Independent Project Analysis

Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group

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Alan Johnston (MIMOSA)
Matt Selway (University of Australia)

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OIIE Capital Project Working Group: 11-4-2020 Meeting Objectives

- Share the OIIE Capital Project Working Group Purpose
- Discuss the capital projects industry current state
- Outline the OIIE Methodology that will be used to gather Owner/ Industry input
- Walk through an example of the OIIE Methodology
- Gather initial Highest Priority Needs from Participants
- Define OIIE Capital Project WG Next Steps

OIIE Capital Projects Working Group Kick-Off Meeting Agenda

- Welcome, Working Group Purpose, Meeting Objectives (5 min)
- Who's Who on the Leadership Team
- Where are we (5 min) – Deb
  - IPA Value Case message, Dispersed Focus
- OIIE Introduction (5 min) - Alan
- OIIE - Where have we been / What do we have ? (Matt)
  - Framework on what has been done - Ready Now, Ready Soon, (10 min)
  - Walk through One example (10 min)
- Initial Opportunity Instructions (5 min)
- Opportunity Brainstorm (15 min)
- Define Path Forward/ Next Steps/ Q&A (5 min)

Open Industrial Interoperability Ecosystem (OIIE) Capital Project Working Group

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

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

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

OIIE Capital Project Working Group Leaders

IPA

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Poll

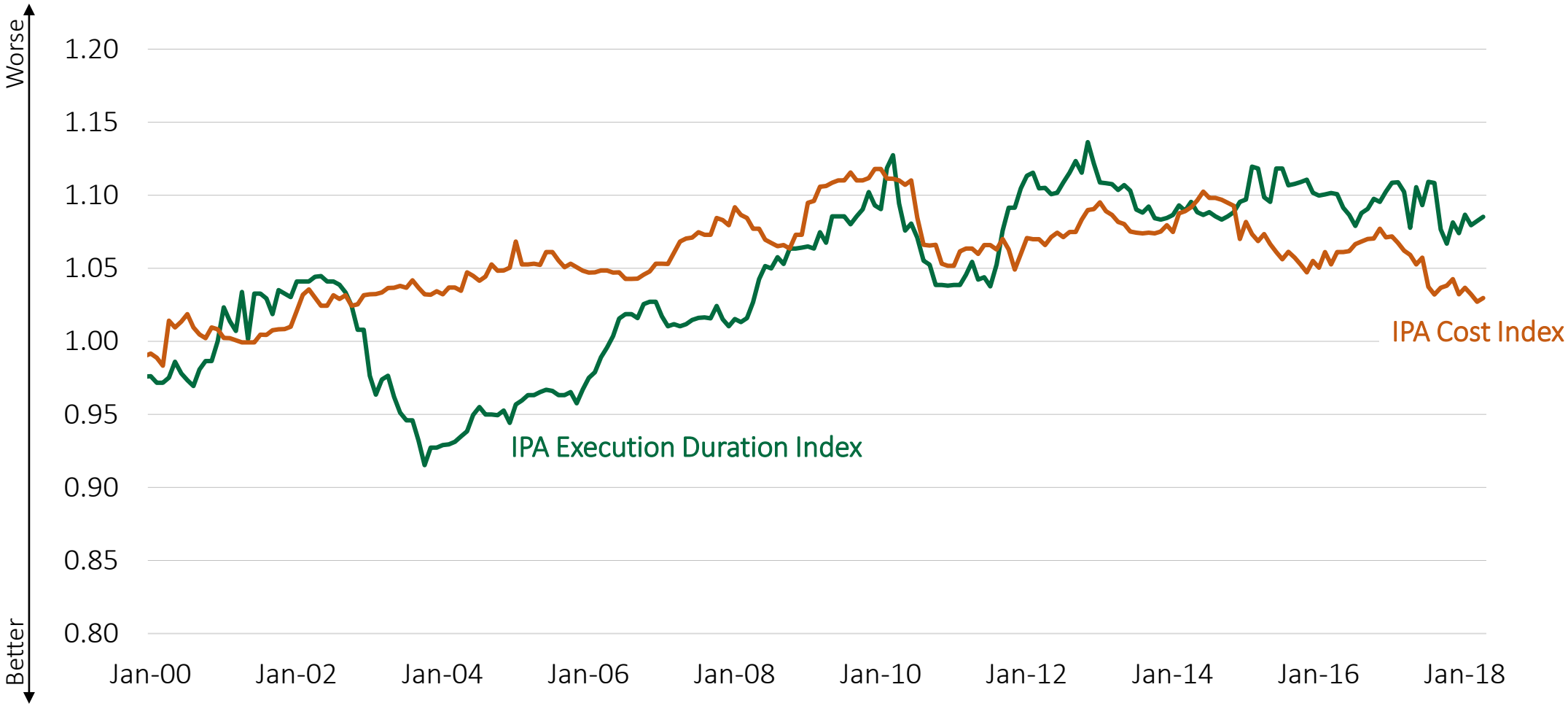
Have you attended a previous IPA Digitalization Webinar?

