

# Open Industrial Interoperability Ecosystem (OIIE) and ISO 18101 Standards-based Interoperability

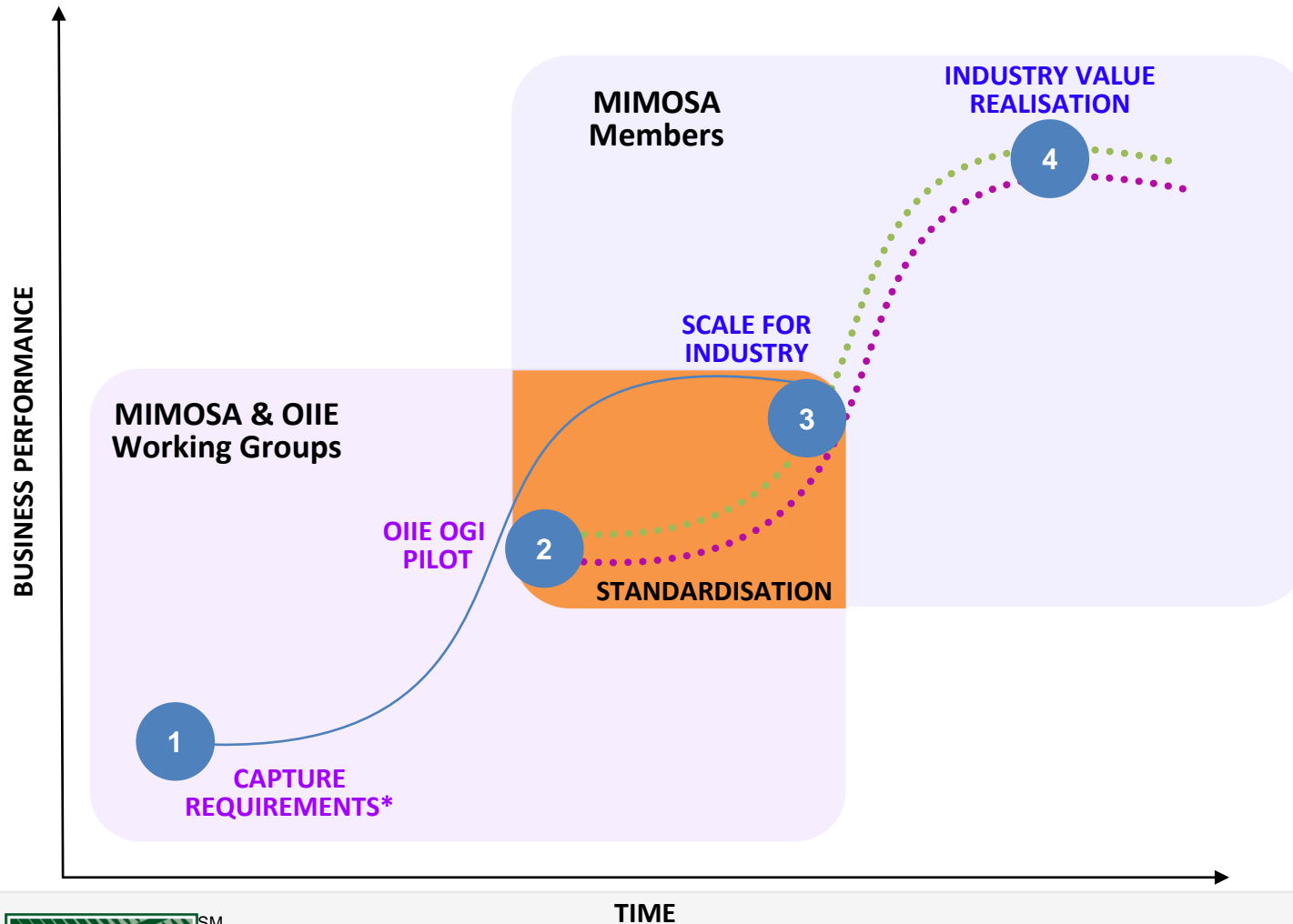
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MIMOSA Open Meeting

# What is the OIIE?

- Open Industrial Interoperability Ecosystem™
- OIIE™ Specification builds on SDO cooperation in the OpenO&M Initiative—several iterations across ~16 years
- Framework and architecture for defining and describing standardised and standards-based ways for how systems should interoperate
  - Supports Digital Transformation, Supplier-neutral solutions, and enable Plug ‘n Play Interoperability (COTS & Open Source)
- Began with focus on O&M since maturity in Enterprise IT and Automation & Control lead to standards development
- Now extending use of those standards to earlier phases of the lifecycle, i.e., supporting **digital transformation** in Capital Projects
  - developing **Digital Twins** from early phases for complete **Asset Lifecycle Management**
- International standardisation pathway through ISO 18101

# THE OIIE INTEROPERABILITY PROGRAM IS THE PRIMARY PROCESS TO DRIVE INDUSTRY DIGITAL TRANSFORMATION



- 1 Capture Industry Requirements**  
 Process of capturing industry user stories and prioritizing them for the OIIE OGI Pilot
- 2 OIIE OGI Pilot**
  - Develop **prototype OIIE use cases** and associated software
  - Validate use cases and **software** in industry pilot
  - Publish version managed **standards** and specifications (use cases, scenarios, events...)
- 3 Scale for Industry**  
 Industry participants **build supported implementations** of OIIE elements for industry use in OIIE systems of systems
- 4 Industry Value Realization**  
 Industry participants assemble their own interoperating OIIE systems of systems using intranets and extranets

\* Industry requirements defined. Next step to validate the client specific requirements.

