Choose specific scenarios for implementation and demonstration given:
- Time, scope, resource constraints

- Participants execute Use Cases
- Live @ Conferences and/or Published Recording
- Build awareness of capability

May include any or all of:

- Data set creation
- Data mappings
- Message mappings
- Adapter Implementation
- Message Flows and triggering
- Partner/Business Specific Processing
- Infrastructure Configuration, a.k.a. Ecosystem Administration

- Are there issues in the definitions?
- Is it fulfilling the requirements?

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OIIE Use Case Development

PROCESS AND DELIVERABLES

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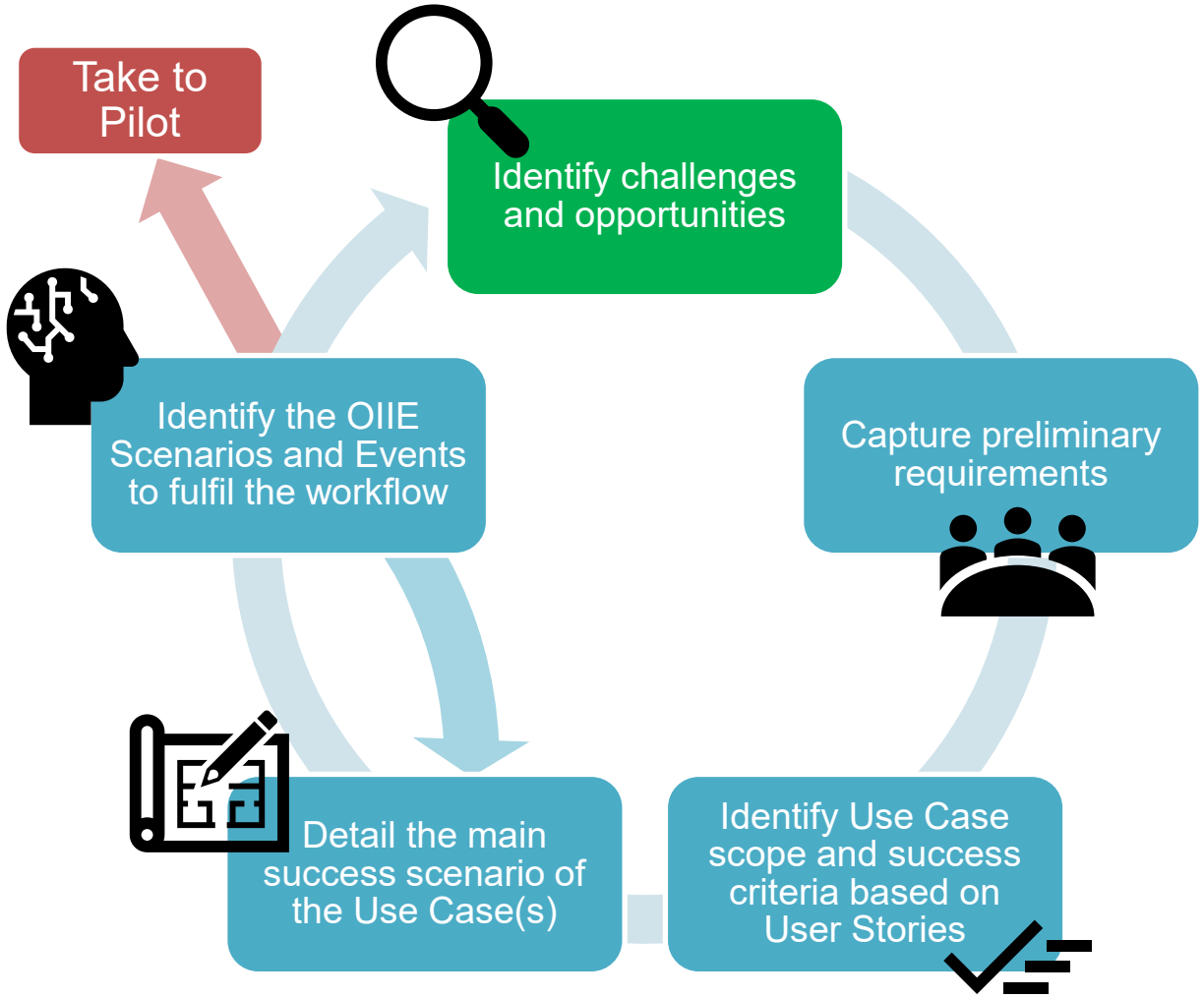
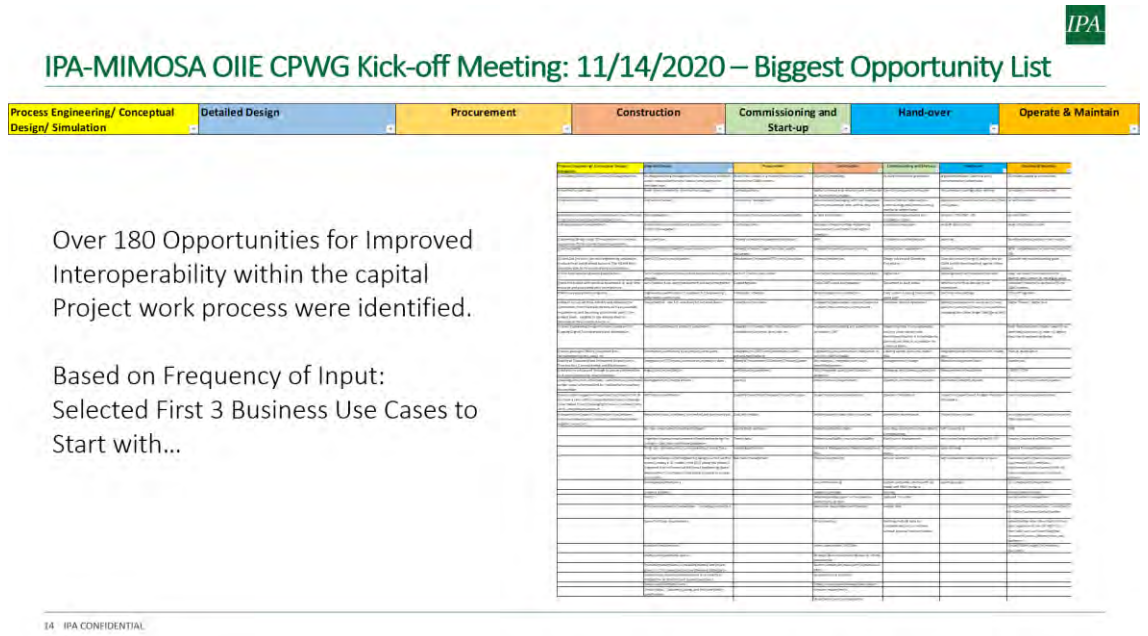
1. Identify Challenges and Opportunities



