Independent Project Analysis

IPA-MIMOSA OIIE Capital Projects Working Group Meeting #9 – 8/16/2021 Meeting Minutes

Deborah J. McNeil (Independent Project Analysis, Inc.)
Alan Johnston (MIMOSA)
Dr. Matt Selway (University of South Australia)
Dr. Karamjit Kaur (University of South Australia)
Von Gusa (GUSA Consulting Services)
Luke Wallace (Independent Project Analysis, Inc.)

OIIE Capital Project Working Group: 08-17-2021 Meeting Agenda

- Share the OIIE Capital Project Working Group Purpose
- Brief Overview of where we've been - Review Meeting #1 - #8 Results
- Sub-team updates:
  - Cost Estimating
  - RFI/ RFI Response
  - Asset Installation
- OIIE Pilot Update
- Key Issue Discussion:
  - What Value is Really there?
- Define OIIE Capital Project WG Next Steps

OIIE Capital Project Working Group Leaders

IPA

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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.

Activities To Date

~57 Owner Companies
Across Multiple Industries

Began 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	152
Attended	39

- *Dug Deeper on Business Use Case Deliverables*

Meeting #5 4-20-21

Participation	#
Invited	290
Registered	100
Attended	38

- Shared sub team progress
- Discussed scope of OIIE OGI Pilot Phase 3.3

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/

Activities To Date

~57 Owner Companies
Across Multiple Industries

Meeting #6 5-18-21		Meeting #7 6-15-21		Meeting #8 7-20-21		Meeting #9 8-17-21			
Participation	#	Participation	#	Participation	#	Participation	#	Participation	#
Invited	290	Invited	290	Invited	290	Invited	290	Invited	
Registered	100	Registered	110	Registered	100	Registered	75	Registered	
Attended	33	Attended	22	Attended	22	Attended	15	Attended	

- Sub-team Update
- Deliverables Discussion
- Next Steps

- Sub-team Update
- *MIMOSA Pilots 3.3 and 3.4 Update*
- Next Steps

- Sub-team Update
- *MIMOSA Pilots 3.3 and 3.4 Update*
- Key Issue Discussion
- Next Steps

- Sub-team Update
- *MIMOSA Pilots 3.3 Update*
- Key Issue Discussion – How $ is spent on capital project
- Next Steps

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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
- September 21, 2021
- October 19, 2021
- November 17, 2021
- December 21, 2021

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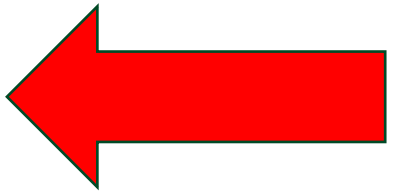


Sub- Team Report Outs

Subteams 1&2 – Cost Estimating –

(Von Gusa/ Luke Wallace)

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

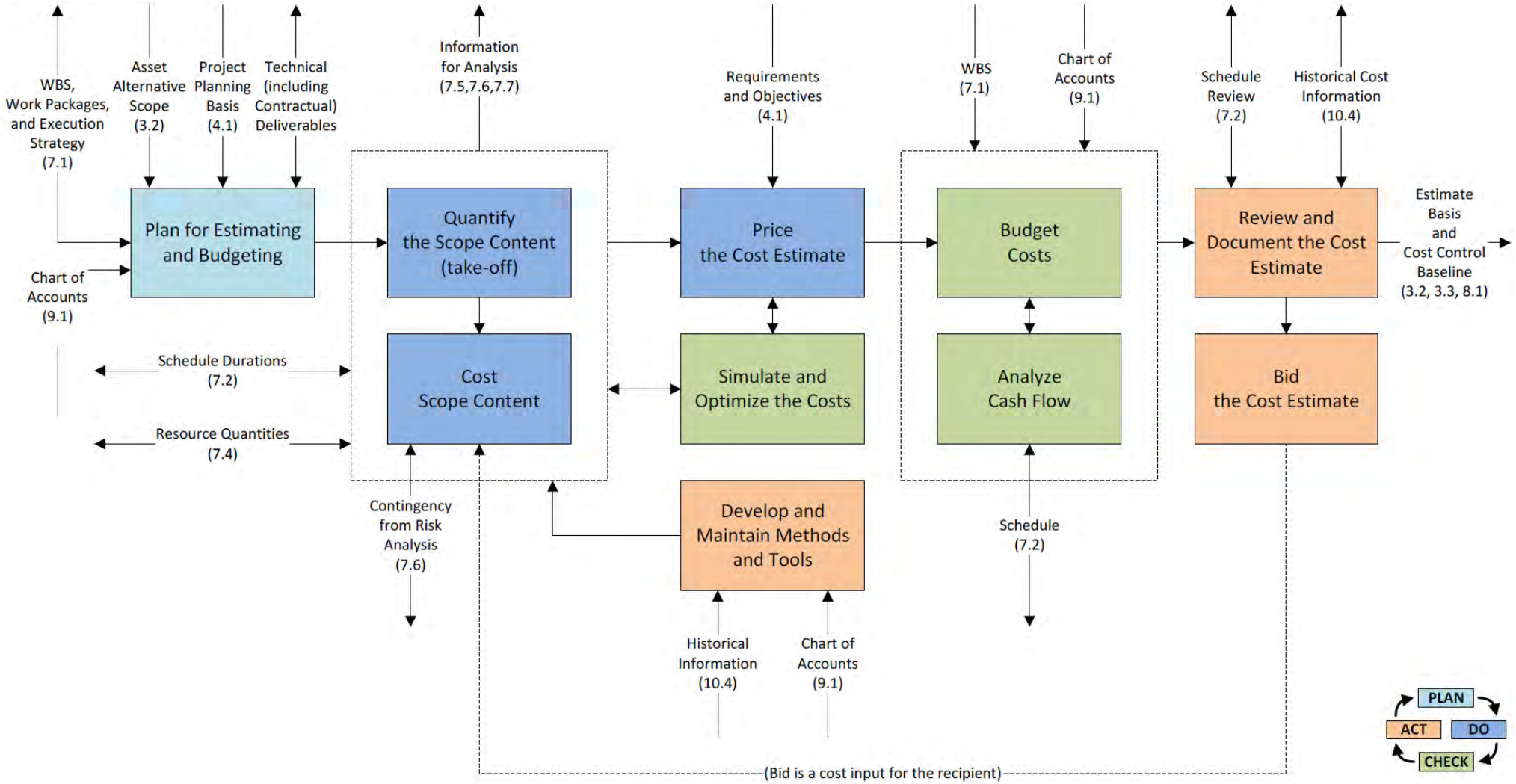


Figure 7.3-1 Process Map for Cost Estimating and Budgeting

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

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			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			