# OIIE R&D Process: How to Solve the Problem?

## (Industry Digital Transformation)

**Identify** useful existing standards and standardization efforts

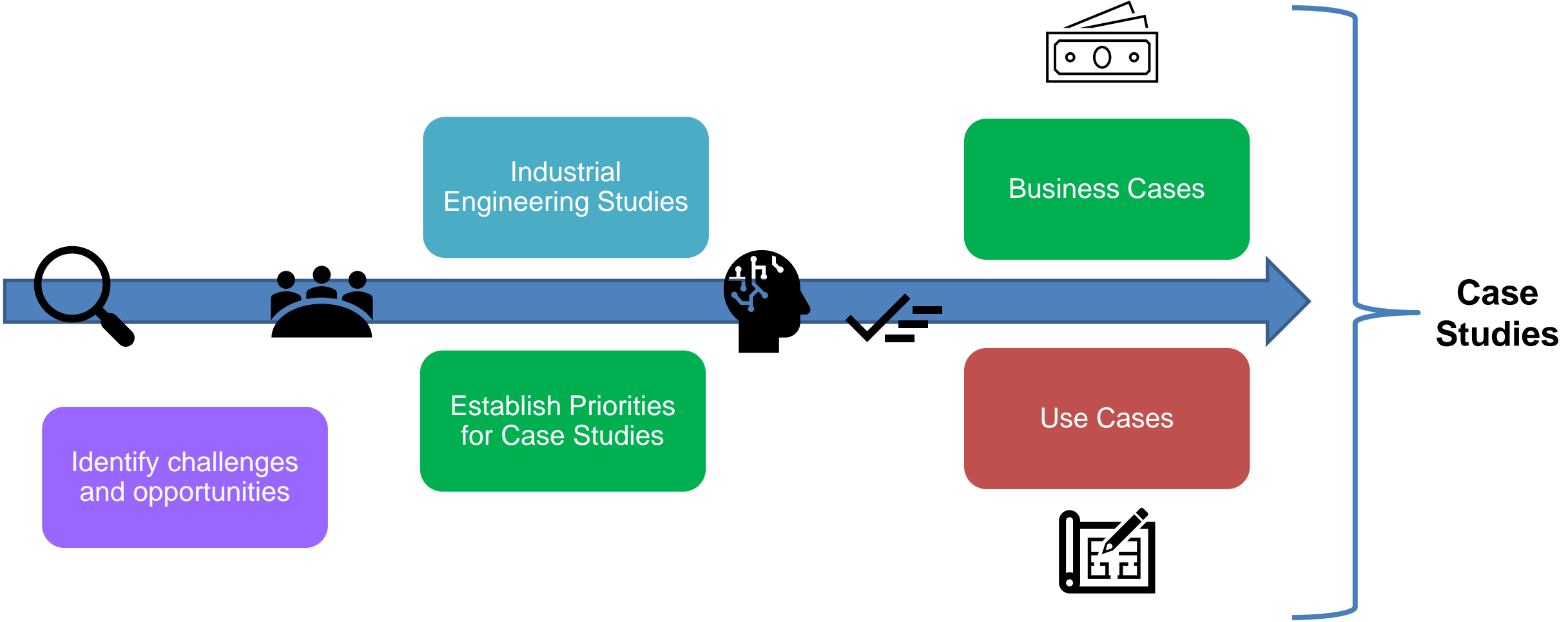
Collaboratively **align** efforts for efficient business value delivery  
Use Australian OIIE™ Interoperability Laboratory for all core R&D/validation functions  
Use FEnEx CRC wherever possible to gain leverage on shared costs

**Develop** using supplier-neutral interoperability specifications and processes  
**Open Industrial Digital Ecosystem (OIIE) and ISO 18101, OIIE Use Cases, OpenO&M ISBM**

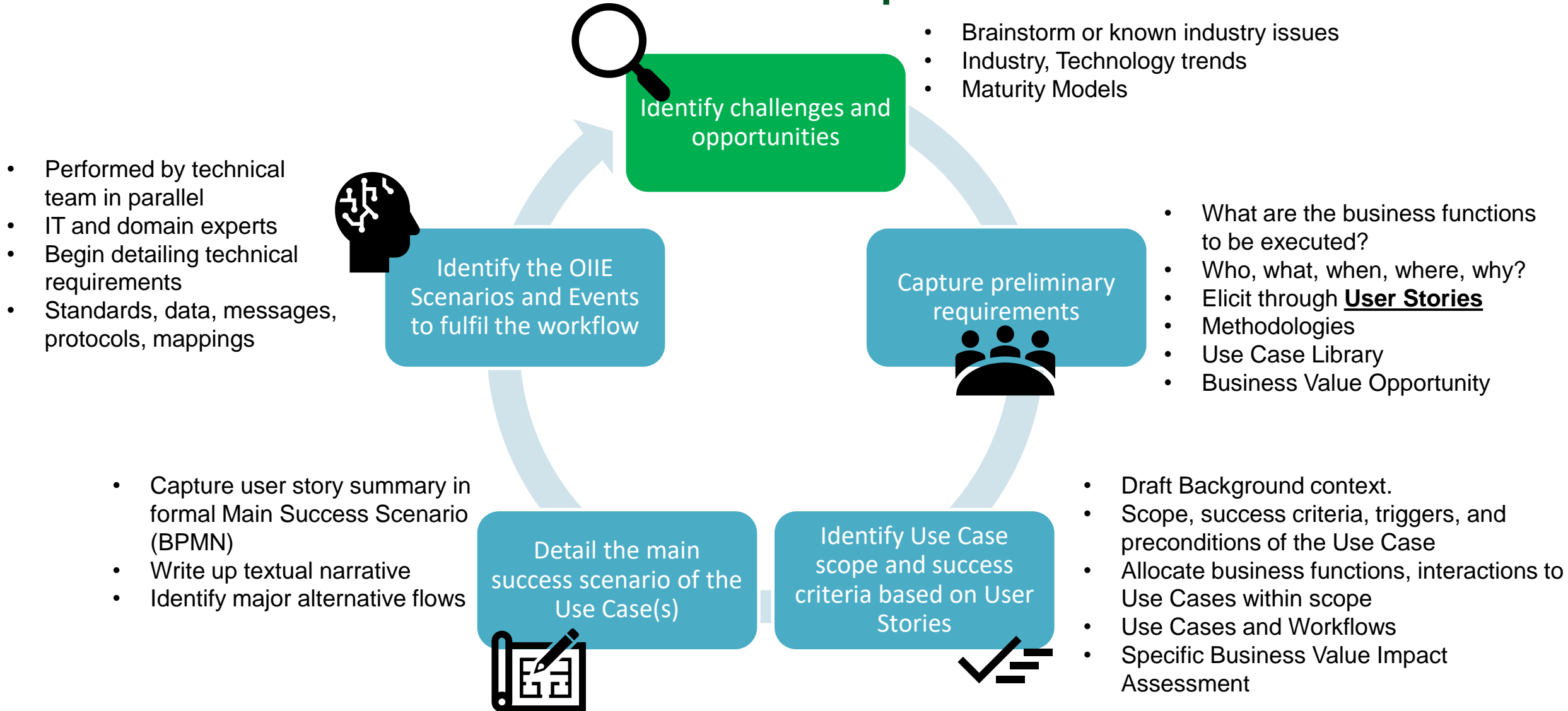
**Validate** in an industry pilot environment with shared costs/risks  
**OIIE OGI Pilot, OIIE Conformance Testing**