Initial Session Information Gathering



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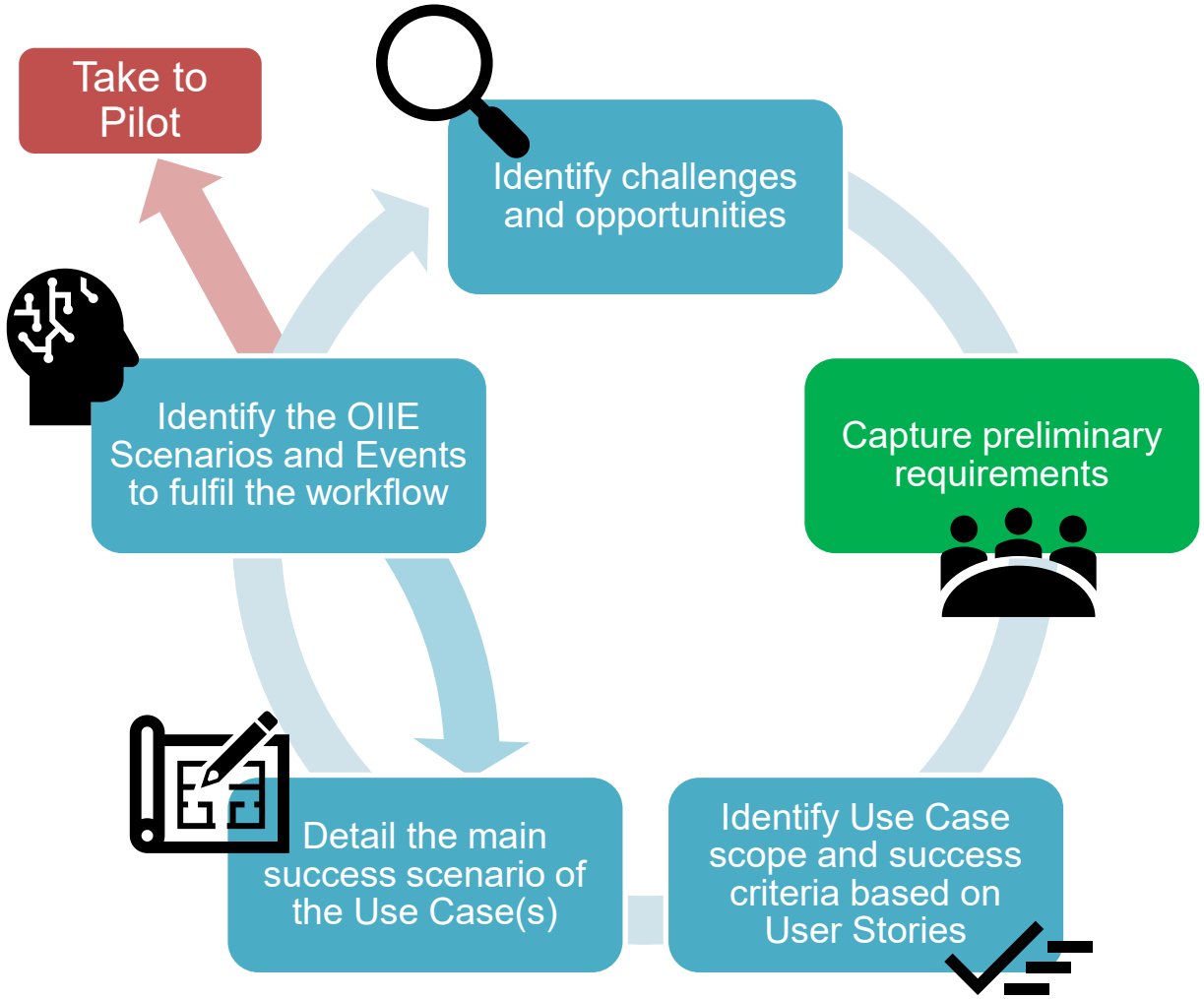
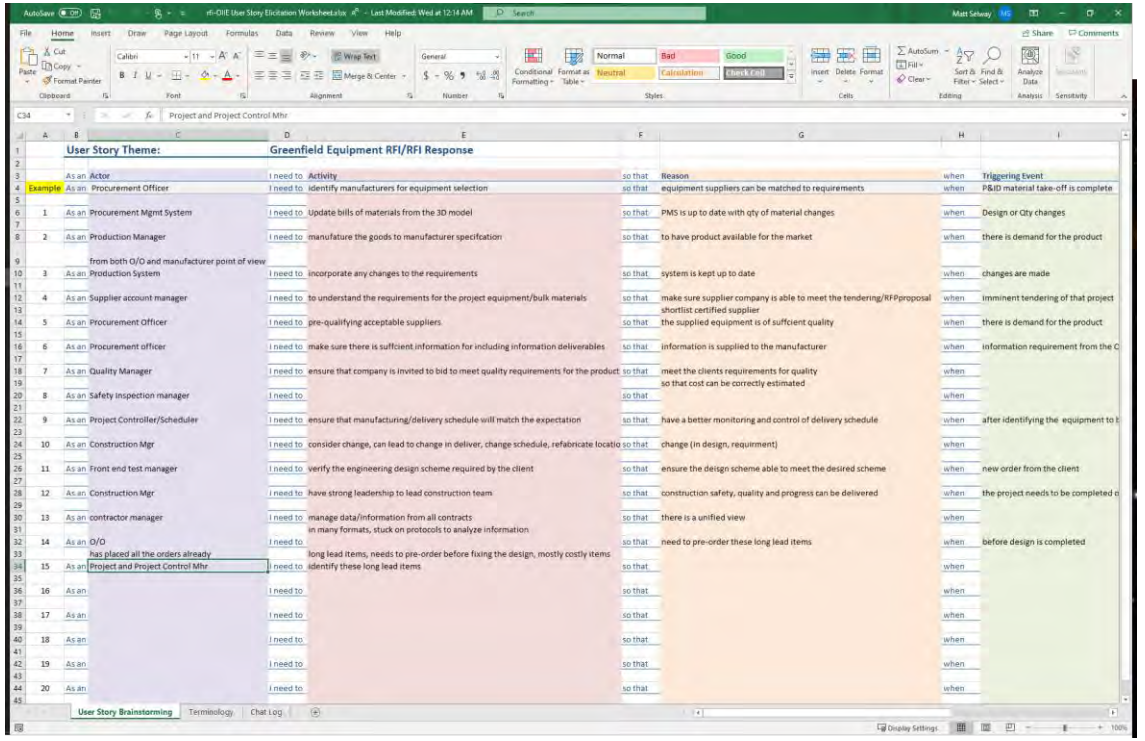
2. Capture Preliminary Requirements