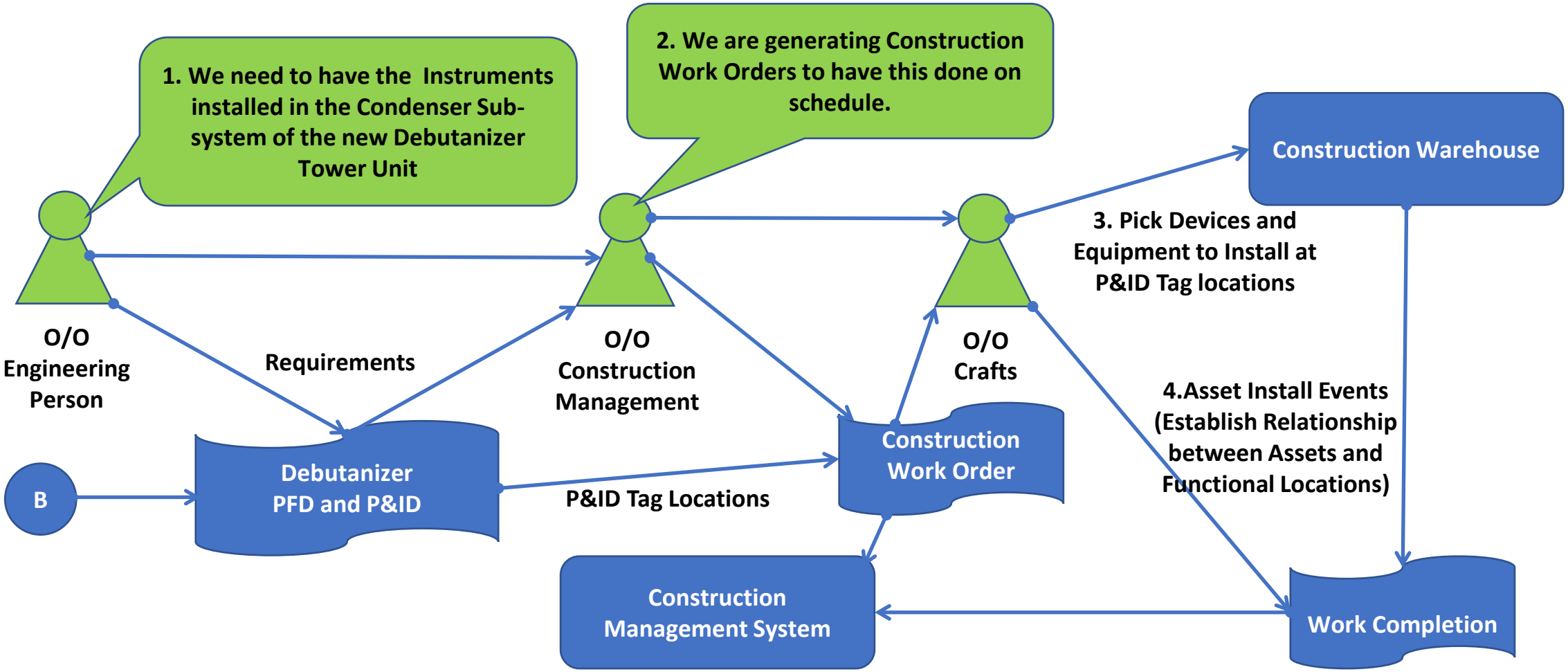
Cost code	Description			Note
	Cost Category (Level 2)	CC	RC or MC	
	Cost Group (Level 3)			
	Cost Sub-Group (Level 4)			
02.020	Foundations up to top of lowest floor slabs: 010 – excavation and disposal020 – lateral supports 030 – raft footings, pile caps, column bases, wall footings, strap beams,tie 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