- ❑ Yes
- ❑ No

Industry Current State

Capital Efficiency Has Not Improved in the Projects World

Is Digitalization the Answer?



* Indices are inflation adjusted

Definitions

- **CEI – Cost Effectiveness Index** - IPA's cost effectiveness analysis evaluates what Industry would spend, on average, to engineer and construct a given scope based on the installed equipment cost (and in some cases bulk materials cost) (i.e., how cheaply the selected scope of technical work is executed). The cost effectiveness index is a project's costs divided by the industry average cost generated from our cost effectiveness models.

- **ESI – Execution Schedule Index**. IPA's schedule models produce industry average durations for the following project phases: project definition (FEL), detailed engineering, construction, and execution (the start of detailed engineering through mechanical completion). The execution schedule index is the project's execution schedule divided by the industry average execution duration generated by the IPA execution schedule model.

Defining Digitalization

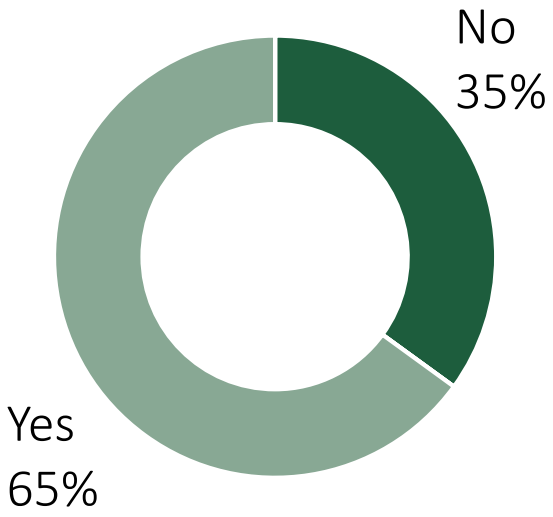
- The definition of digitalization varies, but the following is consistent with most applications in the projects industry:

> "Digitalization is the use of digital technologies to **change a business model** and provide new revenue and value producing opportunities."
>
> - Gartner

- As the definition suggests, digital technologies are being applied to change and improve the way we deliver projects
- This can mean a lot of things, but most companies are going digital to increase the volume, accuracy, and speed of information project teams need for key decision making

Most Companies Are Pursuing Some Form of Digitalization, but the Efforts Vary Considerably

Digitalization Project Underway?