User Story Statements



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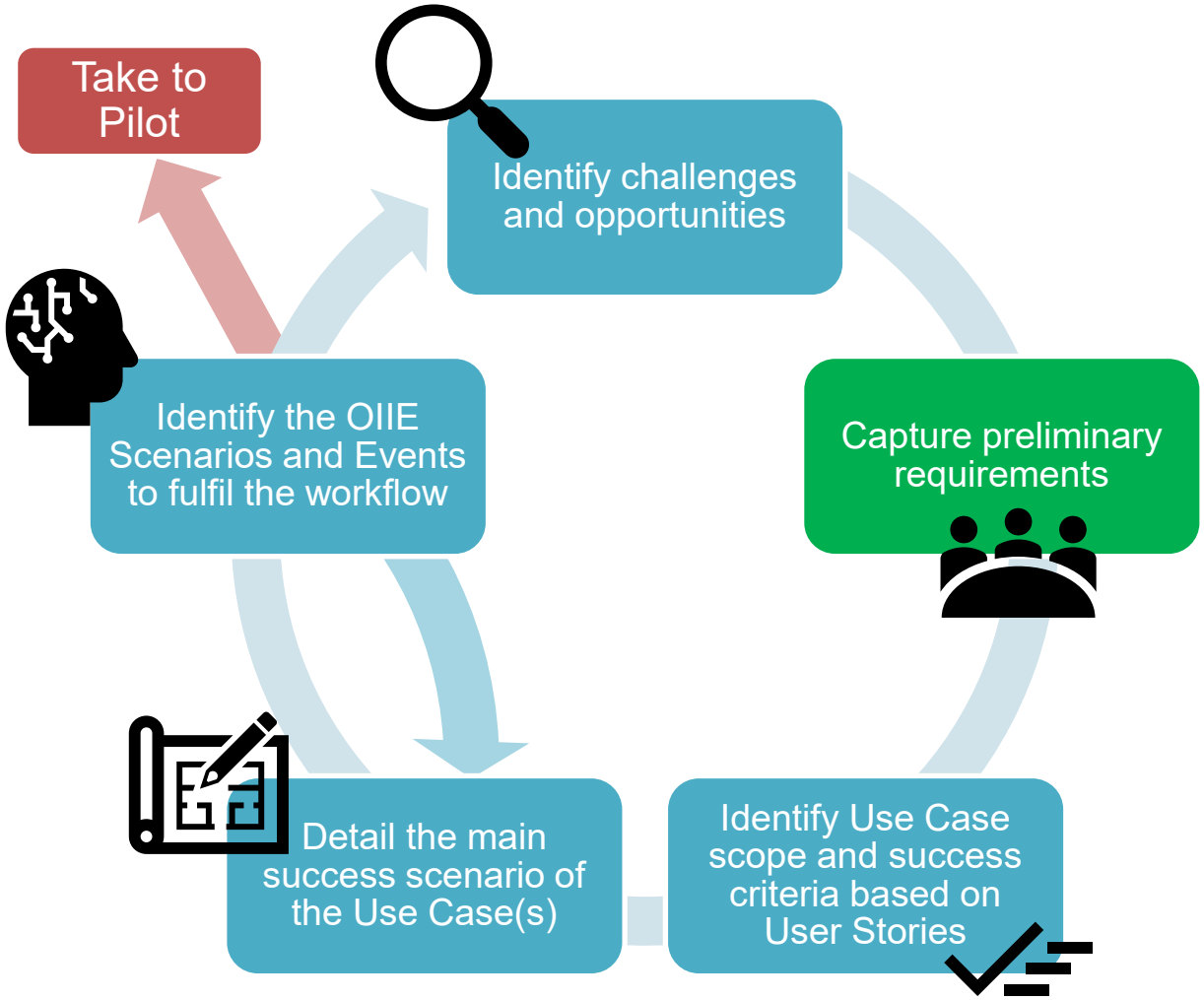
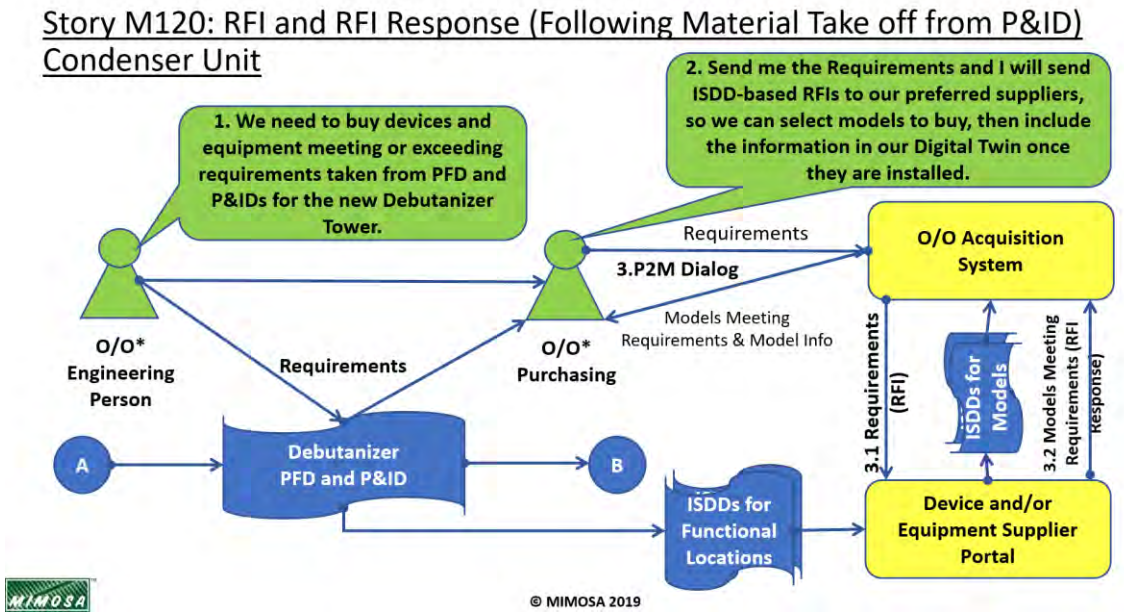


