

Independent Project Analysis

### IPA-MIMOSA OIIE Capital Projects Working Group Meeting #2

Deborah J. McNeil (Independent Project Analysis, Inc.) 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**

IPA



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

Independent Project Analysis (IPA) and <u>MIMOSA</u> (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., <u>interoperability</u> 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**

Cross Project Activities	Capital Projects	Complete/ Commission/ Startup	Operate/ Maintain	Decommission/ Dispose			
	Opportunistic Hande of Structured Digital	over Assets	Sustained Life-cycle Digital Asset Ma	anagement			
	OIIE Use Case 1: Information handovers	to O&M					
	OIIE Us	e Case 2: Recurring	g Engineering Updates to O & M				
		OIIE Use Case 3: Field Changes to Plant/Facility engineering					
OIIE Use Ca	se 4: Enterprise Product Data Library Mana	gement (tied to IS	DDs)				
	OIIE Use Case 5: Ass	set Removal/Instal	lation Updates				
			OIIE Use Case 6: Preventive Maintenance Triggering				
		OIIE Use Case 7: Condition Based Maintenance Triggeri					
		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 Ca	se 11: Enterprise RDL Management						
OIIE Use Ca	se 12: RFI and RFI Response (Models Meeti	ng Requirements a	nd Model Information, Green and Brown Fi	eld)			
			OIIE Use Case 13: Lockout/Tagout				
			OIIE Use Case 14: CBM Data Acquisition				
7 IPA CONFIDEN	OIIE Use Case 15: Capital Project Asset Insta	all					

### Build on Success from OIIE OGI Pilot Phase 3.1



### **Standard OIIE OGI Use Case Methodology**



#### Using Chat – Biggest Opportunity / Challenge in each area



IPA

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

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

cess Engineering/ Conceptual	Detailed Design	Procurement	Con	struction	Commissioning	g and	Hand-ov	/er	Operate & N
sign/ Simulation	▼	▼	▼	<b>•</b>	Start-up	<b>•</b>			
					•				
			Process Engineering/ Conceptual Design/ Simulation	Detailed Design	Procurement	Construction	Commissioning and Start-up	Hand-over	Operate & Maintain
			Al including HAZOP/HAZID, Contract Management etc	<ul> <li>an integrated data management flow that clearly identifies who is responsible for what data at what point at an attribute level</li> </ul>	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 verificatio of construction progress	n 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 then n this phase	n As built datasheets
			Defining and committing on requirements (over differ functions Business/operations/projects/etc)	ent Data aggregation	Contractor/Owner procurement responsibility	as built information	commissioning sequence and completion status	As built - PFD, P&ID, 3D	As built P&IDs
$O_{1}$ $(a = 100 O_{1})$	··· - ···· ··· ··· ··· · · · · · · · ·		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
Uver i su ur	) portunities for H	mproved	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
Interoperap	llity within the ca	IDITAL	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
nicer operaio			Plan activity data with previous experience of cost, tin resource and associated risks from learning.	ne, 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
Project work	c process were id	entified.	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 teamvisibility to the stakeholders for information flow in both directions.	Equipment list, line list, especially for acquired assets y	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 activit	Digital Thread / digital twin , y
			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	r 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 deliverabl and communicated to other disciplines	es 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 sh earlier versus what needs to be finalized before pushi downstream	Ared 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 not have a clean MEB. Having multiple tools to manaj cases makes it very challenging to have a consistent d set to integrate downstream	do MTO data consolidation 3e ata	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 equipmer supplier, owner, etc	Networked data, consistent, connected and common basis at	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)	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
				because the EC in charge of this phase is unable to recover all our data.					tuture enhancements and for future projects.
				rackage equipment data		pre commissioning	model and P&ID markups	warenouse plan	Druge Subara Ambaia
				progress visibility	1	quantity surveying	oaning	+	rower system Analysis

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Verifying As-Built data for completeness and correctness

out physical field verification

of TAG to Equipment Serial Number

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heir daily work and identifying that consistently across different sites and

nent of deliverables ... including contra

Translating design data to reliability models and future plans for CSU, operations and maintenance digital twins Vender data, material and equipment lists, data flow through the contractors and owners seamlessly

are Part Da

fendor and Contractor data fendor data... Equipment, piping. a



### 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**





### **OIIE Case Studies and Enabling Activities**





## User Story Example: Capital Project Equipment/Device Installation





#### We want to capture:



#### Who are the actors or beneficiaries?





What are the tasks or goals?





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





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







## **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>].



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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 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.
- 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.



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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.

#### at P8 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**







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





Front-End - Cost estimating group 1

Front-End – Cost estimating group 2

Middle - RFI/ RFI Response (Greenfield project)

Back end - Capital Project Asset Installation



#### 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 (<u>atjohn@comcast.net</u>) 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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