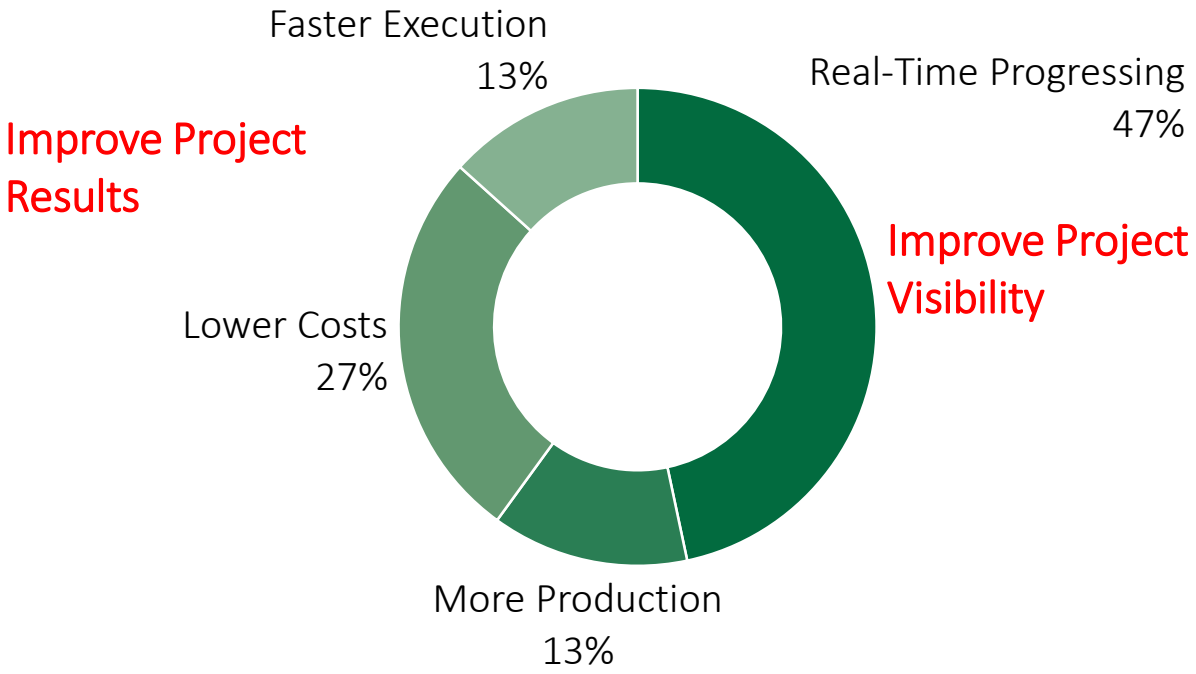


Digitalization Project Examples

- Standardizing COAs and WBSs
- Integrating contractor/owner progress systems
- Building benchmarking databases
- Standardizing engineering data
- Implementing digital twins
- Integrating engineering with construction management tools
- Building platforms to host all data streams

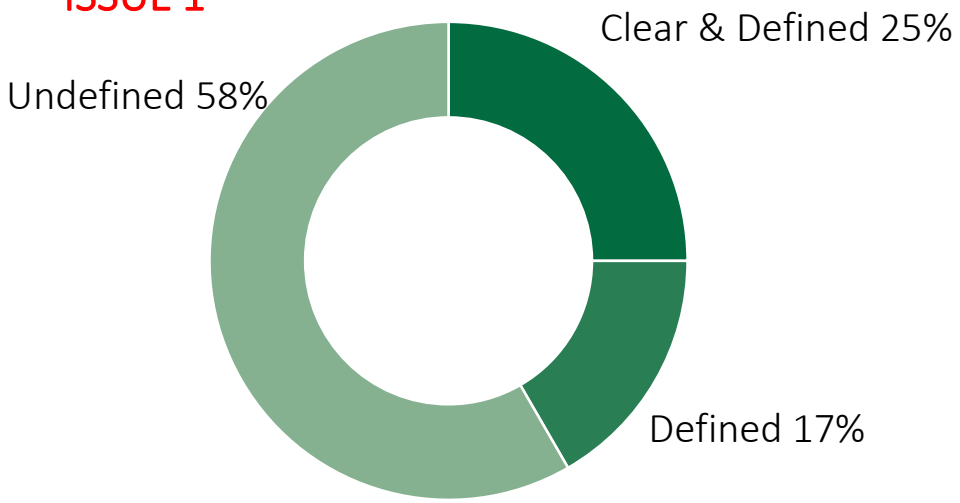
What Would You Do if You Had All of the Information on Your Projects?