User Stories



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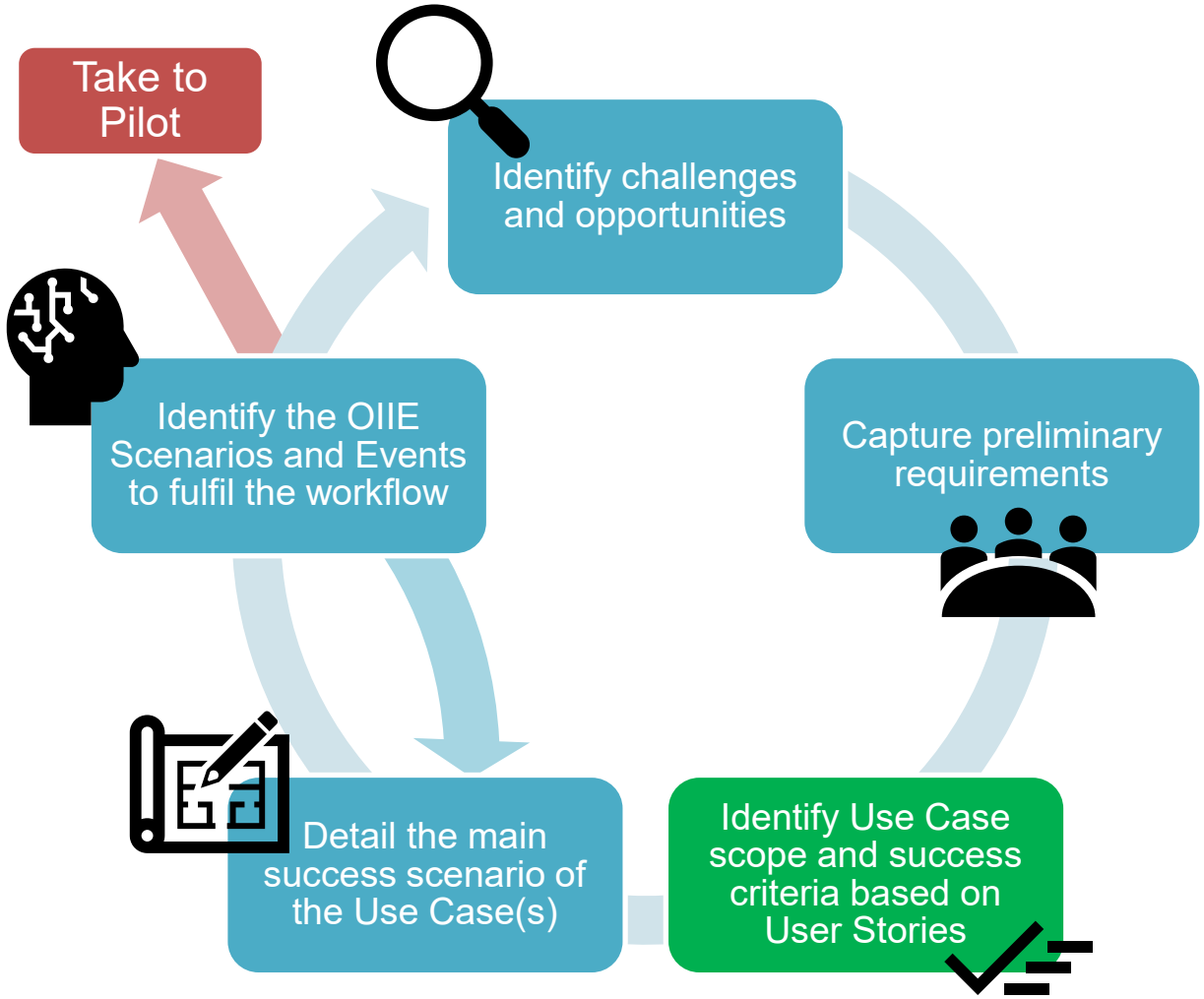
3. Use Case scope and Success Criteria



Use Case Context

OIIE Use Case 12 – RFI and RFI Response for Models Meeting Requirements (Greenfield and Brownfield)

This Use Case describes the process for retrieving Product Models from OEMs that meet specified requirements and (possibly) conform to other provided information. Both Greenfield situations—in which only functional requirements are provided—and Brownfield information remediation situations—in which some information about a serialized asset is known—are

Background

A common issue in the design, construction, and operation of a complex plant or facility is the need to identify appropriate makes and models of important classes of physical assets to be procured and installed. Traditionally, discovering potential make/models of equipment that can fulfil the requirements is performed by sending a

Scope

The scope of this Use Case is limited to the transfer of product models conforming to the exchanged requirements and not the transfer of detailed product model data. Moreover, the following are ***out of scope***: the identification of conforming models by the OEM, i.e., the make/model matchup process; the selection of an appropriate model for procurement; and, the agreement on the standard format (such as ISDDs) with which functional requirements and known asset information are exchanged.

Successful End Condition

A set of possible product models have been identified that meet the functional requirements (and conform to other provided data) and the O&M Reference or Execution environment has been populated with product model data such that it is possible to move forward with the model selection and procurement processes.

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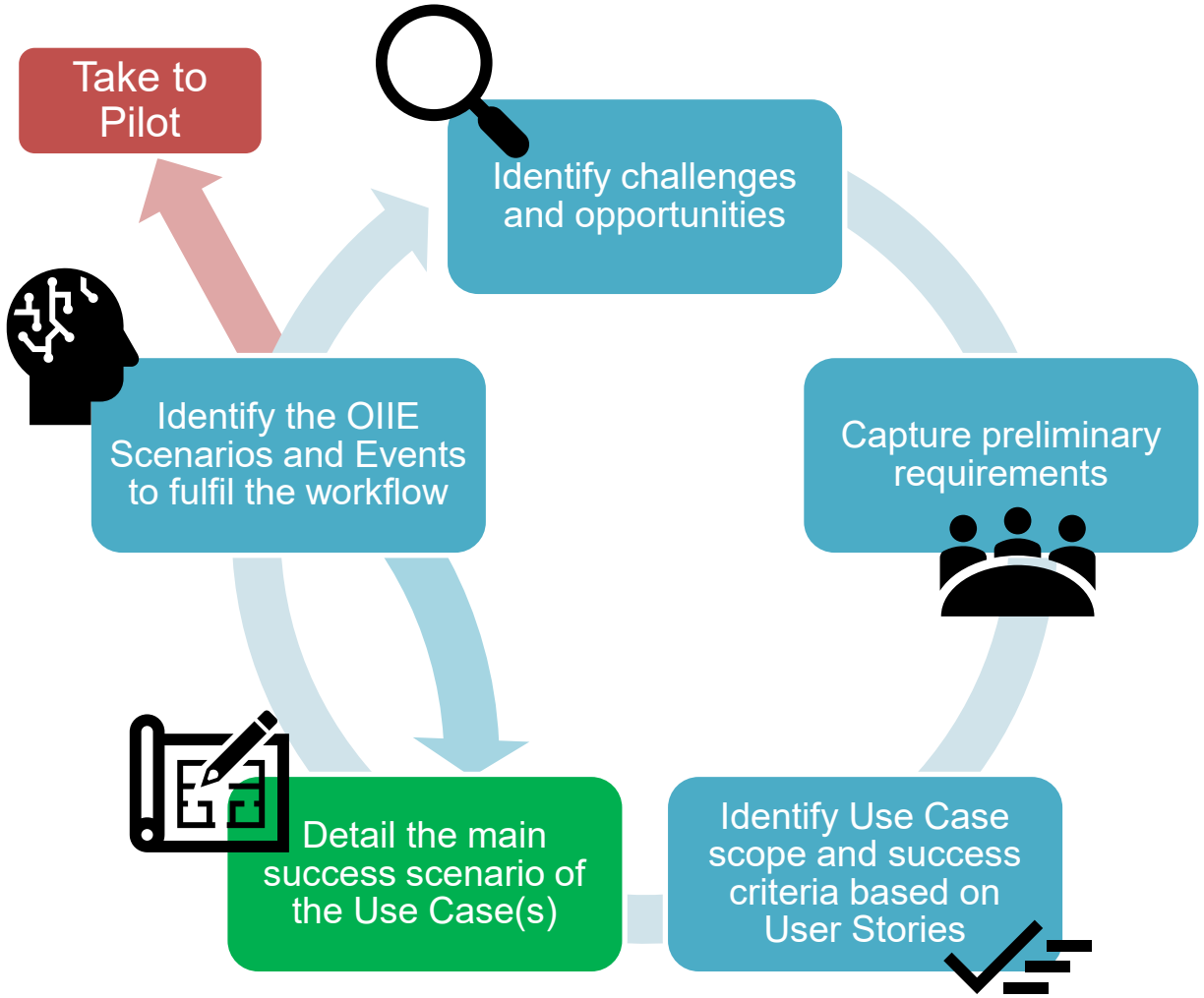
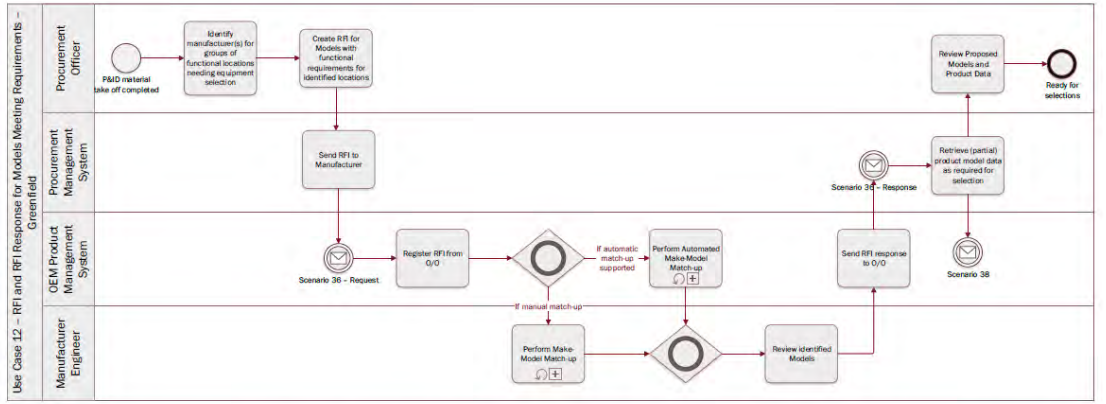
4. Detail the Main Success Scenario/Flow