**Publish** industry standards and specifications.  
Use Process in ISO 18101 to document ISO 18101 parts based on OIIE OGI Pilot

# OIE Case Studies and Enabling Activities



# OIIE Use Case Development Process







# Collaborations

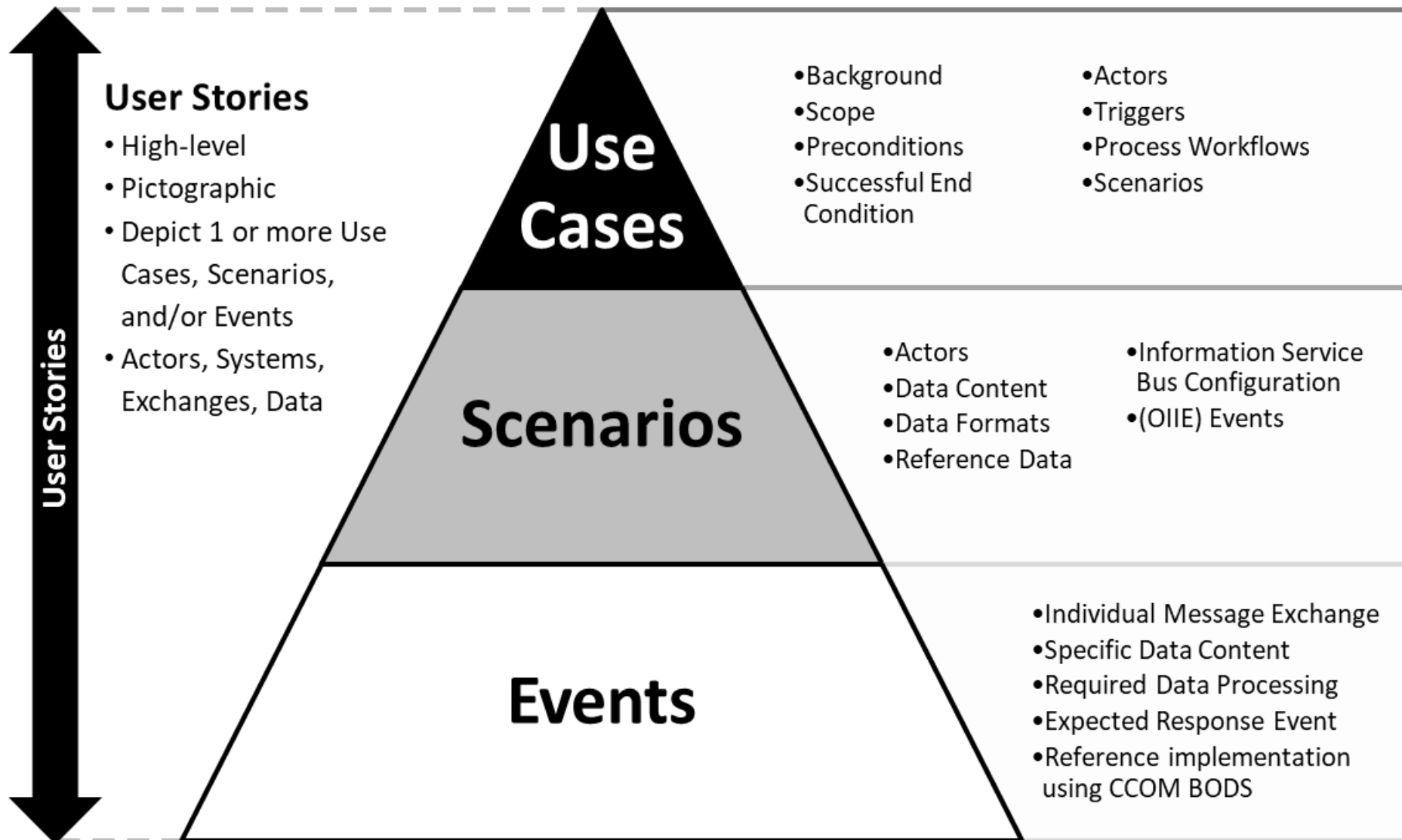
- **OIIE Australia Working Group**
  - NERA Sponsored
  - ISO mirror committee process
  - Webinars held in April 2020
- **OIIE Capital Project Working Group**
  - led by IPA
  - Informative webinar in Nov, followed by breakout group discussions in Dec 2020
  - Aim to identify and prioritise OIIE Use Cases for Capital Projects
- **OIIE O&M Working Group, OpenO&M Initiative (with ISA, MESA, OPC, OAGi)**
  - Overall collaboration on the OIIE with special focus on ISBM
  - ISA leading Operations Management Stream, ISA Datasheets for ISDDs
- **CII/MIMOSA Interoperability JWG**
  - Aims to develop joint OIIE use cases based requirements developed by CII
  - Initially focused on Advanced Working Package
- **IOGP CFIHOS/MIMOSA Joint Working Group**
  - Use of OIIE/ISO 18101 as preferred interoperability/digitalization framework for CFIHOS RDL
  - May help coordinate OIIE Use Case Development for related industry sectors