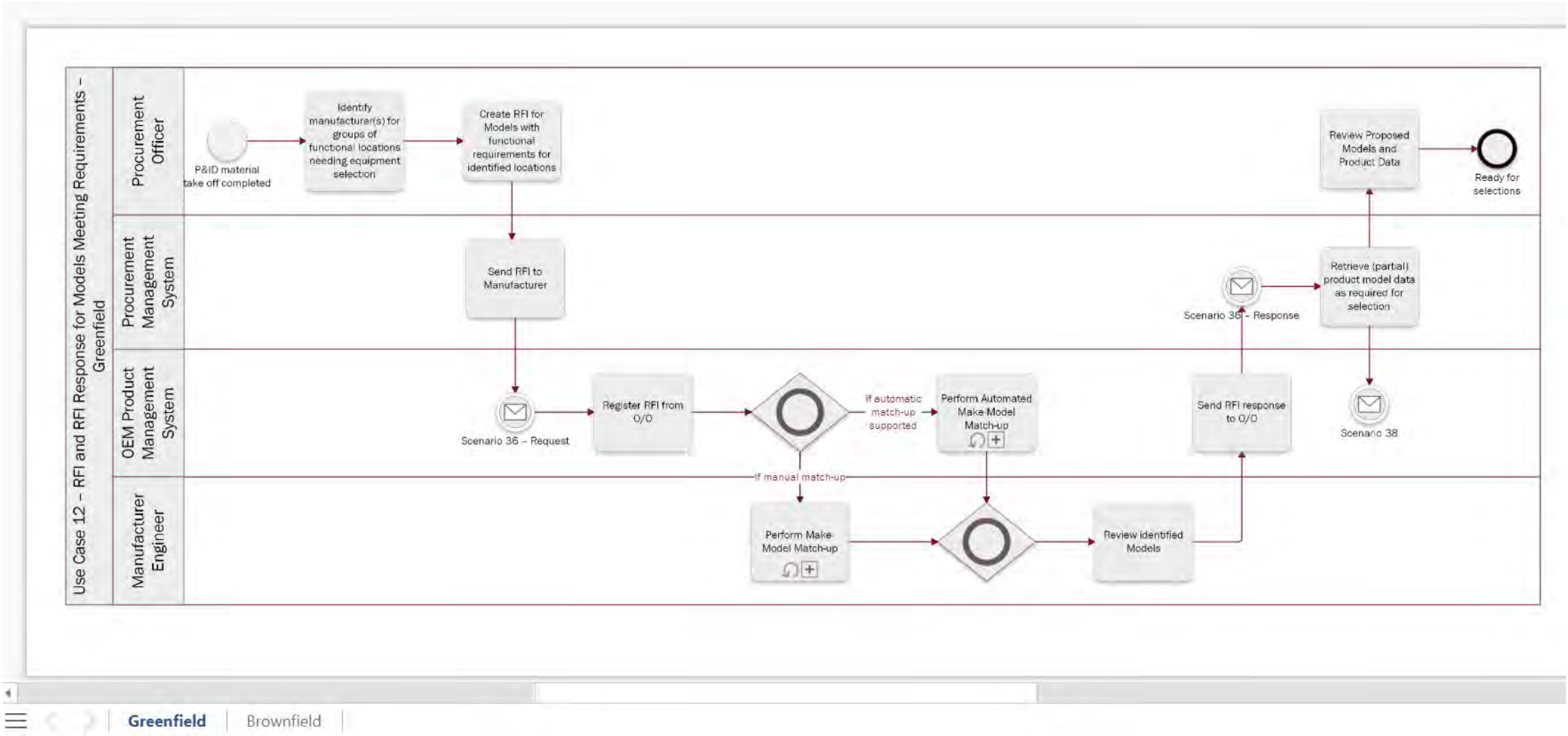
User Story Theme: **Cost Estimation**

	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

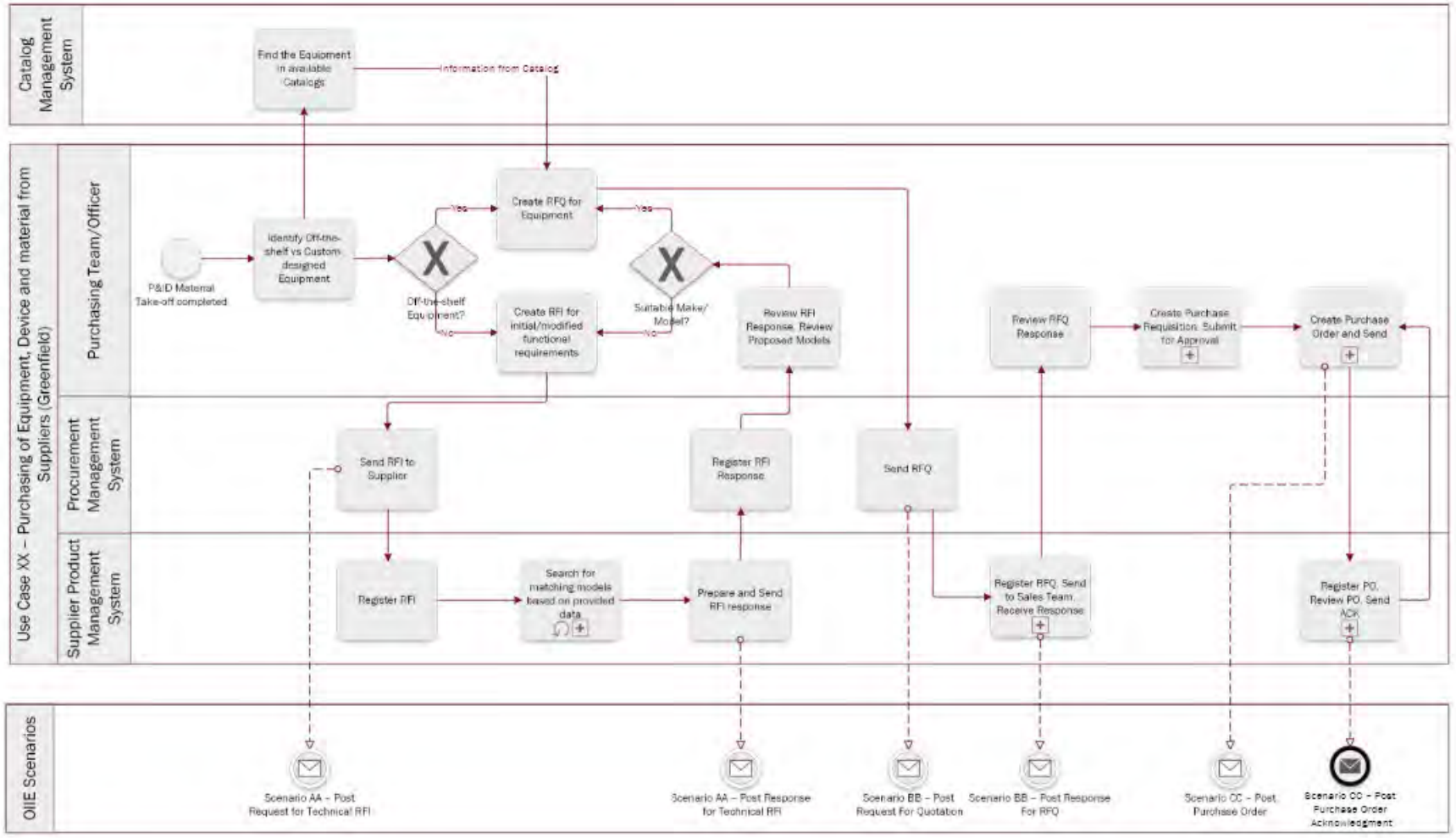

1. We need to have the Instruments installed in the Condenser Sub-system of the new Debutanizer Tower Unit
2. We are generating Construction Work Orders to have this done on schedule.
Construction Warehouse
3. Pick Devices and Equipment to Install at P&ID Tag locations
O/O Engineering Person
Requirements
O/O Construction Management
O/O Crafts
4.Asset Install Events (Establish Relationship between Assets and Functional Locations)
B
Debutanizer PFD and P&ID
P&ID Tag Locations
Construction Work Order
Construction Management System
Work Completion

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

RFI/RFI Response Purchasing Use Case - Greenfield



RFI/RFI Response Purchasing Use Case – Brown Field



Subteam 4- Asset Installation – Capital (Matt Selway)

Sub-Team Updates as of 7/20/21

Subteam 4- Asset Installation – Capital (Matt Selway)

- ✓ Have end to end workflow defined –
- ✓ Identified user stories across the flow
- ❑ Working through defining priorities –
- ❑ discussion underway on where to focus first

Tuesday – 8 am EST every other Tuesday

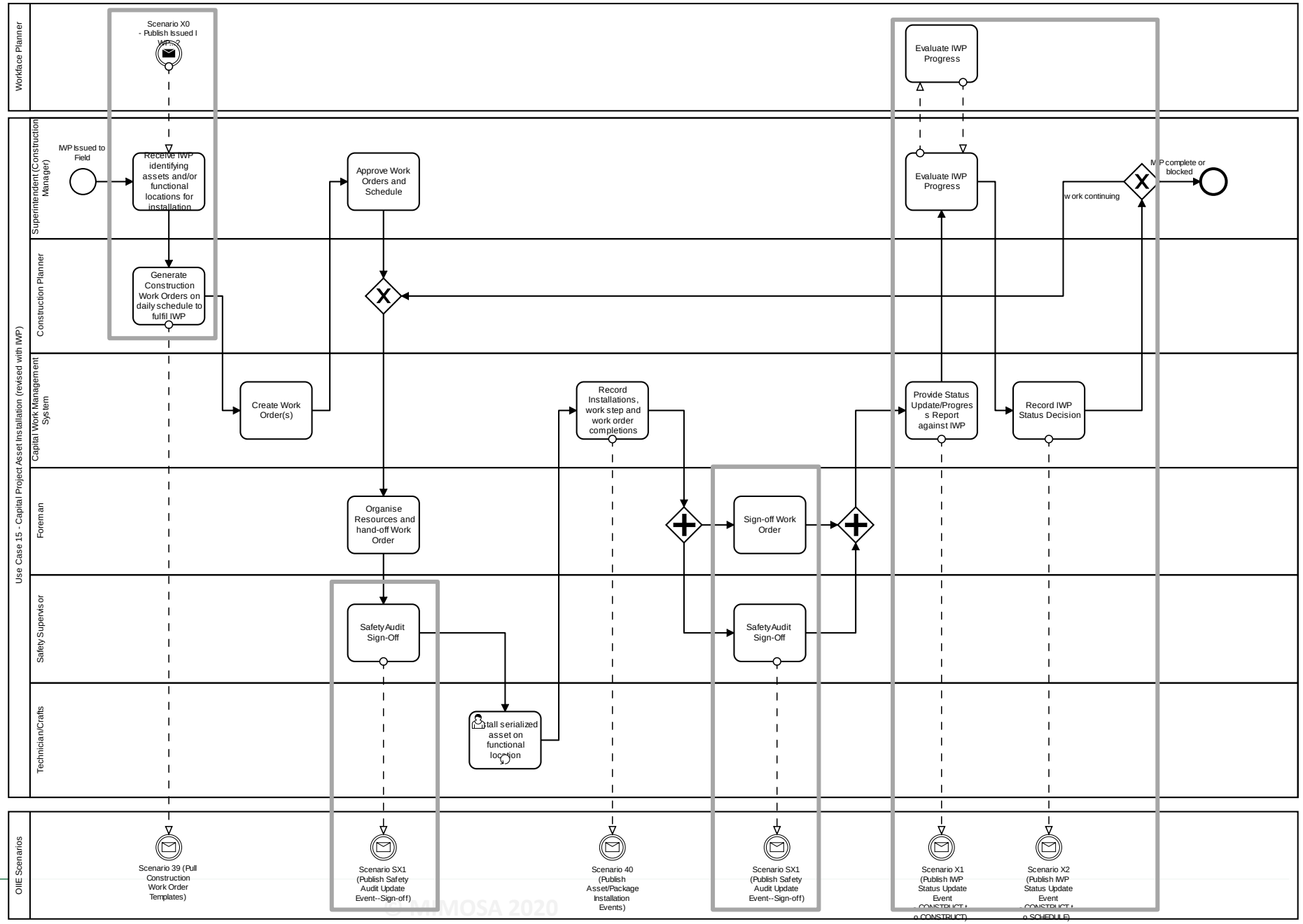
Back-End Sub Team Progress: Capital Asset Installation Use Case Update