Use Case Main Success Flow



Identify potential/preferred manufacturer	The Procurement Officer determines possible/preferred Manufacturers for sets of equipment/instruments that need to be procured and installed based on the functional locations and their requirements.
Create RFI for Models	The Procurement Officer puts together an RFI for product models meeting the functional requirements for a set of equipment to be sent to a particular Manufacturer (or Manufacturers). Requirements must be in a standard format.
Send RFI to Manufacturer	The Procurement Management System sends the RFI, including functional requirements for selected P&ID tag locations, to the Manufacturer(s) according to Scenario 36.
Register RFI	The OEM Product Management System registers the RFI, possibly notifying a Manufacturing Engineer that a request has been received and must be addressed.
Optional **Perform Make/Model Match-up**	Depending on the Manufacturer's processes for matching product models to requirements, the Manufacturer Engineer may manually inspect the RFI and search the product catalogue for possible models meeting the requirements.

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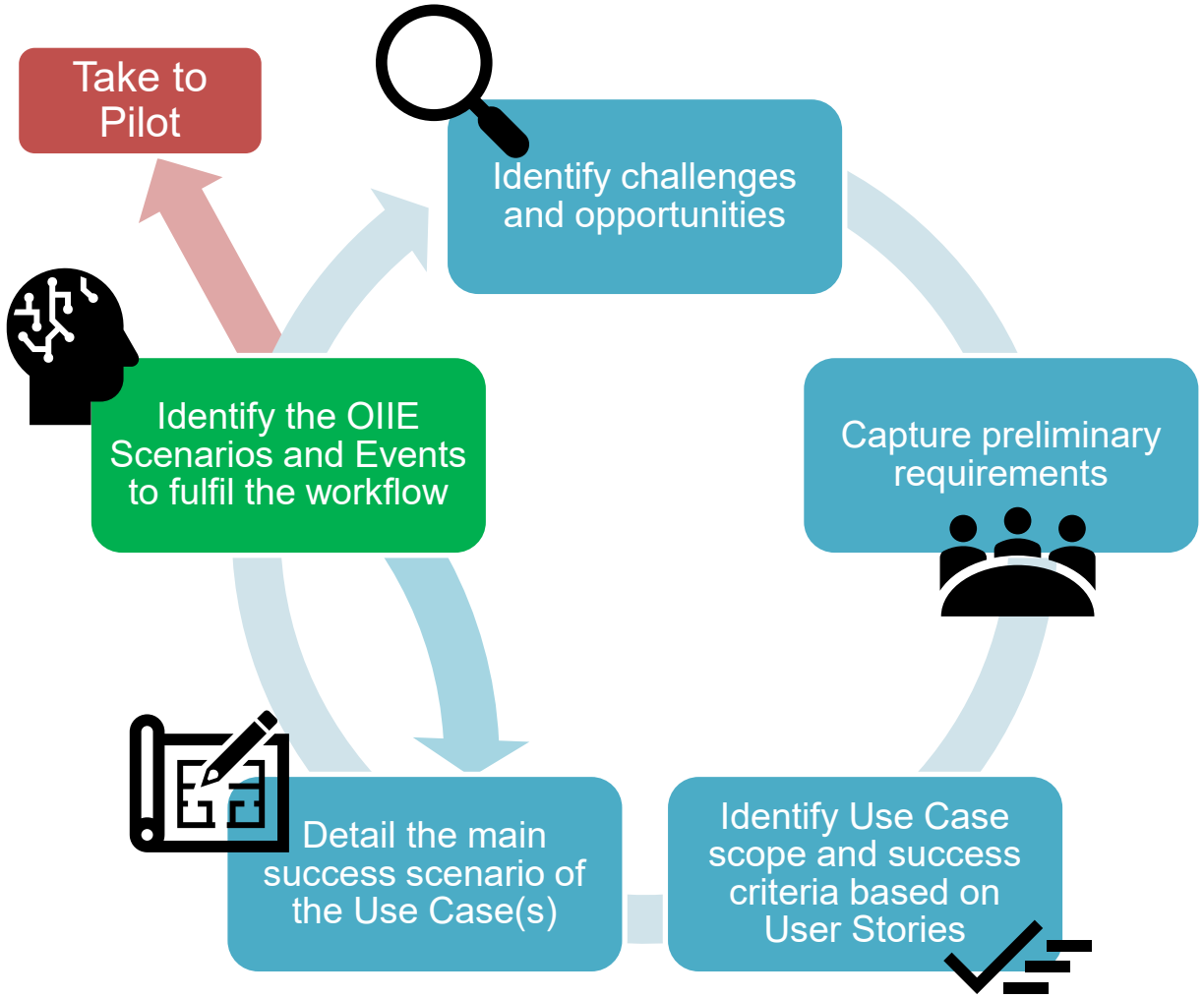
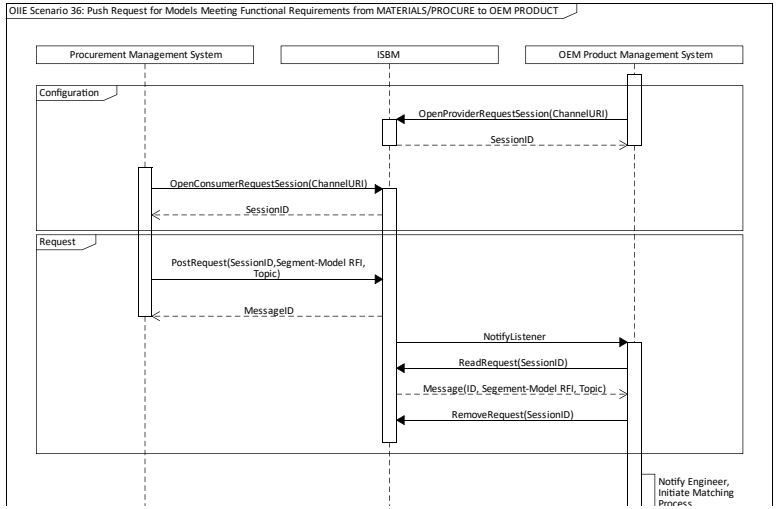
5. Identify Scenarios and Events