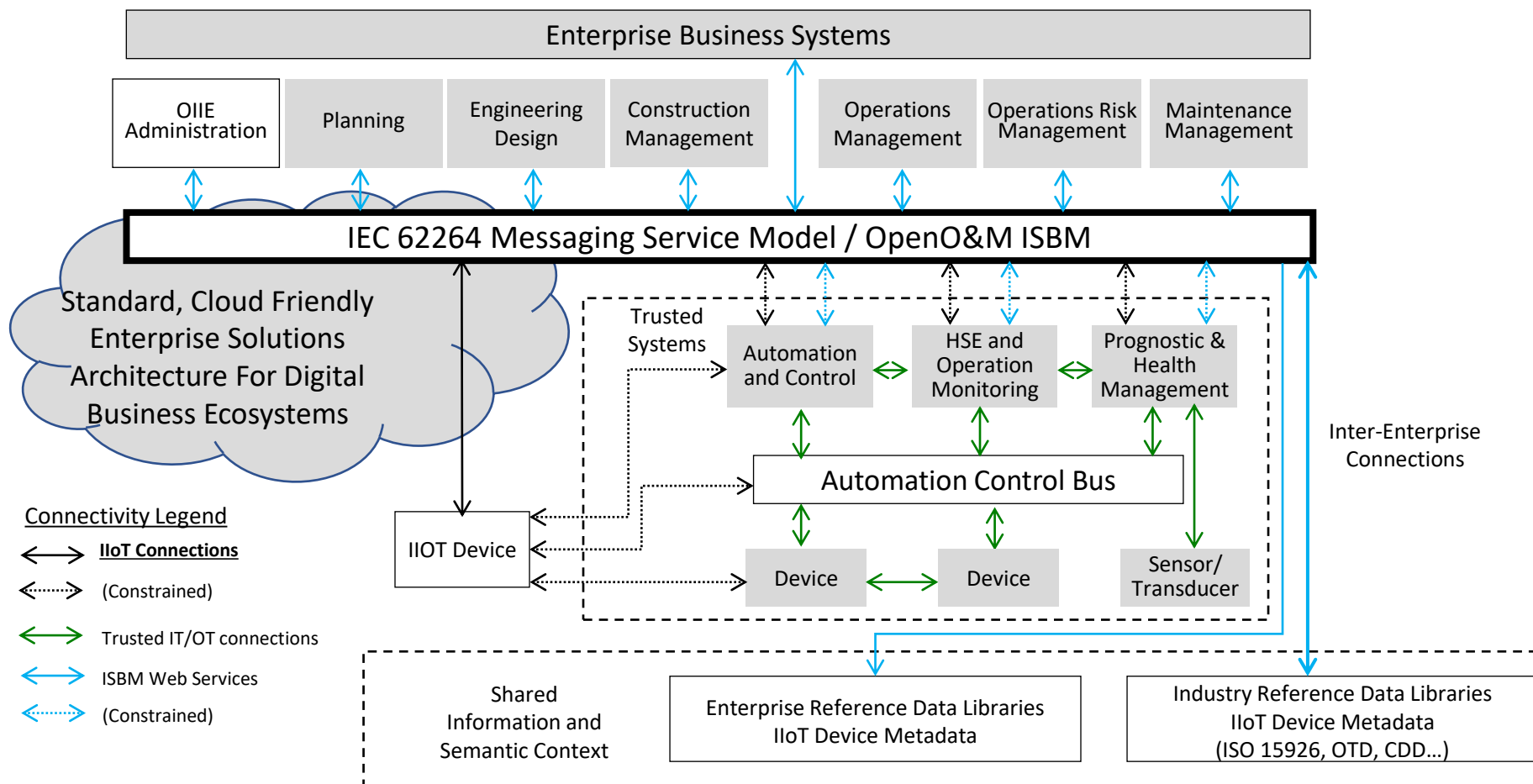
# Partnered OIIE Use Case Development

- **Advanced Working Packaging (AWP) Use Cases** with CII/MIMOSA JWG
  - Started work on AWP Master Index
  - Other high priority digital threads - 3D Modeling, Equipment Design, Project Schedule
- **Capital Project Use Cases:** with IPA/OIIE Capital Projects Working Group
  - Initial requirements gathered for the following 3 areas to be refined and expanded:
    - Cost estimation
    - RFI/ RFI response for Greenfield Projects (including RFP)
    - Capital Project Asset Installation
- **Procurement/Purchasing Use Cases** for Equipment packages: with IOGP JIP 36/CFIHOS
  - ISDDs for components and whole package
- **Use Cases for Analytics** in Energy sector: with Asset Institute and Synengco under FEnEx CRC