What Problem Are You Trying to Solve?



Clear Digitalization Objectives?

ISSUE 1



Clear: Objective has direct link to business goals

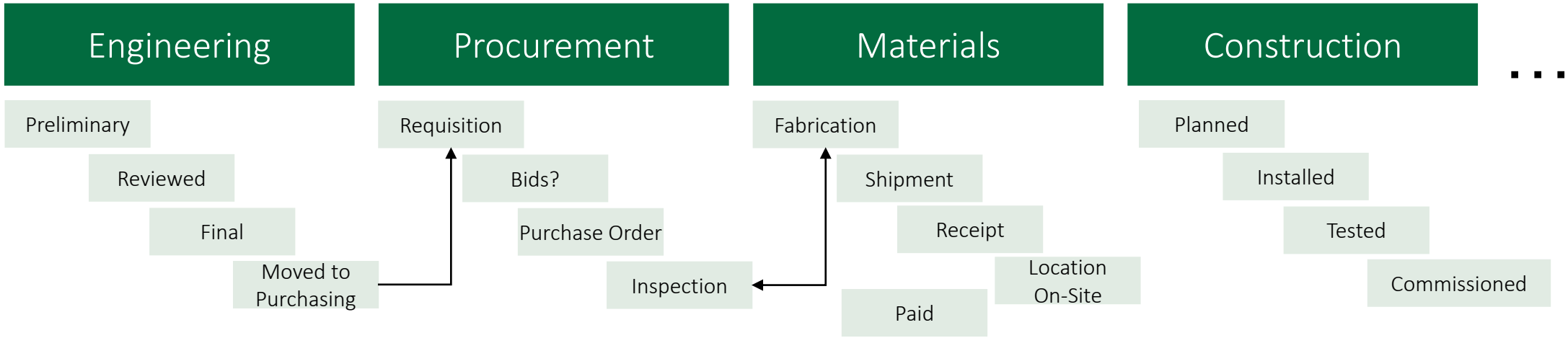
Defined: Outlined objective, but indirect links to business objectives

Undefined: No specific objectives identified yet

Why the Interoperability and "End to End" Focus ?

Facility Data (What am I going to build?)