Incorporating:

- IWP issuance as trigger;
- breakdown into daily work orders;
- scenarios for safety checks; and
- IWP evaluation and status updates

Investigating MIMOSA CCOM Work Requests and for representing IWPs in digital, system-system exchanges:

- conceptual mapping seems to match
- using existing models supports fast initial implementation of Use Case
- ongoing use may help move away from spreadsheets in CAPEX



Back-End Sub Team Progress: Next Steps

- Revise the generalised process further to capture additional important system-system interactions (a.k.a. OIIE Scenarios)
- Detail out the newly identified OIIE Scenarios with data requirements, interaction expectations, etc.:
  - Safety Audit Updates—Sign-off
  - IWP Status Updates (construction-to-construction systems)
  - IWP Status Updates (construction-to-scheduling/planning systems)

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

Open Industrial Interoperability Ecosystem (OIIE)™
OGI Pilot Phase 3.3 Overview

For OIIE Capital Projects Working Group

June 15, 2021

OIIE OGI Pilot Phase 3.3 and 3.4 Update

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
  - Adding specifications for other Key Components to fully support OIIE
  - Capturing requirements for Managed Industry Clusters **(Initial Example-Energy Clusters)**
  - **"Dog Fooding" OIIE with OIIE AU WG and FEnEx CRC**
  - **Adding new asset class example for general facilities/infrastructure (Street Lamp Assembly with LED Bulb)**
  - **Adding Use Case for PM Inspection Triggering of Work (with example app)**
  - **Expect completion October 2021**
  - **Phase 3.4 to follow starting in Nov/Dec 2021**
  - **Anticipate wrap-up end of October**
- **Phase 3.4 (2021-2022) – Planning for Next Phase (2021 - Q4 Start)**
  - **Prepare for Production Pilots-Generate Technical Report to be used as input for ISO 18101**
  - Cross-Sector alignment for Critical Infrastructure Risk Management
  - Shared Investment and Risk – Requirements from Members and Sponsors are Prioritized
  - Alignment with FEnEx CRC Interoperable Analytics Project povides matching R&D funds
  - Include more requirements established with OIIE Capital Projects WG, OIIE Australian WG, FEnEx CRC, CFIHOS, and CII

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

1. P&ID Creation and Export of Condenser Unit P&ID to Proteus XML Format (Worley)	2. Transform to CCOM XML Format (UniSA)	3. Greenfield RFI/RFI Response • RFI based on functional requirements (UniSA) • RFI Response, Models (Yokogawa)	4. Capital Project Asset Installation (UniSA)	5. (Simulated) Handover of As-Built Data to PdMA + SAP (add CFIHOS RDL based properties)	6. CBM—Collection of Measurement data and output of Advisory (PdMA)	7. Remove and Replace Maintenance Activity (UniSA)	8. Brownfield Information Remediation • RFI based on limited asset data (UniSA) • RFI Response, Model/Asset data (Yokogawa)
OIIE Use Case 1 (As-Designed)		**OIIE Use Case 12**	OIIE Use Case 15	OIIE Use Case 1	OIIE Use Cases 14, 7, 5 (CBM Acquisition, Triggering, and Resulting Maintenance)		**OIIE Use Case 12**

CFIHOS Capital Facilities Information HandOver Specification
MIMOSA
The OpenO&M Initiative

Planned Sprints

Sprint 0 Task	Status
2. CFIHOS RDL 1.4.1 Analysis done by MIMOSA	Awaiting CFIHOS review

Sprint #	Backlog Tasks			Task Short Description
Sprint 1 (June 2021)	1	4 9 10	3	1. Purpose of CFIHOS RDL for pilot 3. Review CFIHOS RDL based ISDD for Diff. Press Trans. 4. Generate CFIHOS RDL based ISDD for Motor 9. Extend OIIE Handover Use Case for CFIHOS ISDDs 10. Demo extended OIIE Use Case 1
Sprint 2 (July 2021)	7	6.1	8	6.1 ISBM 2.1 Specification update (AMQP) 7. New OIIE Use Case for Purchasing 8. Extend OIIE Use Case 15 with IWP
Sprint 3 (Aug 2021)	5	6.1	6.2	5. Generate JIP 33 based ISDD for LV Electric Motor 6.2 Service Directory 2.1 Specification update (Capabilities and Cluster)

NOTE: Backlog tasks 11, 12, 13 will be covered in future sprints.

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

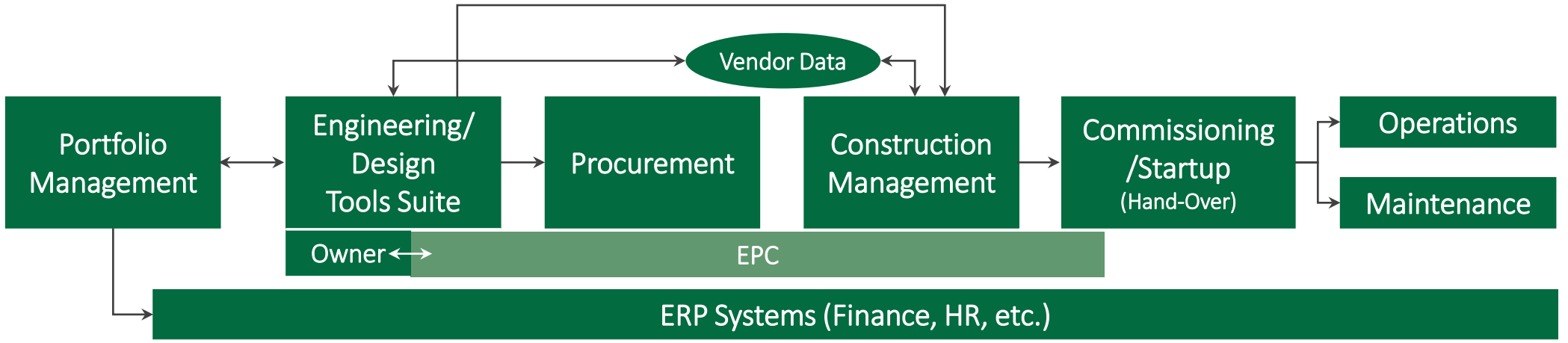
Sub-Team Updates as of 7/20/21

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

See following where $ and time are actually spent on Industry Projects and current industry average performance

Digitalization Framework

Project Improvement Requires a Value Case and End to End Focus



Key Support Systems

Document Management

Project Management + Project Controls (Estimating, Progressing Data Flow, Scheduling)

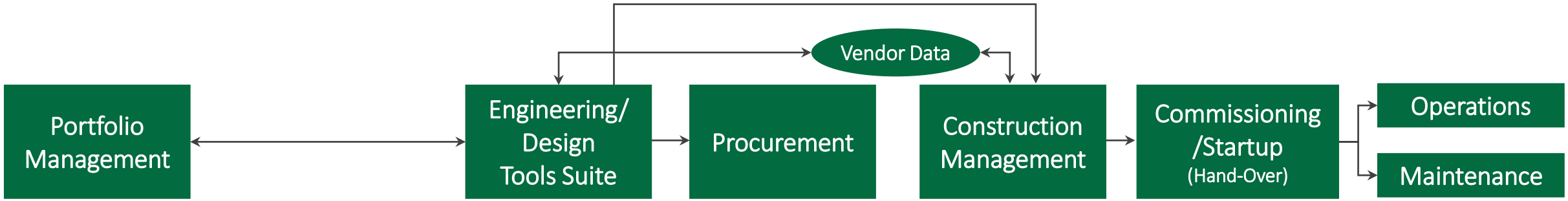
Data Management (Data Flow, Storage Data Flow, Quality Control)

Performance Metrics System (Input/Output Data flow, Quality Data Flow, Benchmarks)

Work Process Governance, Work Process Improvement, Lessons Learned

Digitalization – Where Is Your Value Case?