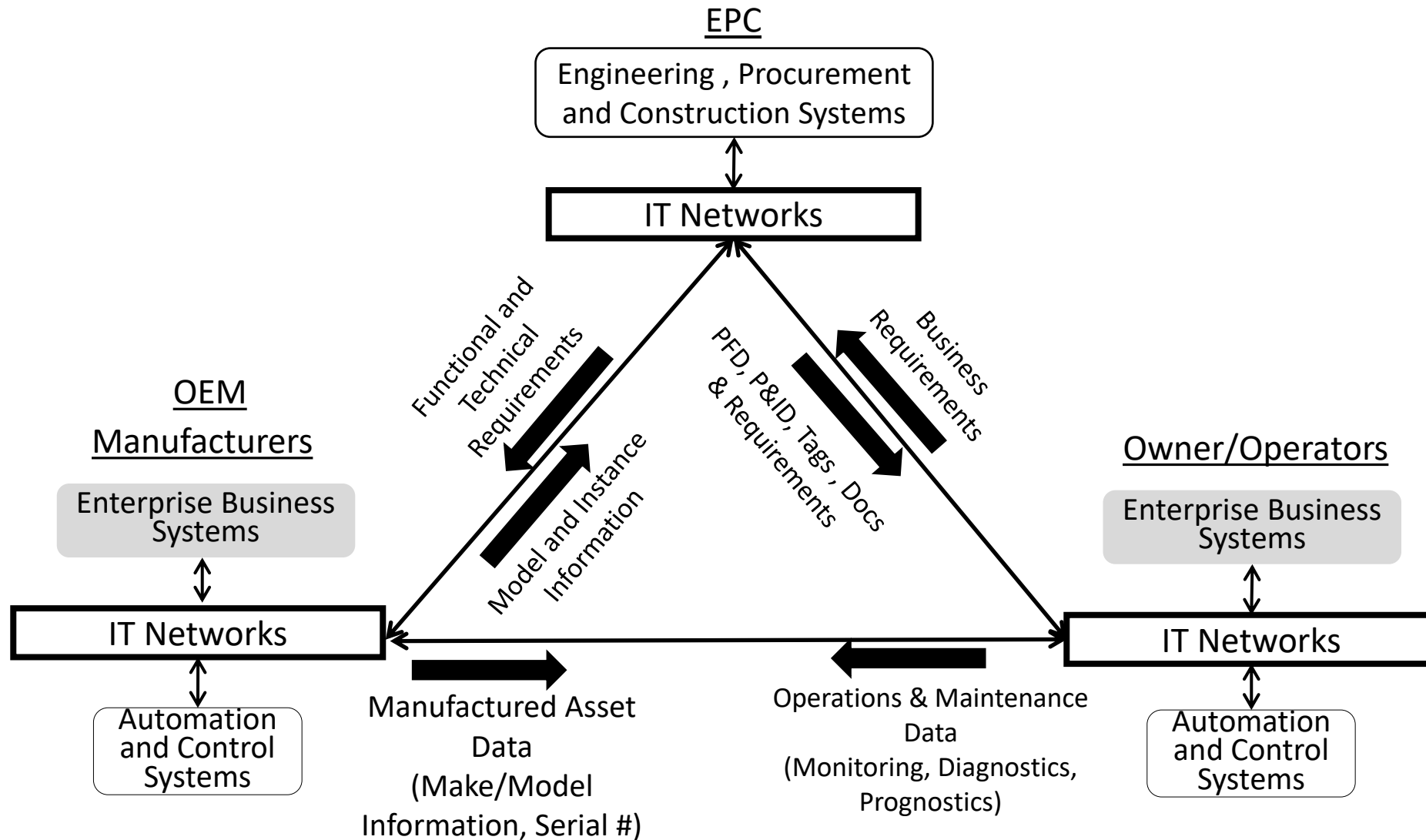
# OIIE Use Case Architecture - 1



# Intra-Enterprise OIIE Digital Ecosystem



# Inter-Enterprise OIIE Digital Ecosystem

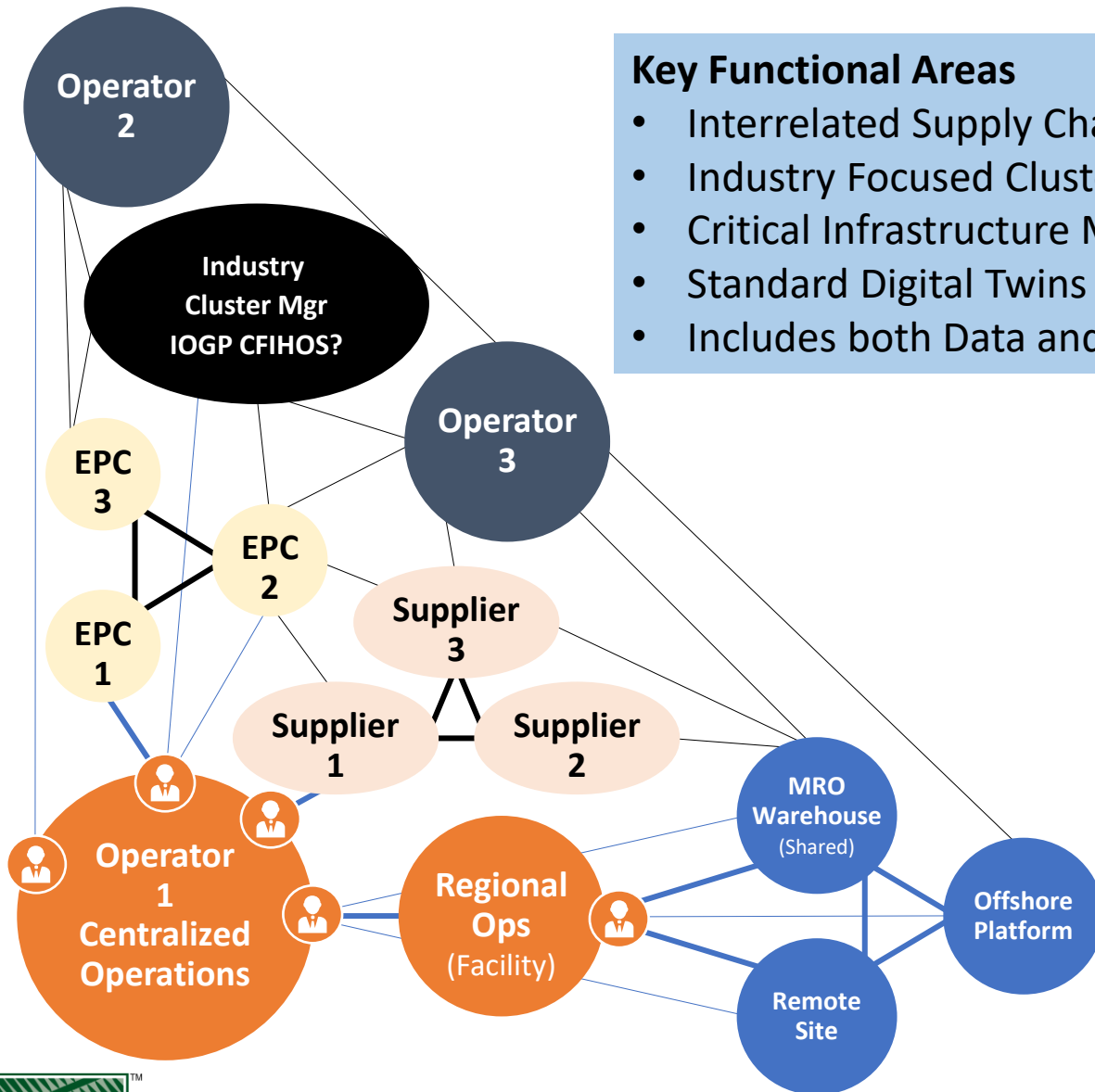


# OIIE and ISO 18101 Interoperability Framework

## Asset-centric Connected Digital Ecosystems – Industry Clusters

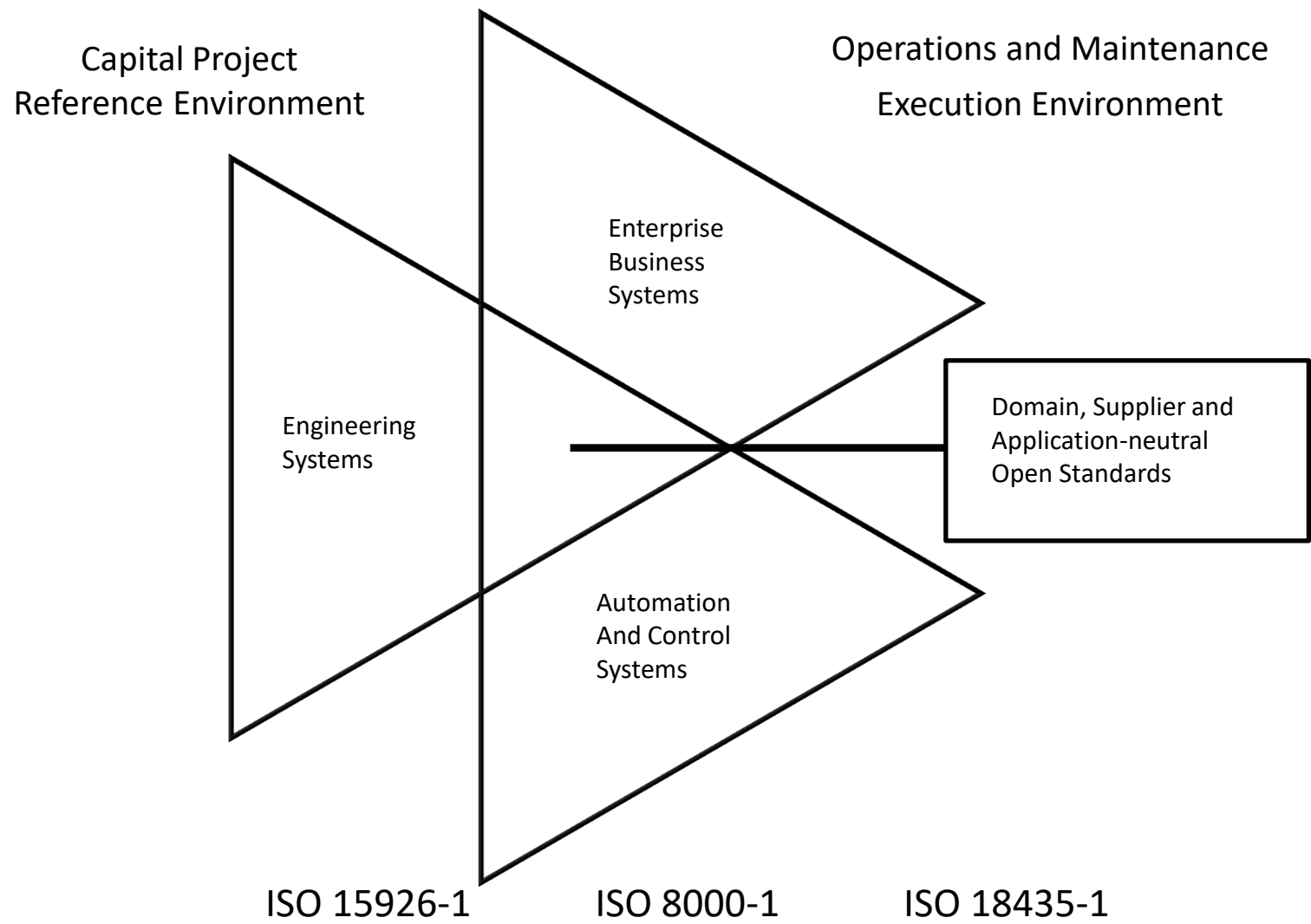
### Key Functional Areas

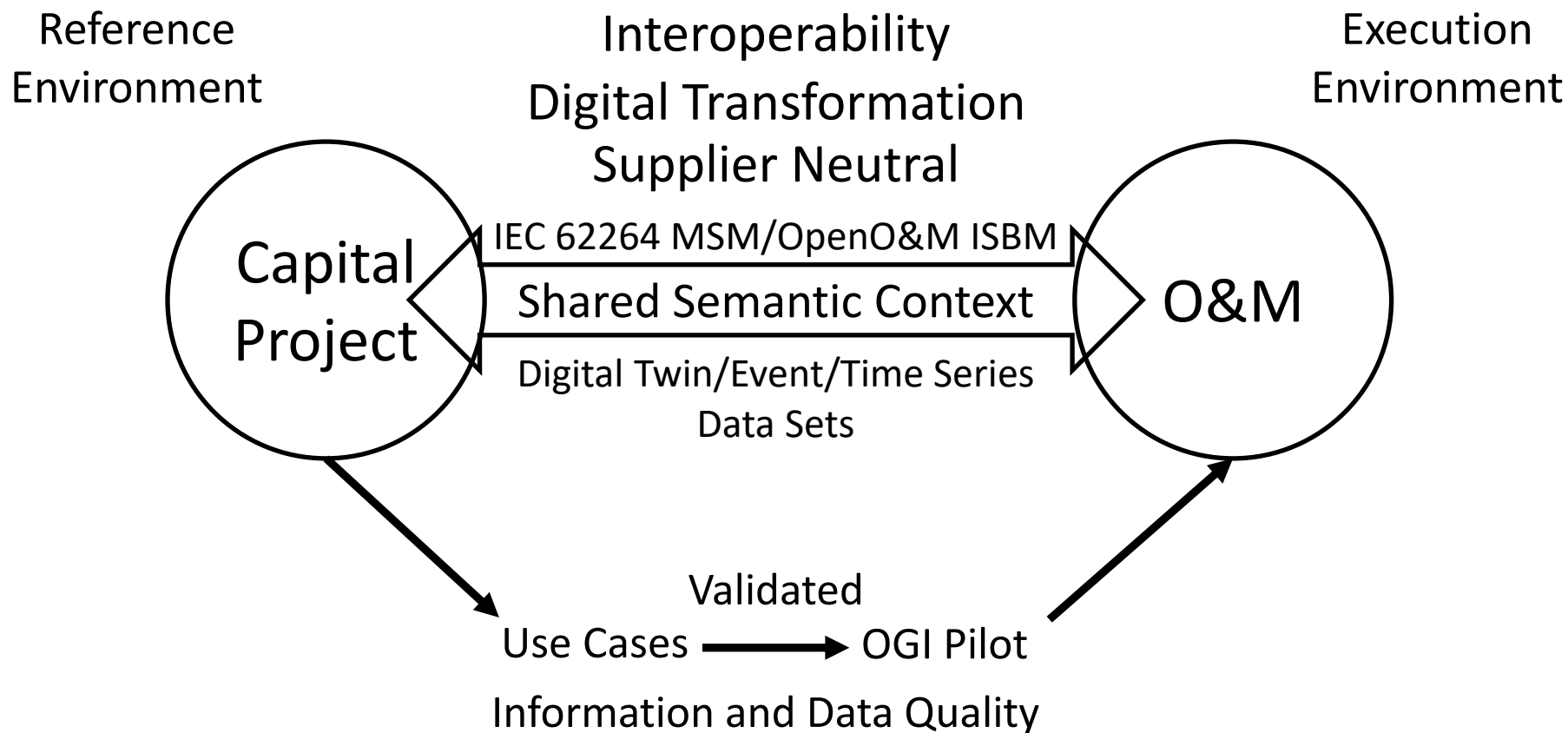
- Interrelated Supply Chains – CAPEX and OPEX
- Industry Focused Clusters: e.g., Hydrogen Clusters
- Critical Infrastructure Management
- Standard Digital Twins (synchronized across the lifecycle)
- Includes both Data and Required Documents