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



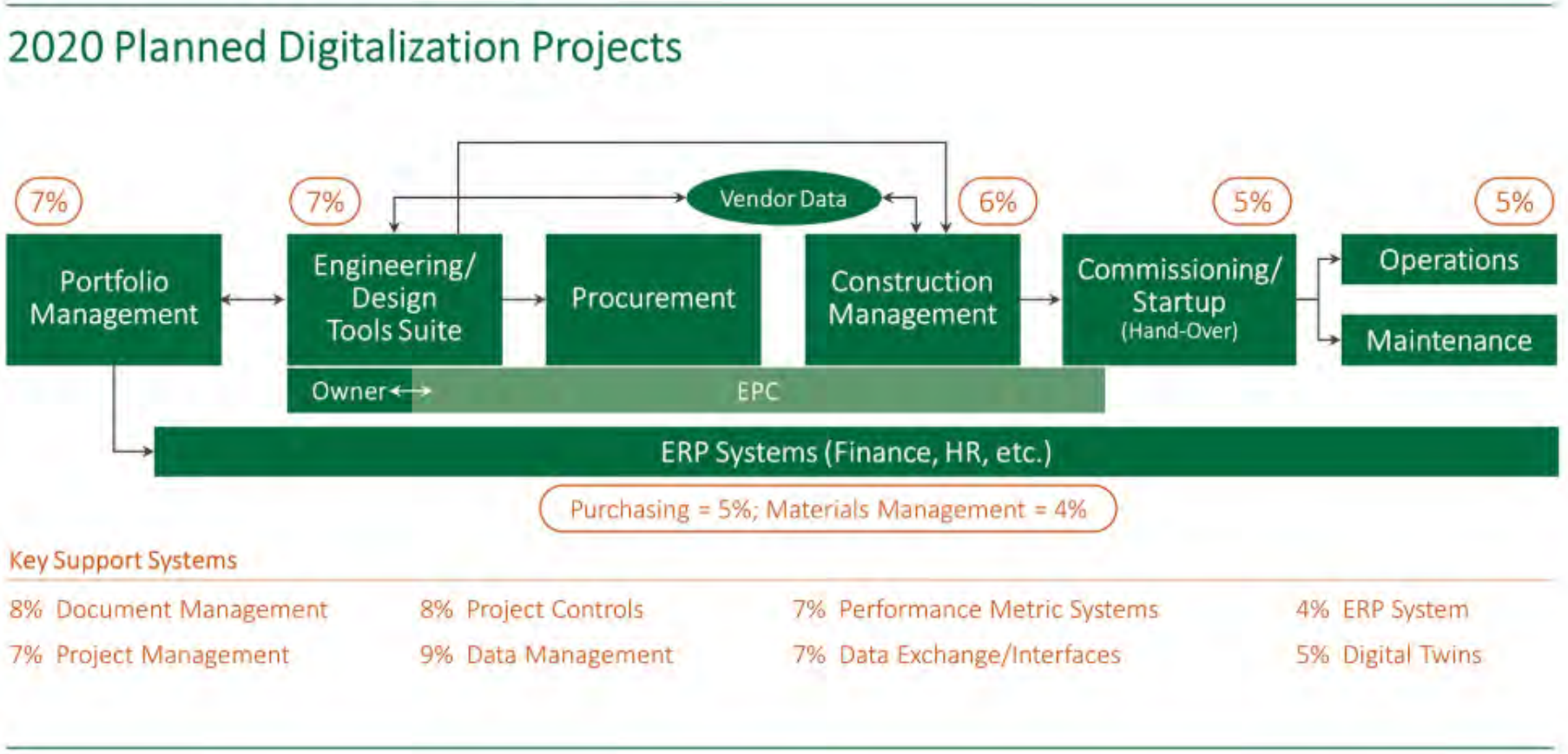
Financial Data (Where's the $?)

Operations and Maintenance (How will I operate what's built?)

Performance Data (How am I doing against plan?)

2020 Digitalization Plans—July 2020 Survey Results

The 185 digitalization efforts are spread evenly across the project life cycle and support systems