Scenarios

OIIE Scenario 36 – Push Request for Models Meeting Functional Requirements from MATERIALS/PROCURE to OEM PRODUCT

This scenario details the exchange of an RFI, and its response, requesting possible models



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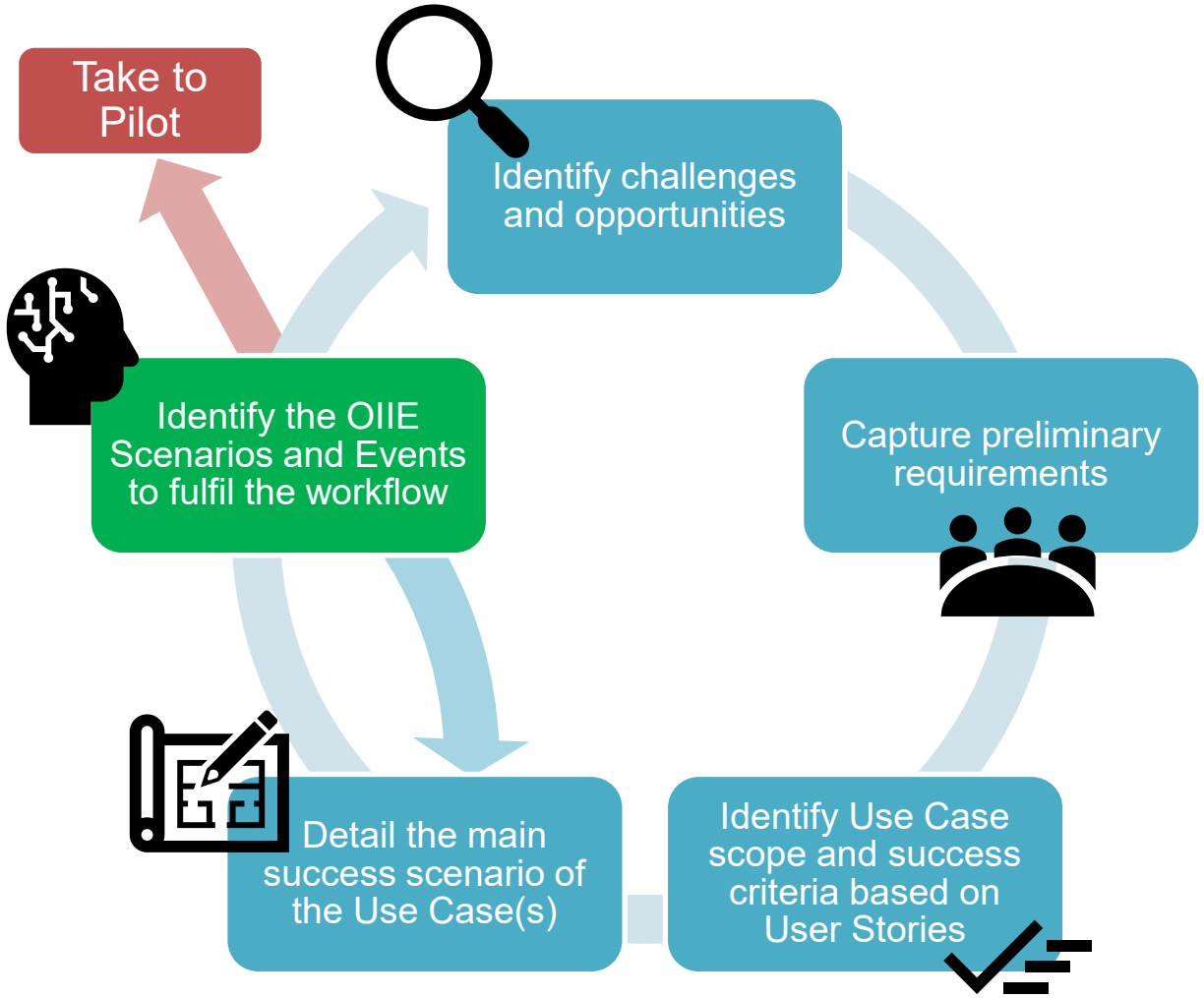
5. Identify Scenarios and Events



Events

OIIE Push RFI for Models Meeting Requirements Data

This Event is sending request for models meeting requirements, including requirement data sheets in an agreed standard format, and expects to receive possible models that meet or exceed those requirements.