### Key Information Technology Features

- Specifies Vendor Neutral Industrial Digital Ecosystem
  - Standard APIs
  - Standard Directories & Registers (Ecosystem Admin)
  - Standard Data Containers (BODS)
  - Standard OIIE Use Cases
  - Standard Data Models
  - Standard Ontologies, OTDs and other reference data
  - ISO 8000 based data quality
- Includes:
  - Industry Standard Digital Utility Services
  - Standard ID Management
  - Transaction, Event and Sensor-based





# Infrastructure Specifications of the OIIE

## ISBM



- Common Communication and Message Exchange Interfaces

## Service Directory



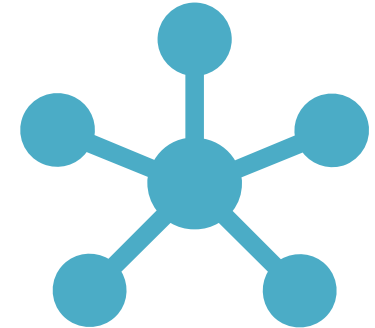
- Service Discovery and Configuration

## CIR



- Object Identification, Mapping, and Translation

## SDAIR



- Federation, Provenance, and Management of Change



# OIIE Core Elements

- Supplier-Neutral Digital Services API – OpenO&M ISBM
- OIIE Standard Registers - SDAIR
- OIIE Standard Directories – CIR, Services
- OIIE Standard Data Models – MESA/B2MML, MIMOSA CCOM, Proteus
- Standard Reference Data
  - RDLs (CFIHOS, ISO 15926)
  - Open Technical Dictionaries (ISO 22745)
  - Ontologies- Upper, Domain and Event Levels: (ISO 15926-14, IOF)
  - IEC Common Data Dictionary (CDD)
  - Industry Standard Datasheet Definitions (ISDDs)—based on ISA, API, IEEE, ... ISDs
- OIIE Standard Industrial Digital Services
  - Tied to OIIE Use Cases, Scenarios and Events