Digitalization Program Primary Challenges

Challenge #1 – Digitalization programs and projects have unclear objectives

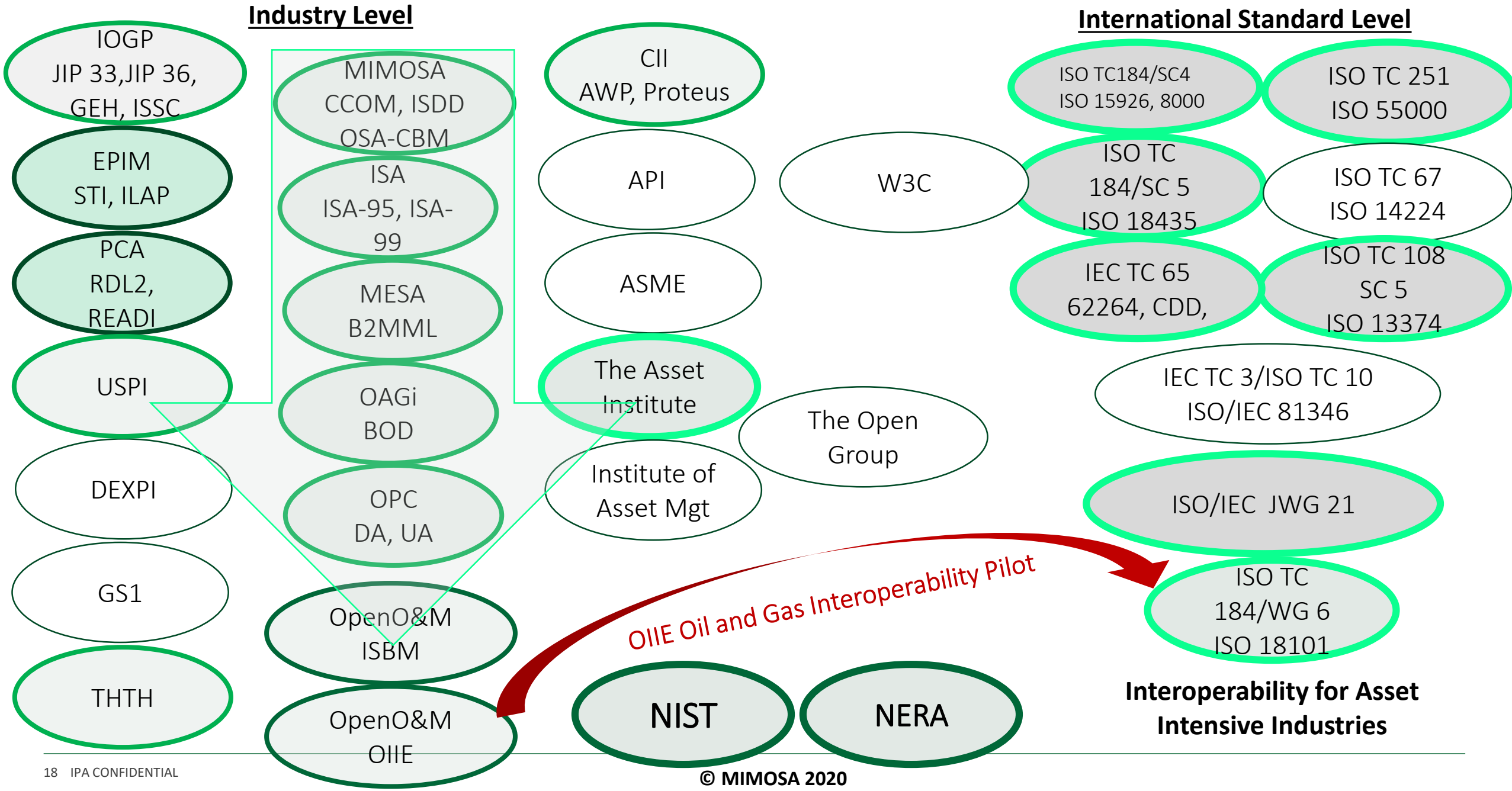
Challenge #2 – The value to be delivered is difficult to “prove” and measure

Challenge #3 – Value delivery requires complex data movement, information flow, and task completion interoperability across systems