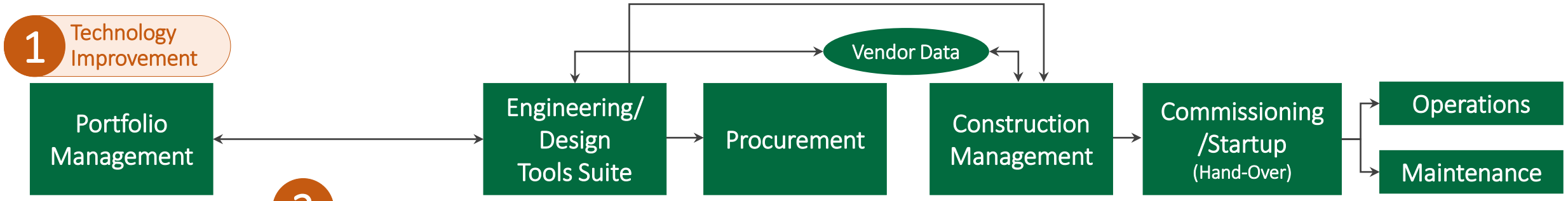
Example for a Typical Industry Average 100 M$ Project Spend



Picking the "Right" Project	ROI					
Cost	FEL 5% TIC	Engineering & PM 21% TIC Eng: 15% PM: 6%	Materials 39% TIC Equip: 22% Bulks: 17%	Construction 37% TIC Direct: 27% Indirect: 6% CM: 6%	Start Up 1%	Hand-off to O/M
Cost Growth From Estimate	3%	24%	Equip: 0% Bulks: 6%	Labor: 32% Indirects: 17% CM: 20%	SU: 12%	?
Speed Execution: 22 Months Cycle Time: 37 months	FEL 14 months	Engineering 14 months	Procurement 18 months	Construction 15 months	SU: 1 month	Hand-off to O/M ? Months
Schedule Slip Execution Slip: +8% Cycle Time Slip: +5%	+0%	+24%	+15%	+11%	SU: -15%	?

Digitalization – Where Is Your Value Case?

Example for 1B$/Year – Ten 100 M$ Projects



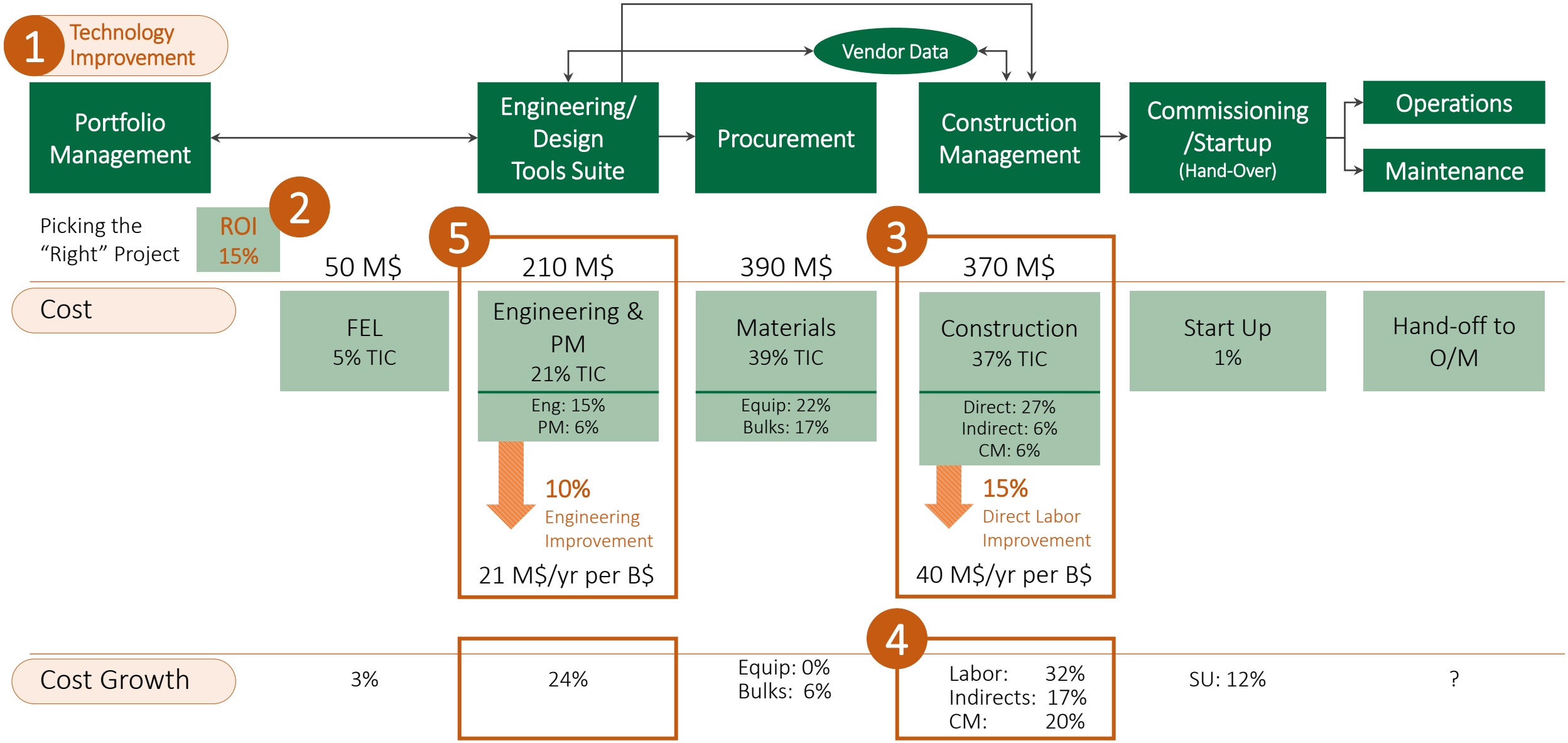
Picking the "Right" Project

2 ROI 15%

		50 M$	210 M$	390 M$	370 M$		
Cost		FEL 5% TIC	Engineering & PM 21% TIC	Materials 39% TIC	Construction 37% TIC	Start Up 1%	Hand-off to O/M
			Eng: 15% PM: 6%	Equip: 22% Bulks: 17%	Direct: 27% Indirect: 6% CM: 6%		
Cost Growth		3%	24%	Equip: 0% Bulks: 6%	Labor: 32% Indirects: 17% CM: 20%	SU: 12%	?
Speed Execution: 22 Months Cycle Time: 37 months		FEL 14 months	Engineering 14 months	Procurement 18 months	Construction 15 months	Start Up: 1 month	Hand-off to O/M ? Months
Schedule Slip Execution Slip: +8% Cycle Time Slip: +5%		+0%	+24%	+15%	+11%	SU: -15%	?