# ISDD Build and Use Plan

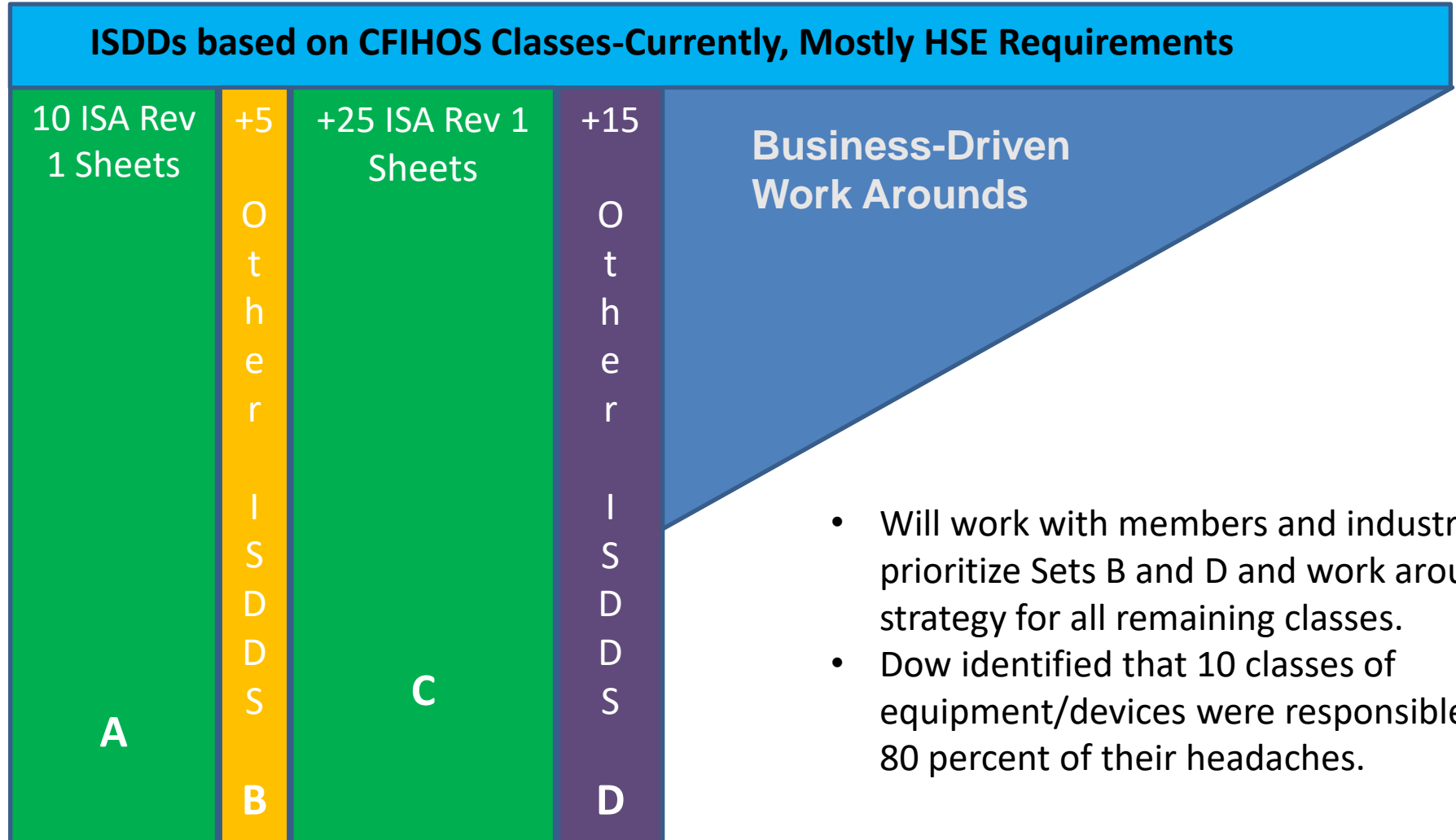
## Numbers of Properties on ISDs

All properties needed for digitalization

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

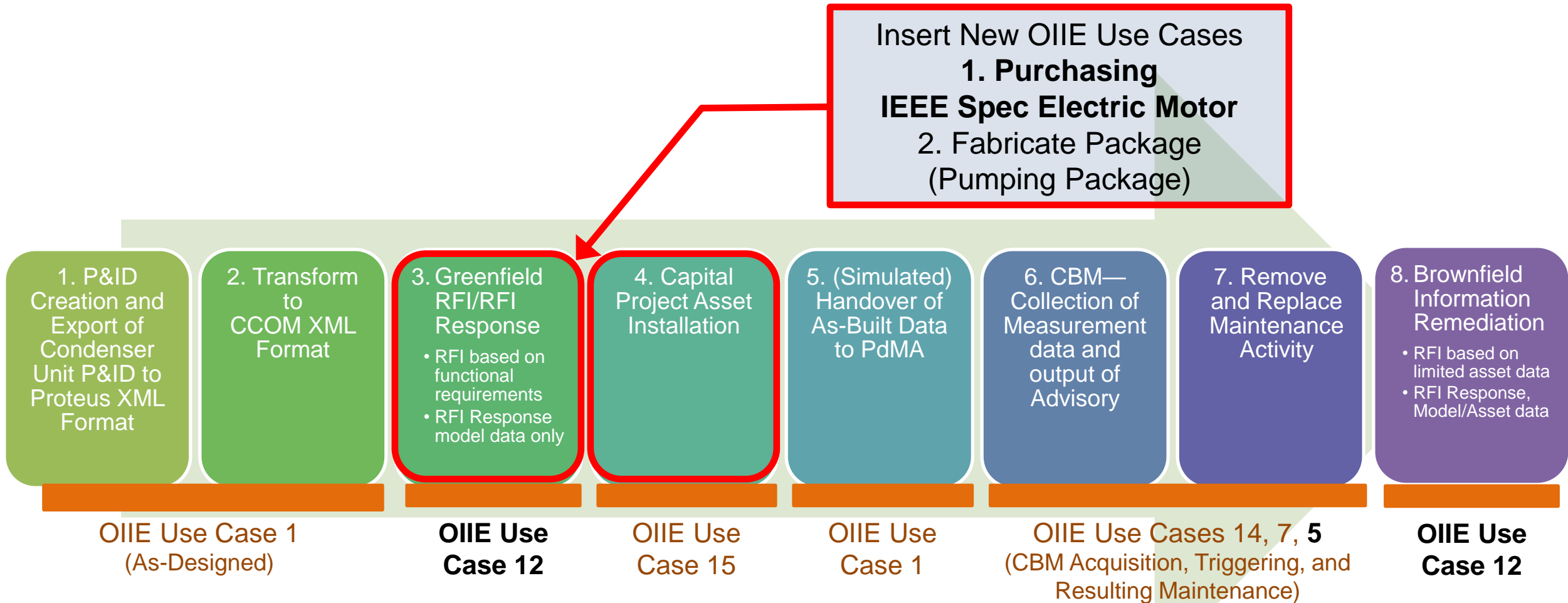
## Current Status

- Preparing exemplar ISDD referencing CFIHOS RDL
- Incorporate into a procurement/purchasing Use Case



- 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 headaches.

# OIIE OGI Pilot Phase 3.3 and Beyond



15 OIIE Use Cases have been identified spanning the Asset Lifecycle. Details are developed and validated in the OIIE OGI Pilot. We intend to submit the set above (likely including others) in forthcoming TRs, to be included in ISO 18101-3.

**Thank You!**