Specific Data Content

The data sent from the source system is, at a minimum, composed of:

- The functional location(s) (P&ID Tag)
- Engineering Data sheets containing the functional requirements for each location (or group of locations)

In addition, the following data can be sent for context:

- The agent (person or organization) making the request, for contact purposes
- A timestamp indicating a deadline by which a response should be made
- Additional property sets/data sheets specifying additional information that may be considered when finding models that meet the requirements

Data Processing

This Event is pushing request for information for models meeting requirements and require that the recipient

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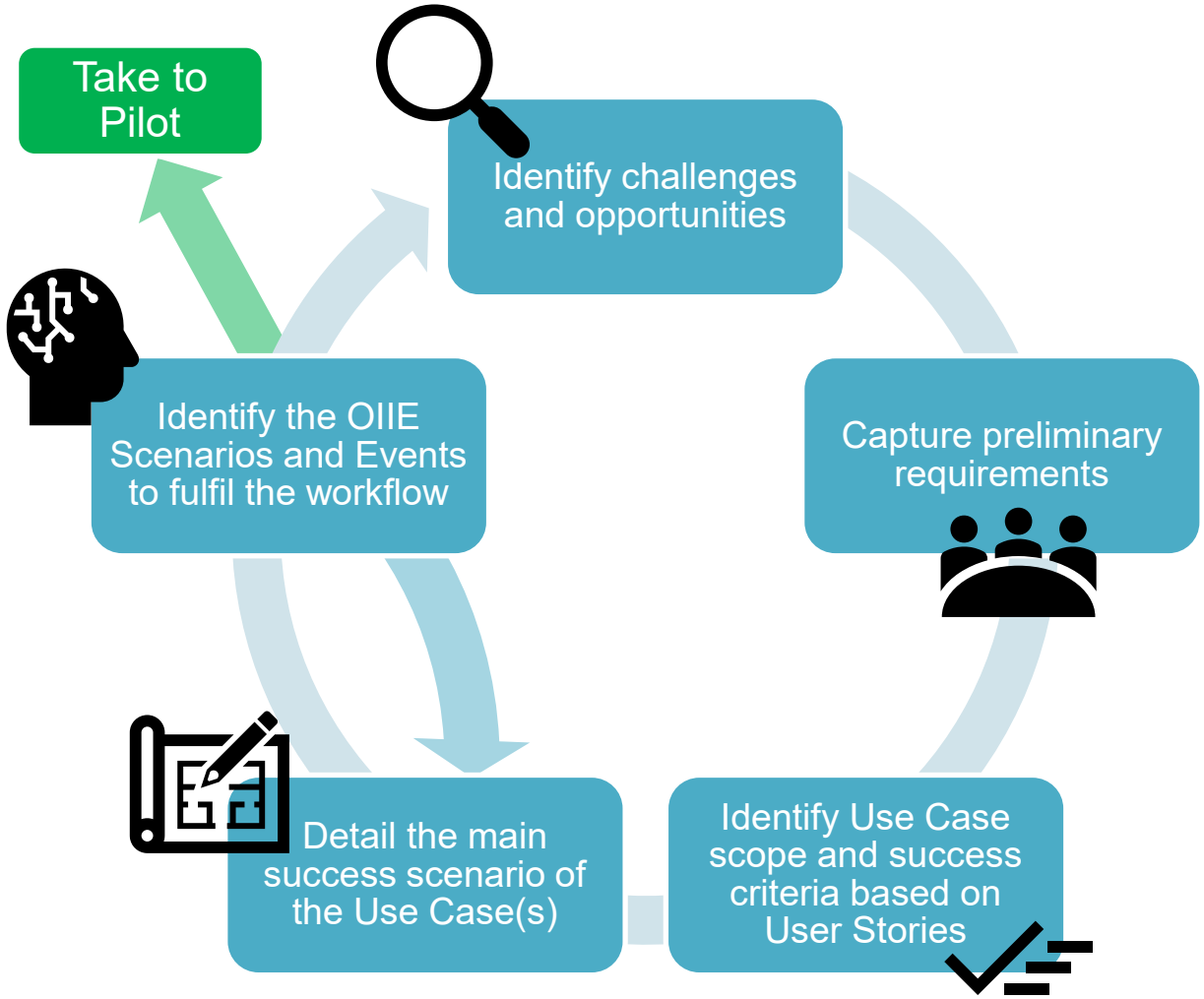
6. Piloting a Use Case



RFI/RFI Response Pilot Video (Yokogawa)

https://vimeo.com/368708347#t=1839s

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Summary

We aim to:

- Identify
- Prioritise
- Align
- Define
- Pilot / Validate
- Standardise / Publish

OIIE Use Cases for Capital Projects to realise industry digital transformation, improve efficiency, and deliver value.

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Next Steps

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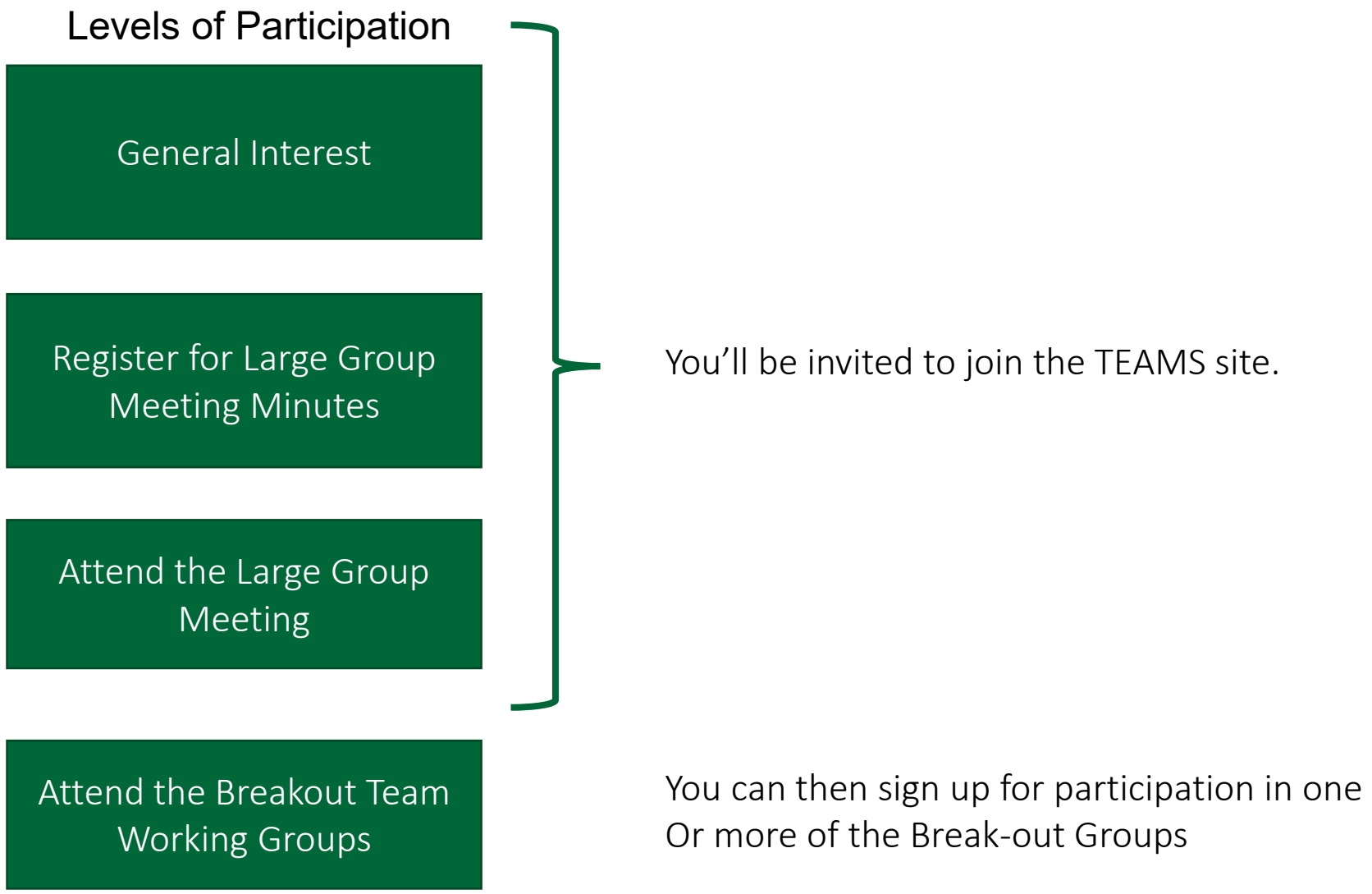
IPA – MIMOSA OIIE CPWG