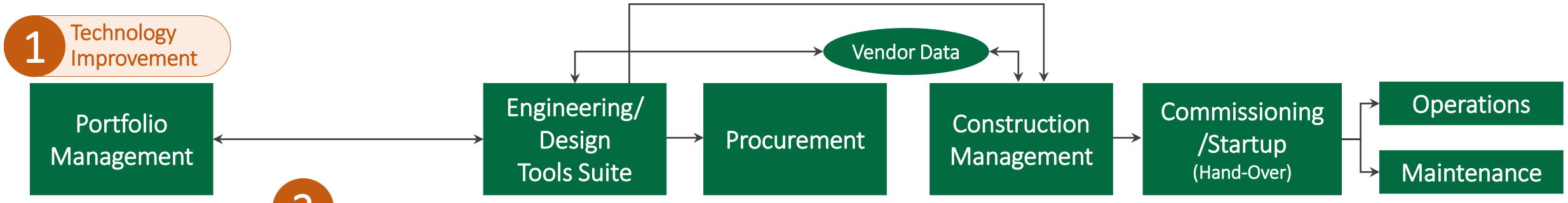
Digitalization – Where Is Your Value Case?

Example for 1B$/Year – Ten 100 M$ Projects



Digitalization – Where Is Your Value Case?

Example for Typical 100 M$ Project Spend



Picking the "Right" Project

2 ROI 55%

Cost	FEL 5% TIC	Engineering & PM 21% TIC Eng: 15% PM: 6%	Materials 39% TIC Equip: 22% Bulks: 17%	Construction 37% TIC Direct: 27% Indirect: 6% CM: 6%	Start Up 1%	Hand-off to O/M
Cost Growth	3%	24%	Equip: 0% Bulks: 6%	Labor: 32% Indirects: 17% CM: 20%	SU: 12%	?
3 Speed Execution: 22 Months Cycle Time: 37 months	FEL 14 months	Engineering 14 months	Procurement 18 months	Construction 15 months	Start Up: 1 month	Hand-off to O/M ? Months
Schedule Slip Execution Slip: +8% Cycle Time Slip: +5%	+0%	+24%	+15%	+11%	SU: -15%	?

Check-

Access to MIMOSA TEAMS work area –

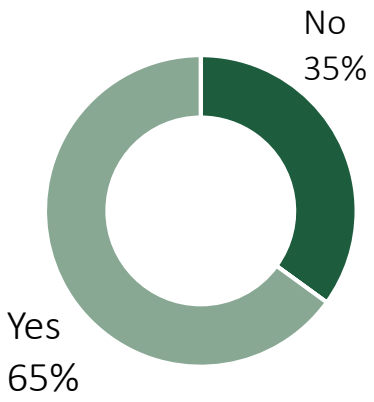
Anyone needing an invitation contact Matt Selway:

Matt.Selway@my.unisa.edu.au

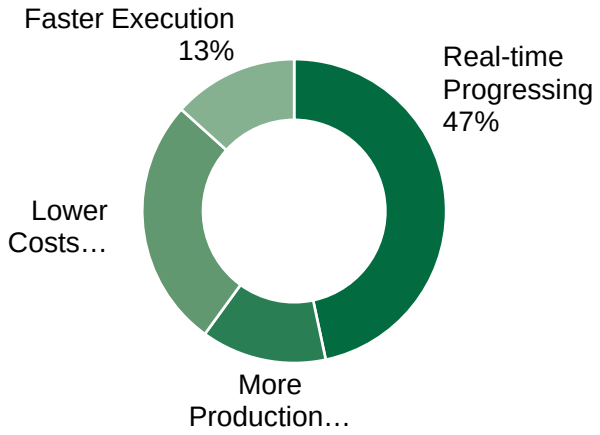
Key Issues

Capital Projects Industry – Digitalization Status

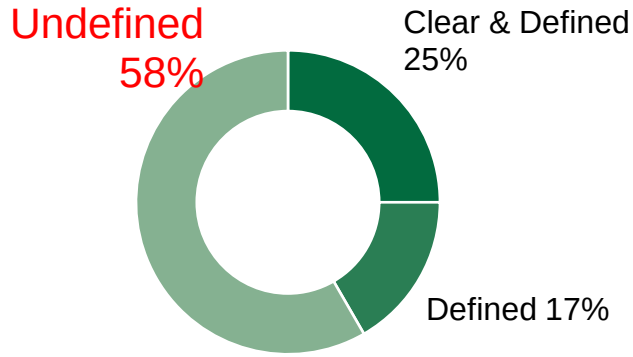
Digitalization Project Underway?



What Problem Are We Trying to Solve?



Are Digitalization Objectives Clear?



Clear: Objective has direct link toward business goals

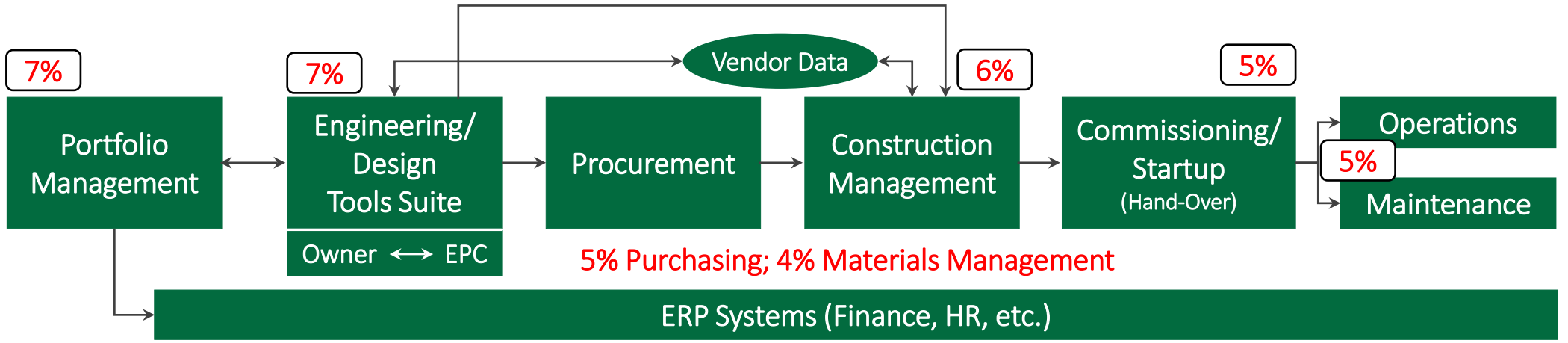
Defined: Outlined objective, but indirect links to business objectives

Undefined: No specific objectives yet identified

We're struggling to get our Digitalization efforts focused and progressing.