Challenge #4 – The Capital projects industry is very dispersed in it’s efforts

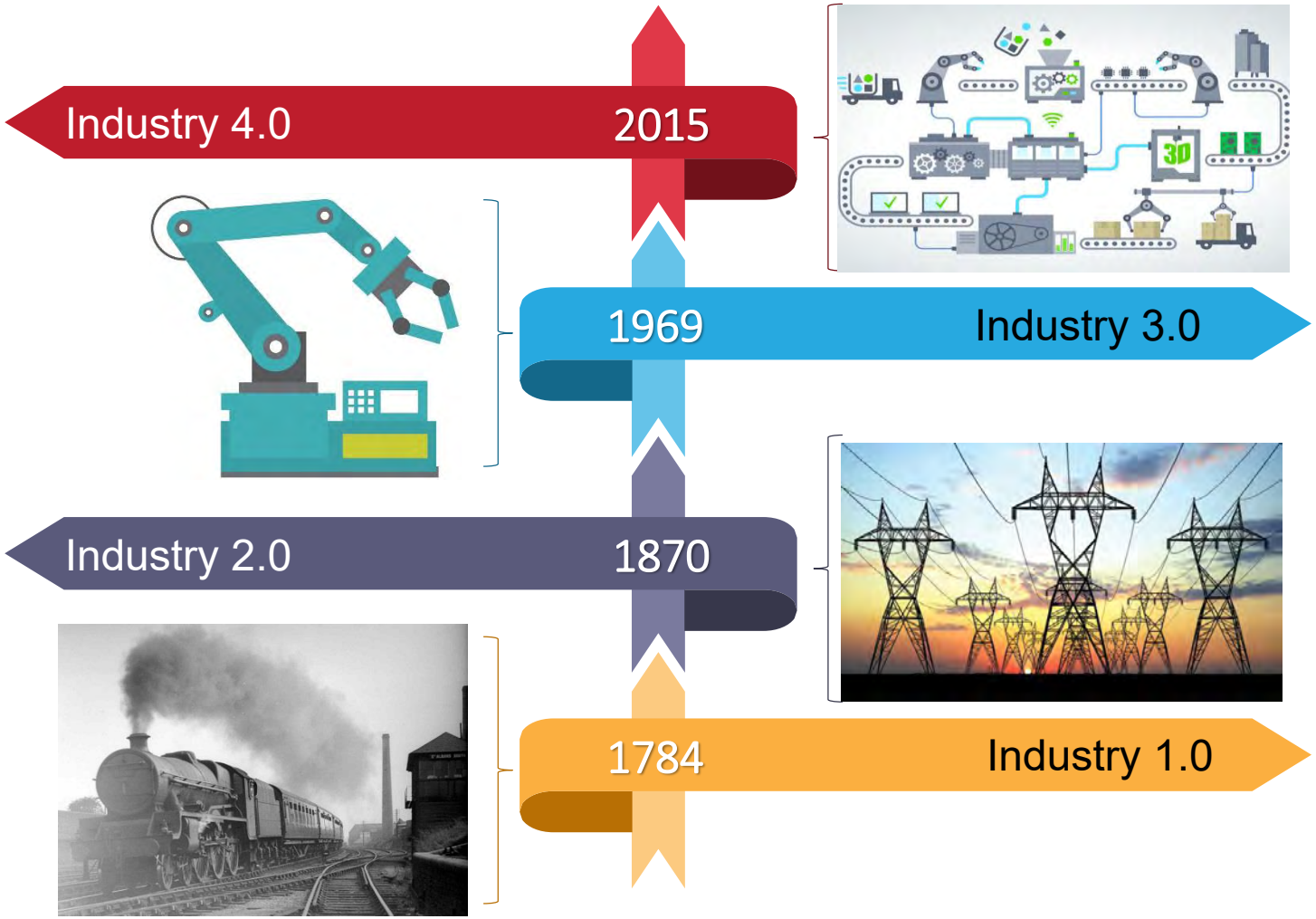
Open Industrial Interoperability Ecosystem (OIIE) and ISO 18101

Interoperability for Physical Asset Management-Associations and Activities



Industrial Revolution Phases and Common Principals

Modularity, Standardization and Interoperability



- Each phase has built on top of prior phases including more aspects of industrialization
- All phases have included various aspects of modularity, standardization & interoperability enabling businesses to specialize, scale and cooperate for major efficiency gains
  - Standard gauge railroads, screw threads
  - Electrical/Utility standards
  - Mechanical standards
- Modularity and interoperability were key contributors to Allied victory in WWII
  - Victory ships
  - B-24 Bombers
- **In Industry 4.0 (Digitalization and AI)**
  - Supply chains need to be fully integrated across many industries
  - Sharing industrial internet and AI
  - Modular, standardized & interoperating **industrial digital ecosystems**

Industrial Digital Transformation – 2020 and Beyond

A Pragmatic Solution: Standards-based Interoperability and the OIIE

Open Standards-based Interoperability

- Defined by vendor-neutral standards
- Highly Heterogeneous, SME Friendly
- System of Systems Interoperability
- Suppliers build and maintain standard adaptors with commercial support model
- Higher quality with lower costs and risks

➢ **Practical basis for industry digital transformation**

Open Industrial Interoperability Ecosystem (OIIE)
ISO 18101

Supports

- Digital Twins
- Systems of Systems
- Interoperability
- AI, Ontology, OTDs
- Analytics