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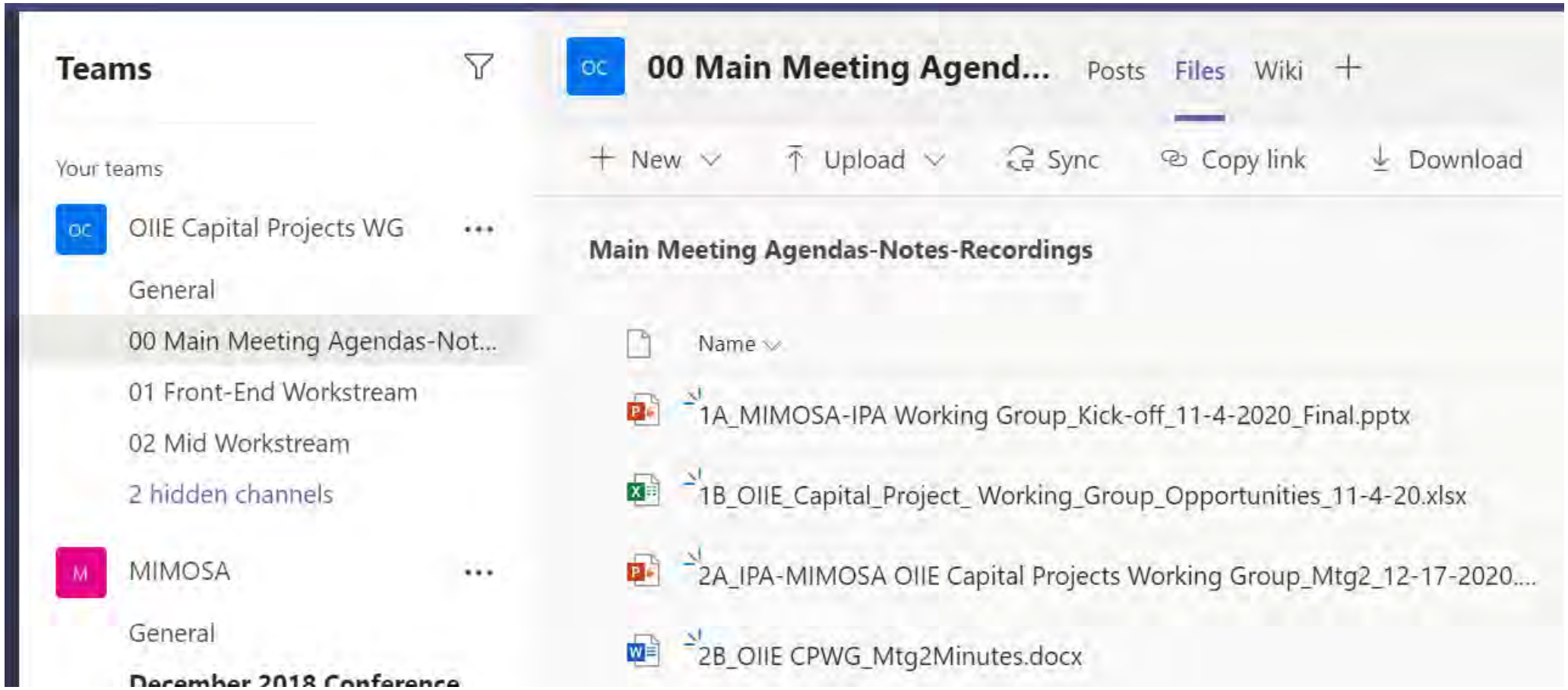
Join us on TEAMS and let's get to work…



Gathering Input on 3 Use cases

NEXT Sub-Team Meetings – March 30th 7-8 am EDST

Break Out Group	Facilitator	Meeting Link
Front-End - Cost estimating group 1	Von Gusa	Click here to join the meeting
Front-End - Cost estimating group 2	Troy Schwartz	Click here to join the meeting
Middle - RFI/ RFI Response (Greenfield project)	Karamjit Kaur	Click here to join the meeting
Back end - Capital Project Asset Installation	Matt Selway	Click here to join the meeting

In April – Sub Teams will begin meeting on different days and times so that you can join more than one sub-team if you wish.

Next Steps:

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

2. Please participate in the smaller 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)

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. This Larger 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
   Next Large Team Meeting: April 20th 7 to 8 am EDST – same meeting link
   If you need new meeting invitation – please email dmcneil@ipaglobal.com

Using the TEAMs Chat Window…

I Wish I knew or Understood…

THANK YOU

Independent Project Analysis

United States
Independent Project Analysis, Inc.
44426 Atwater Drive
Ashburn, VA 20147
USA
+1 703 729 8300

Australia
Independent Project Analysis, Inc.
Level 2, Suite 2
192 High Street
Northcote, VIC 3070
Australia
+61 3 9458 7300

United Kingdom
Independent Project Analysis, Ltd.
Wellington House – First Floor
Worton Drive
Reading RG2 0TG
United Kingdom
+44 118 920 7800

Brazil
Independent Project Analysis Latin America
Rua Deputado Heitor Alencar Furtado, 3415
Edificio Montelig – 4o andar
Campo Comprido
Curitiba – Paraná 81200-528
Brazil
+55 41 3028 9028

Singapore
Independent Project Analysis, Pte Ltd.
No. 1 International Business Park
#10-02 The Synergy
Singapore 609917
Singapore
+65 6567 2201

The Netherlands
Independent Project Analysis, Inc.
WTC The Hague Business Center, Room 03.25
Prinses Margrietplantsoen 33
2595 AM The Hague
The Netherlands
+31 70 335 0707

Deborah J. McNeil
Capital Solutions and
Digitalization Director
571-440-1300
dmcneil@ipaglobal.com

Luke Wallace
Capital Solutions Research Leader
703-726-5309
lwallace@ipaglobal.com

www.ipaglobal.com