We are fragmented on our digitalization focus…

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



Key Support Systems

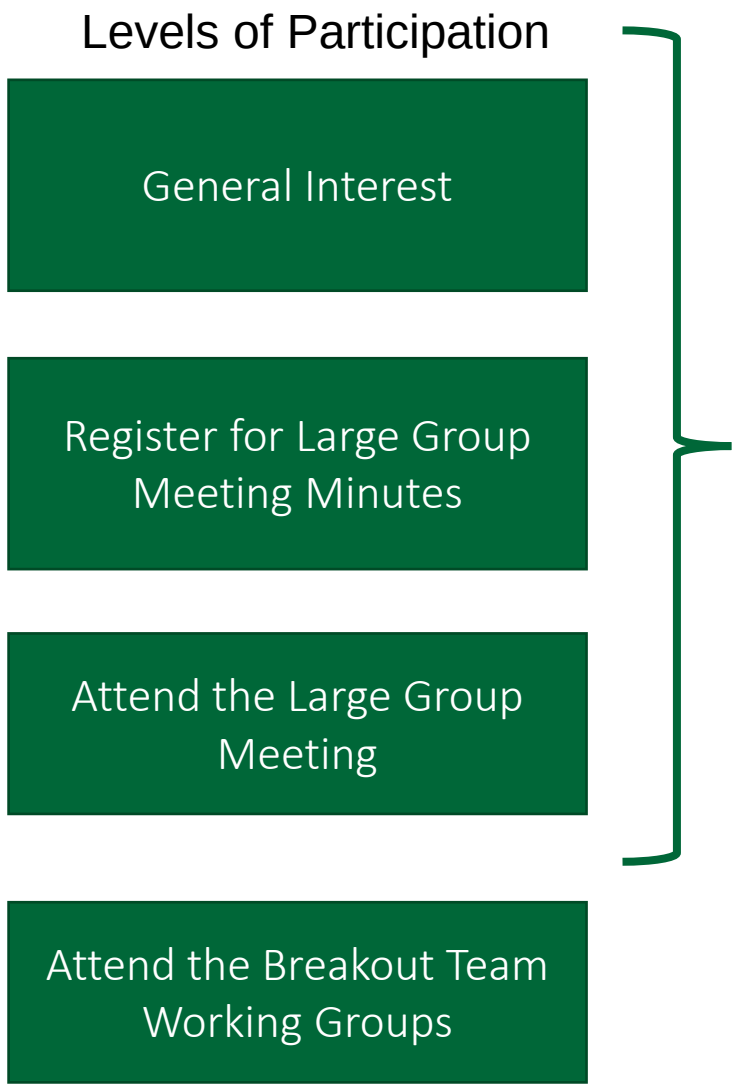
8% Document Management	8% Project Controls	7% Performance Metric Systems	4% ERP Systems
7% Project Management	9% Data Management	7% Data Exchange/ Interfaces	5% Digital Twins

Where / What impact ?

Where in the project lifecycle are you trying to make an impact? Drive value?	What value are you trying to achieve?

Next Steps

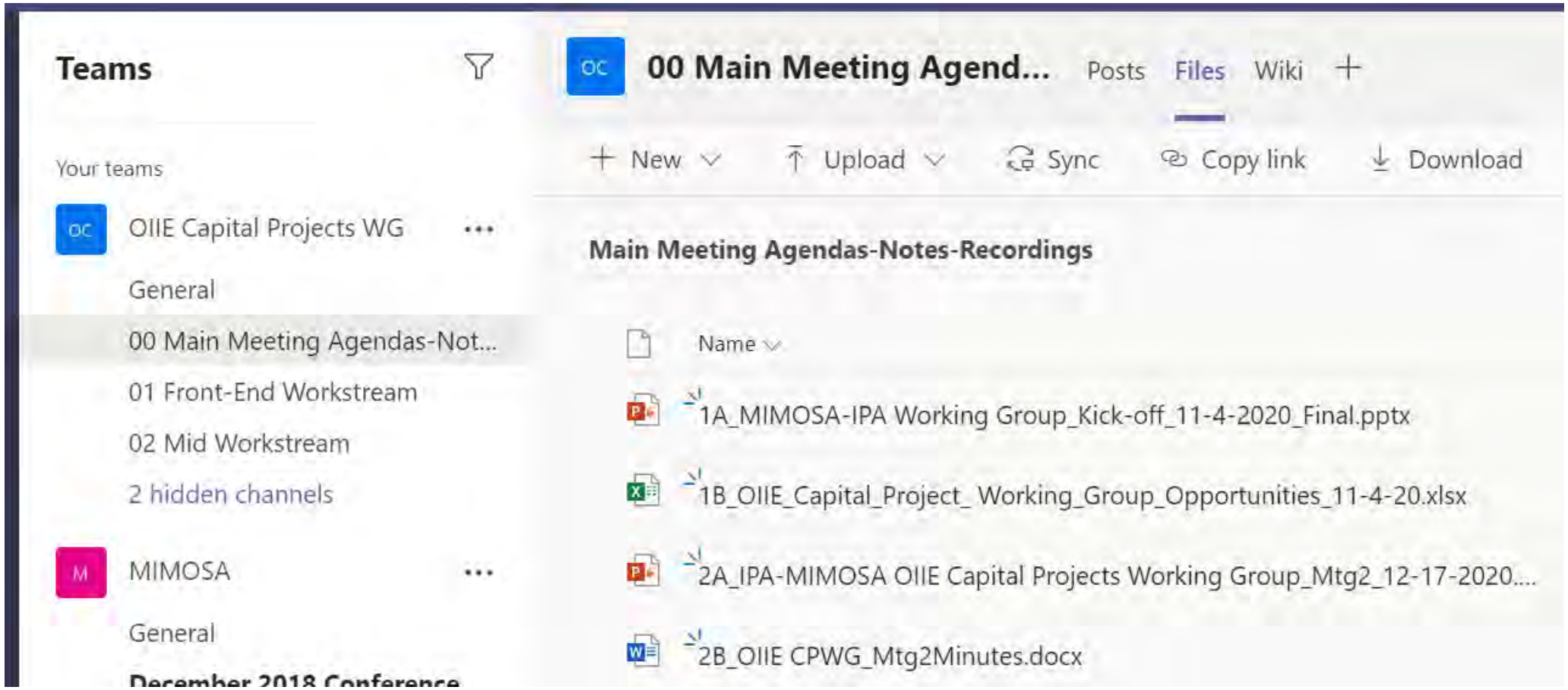
IPA – MIMOSA OIIE CPWG



You'll be invited to join the TEAMS site.

You can then sign up for participation in one Or more of the Break-out Groups

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



Gathering Input on 3 Use cases

Sub-Teams-

Cost Estimating – Will restart meetings in September

RFI and Asset Installation Teams – meeting every other Tuesday

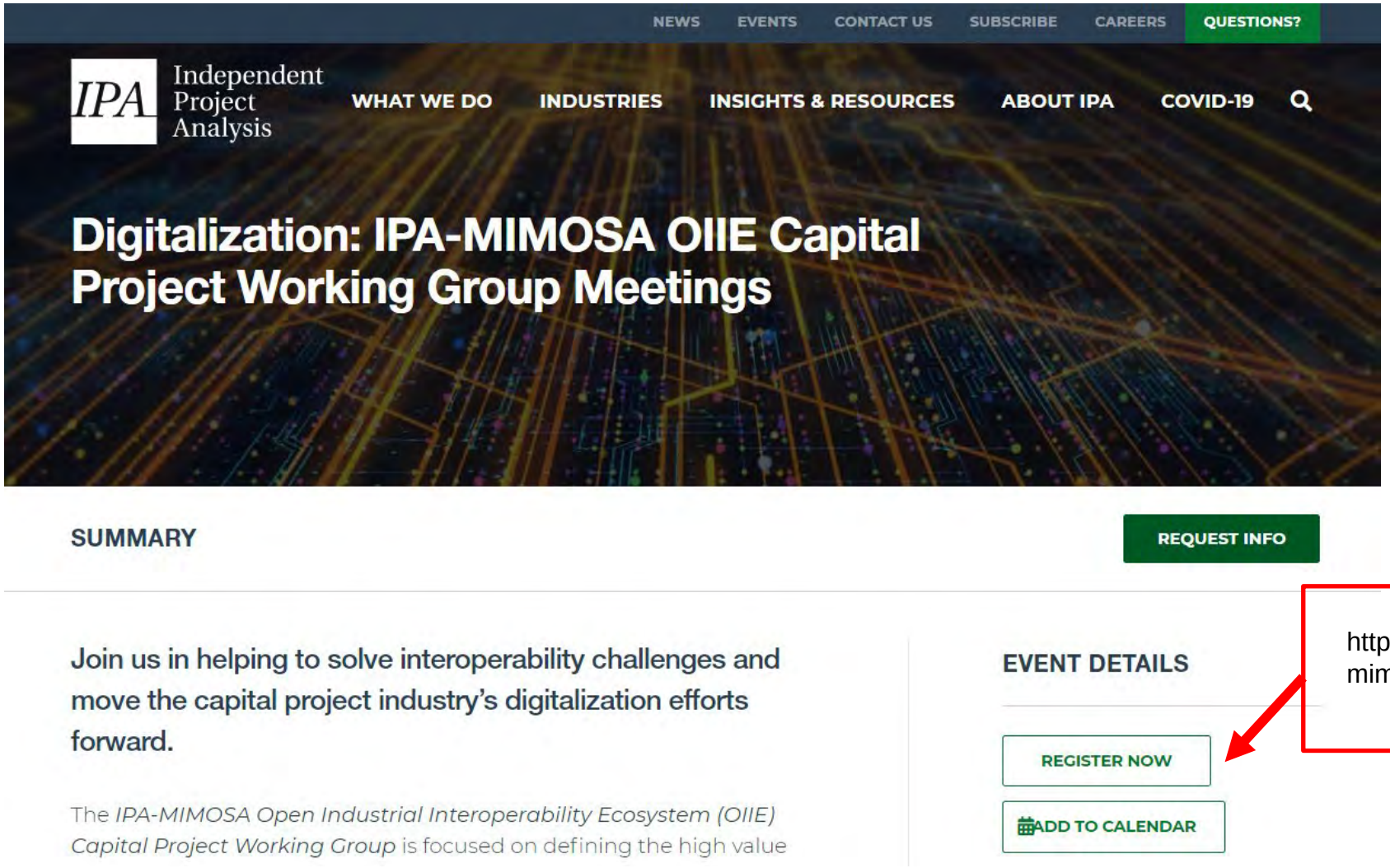
8 to 9 am EDST –

Break Out Group	Facilitator	Meeting Link
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

Next Main (Large)Group May Meeting – September 21, 2021 8 – 9 am EDST

NOTE: Time Change – Starting one hour later

New Member Registration



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

SM

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

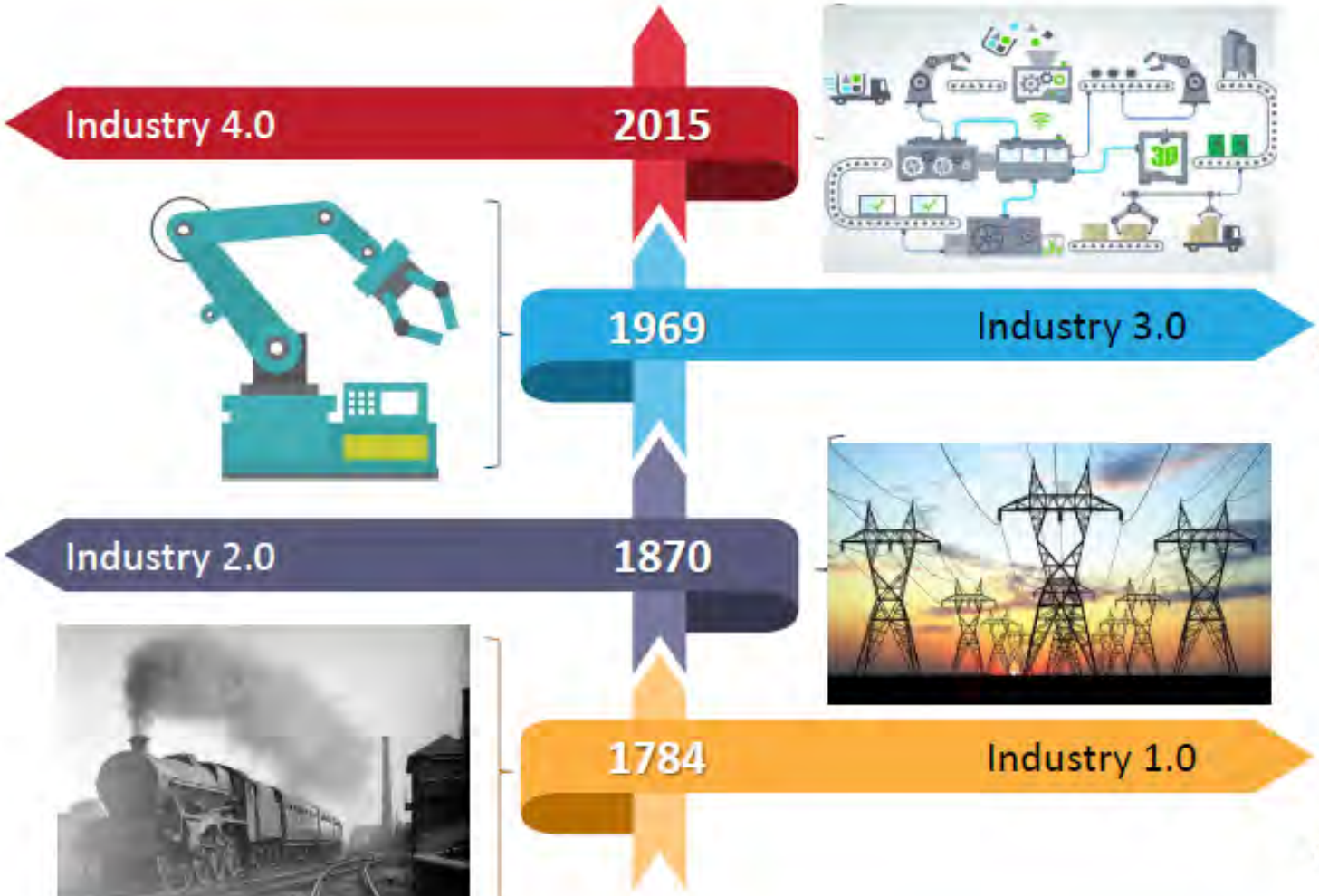
d) The Main Team will meet once a month on the 3rd Tuesday from 7 to 8 am EDST to report on progress, share industry knowledge, set priorities and continue the knowledge sharing and dialog.

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

THANK YOU

Industrial Revolution Phases and Common Principals

Gaining Business Efficiency from Modularity, Interoperability and Standardization



- **In Industry 4.0**
  - Supply chains need to be fully integrated across many industries
  - Sharing industrial internet and AI
  - Modular, standardized & interoperating **industrial digital ecosystems**
- **All industrial revolution phases** have included various aspects of modularity, interoperability & standardization enabling businesses to specialize, scale and cooperate for **major business efficiency gains**
  - Standard gauge railroads, screw thread
  - Electrical/Utility standards
  - Mechanical standards
- **Intermodal Transport** provides a useful physical analogy for what we are now doing in the digital world

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.]