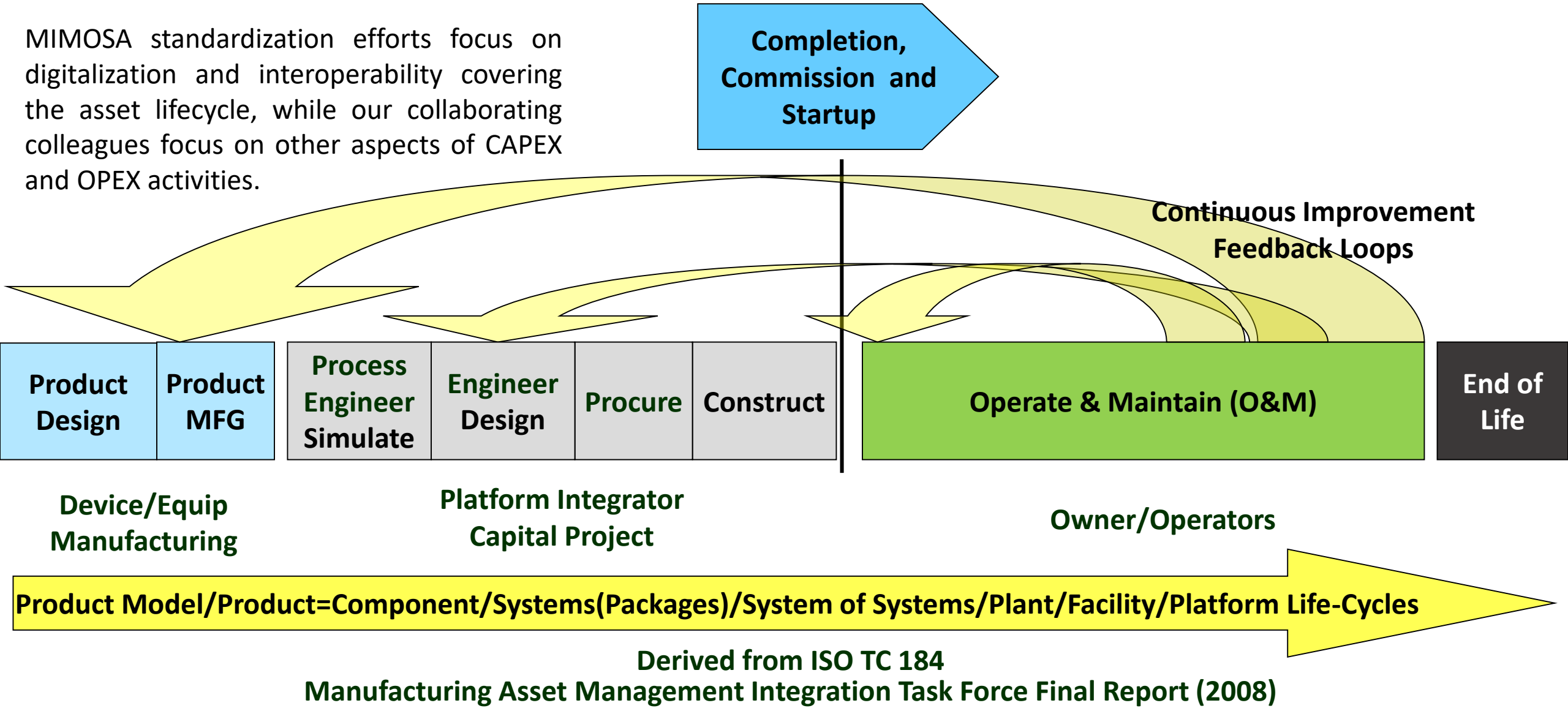
Industry Standard Digital Ecosystem

- ➢ Standard use case architecture
- ➢ Standard use cases, scenarios & events
- ➢ Standard data models
- ➢ Standard message models
- ➢ Standard reference data
- ➢ Standard APIs and services definitions
- ➢ Standard adaptors

OIIE Oil and Gas Interoperability Pilot⟶Builds and Validates OIIE and ISO 18101

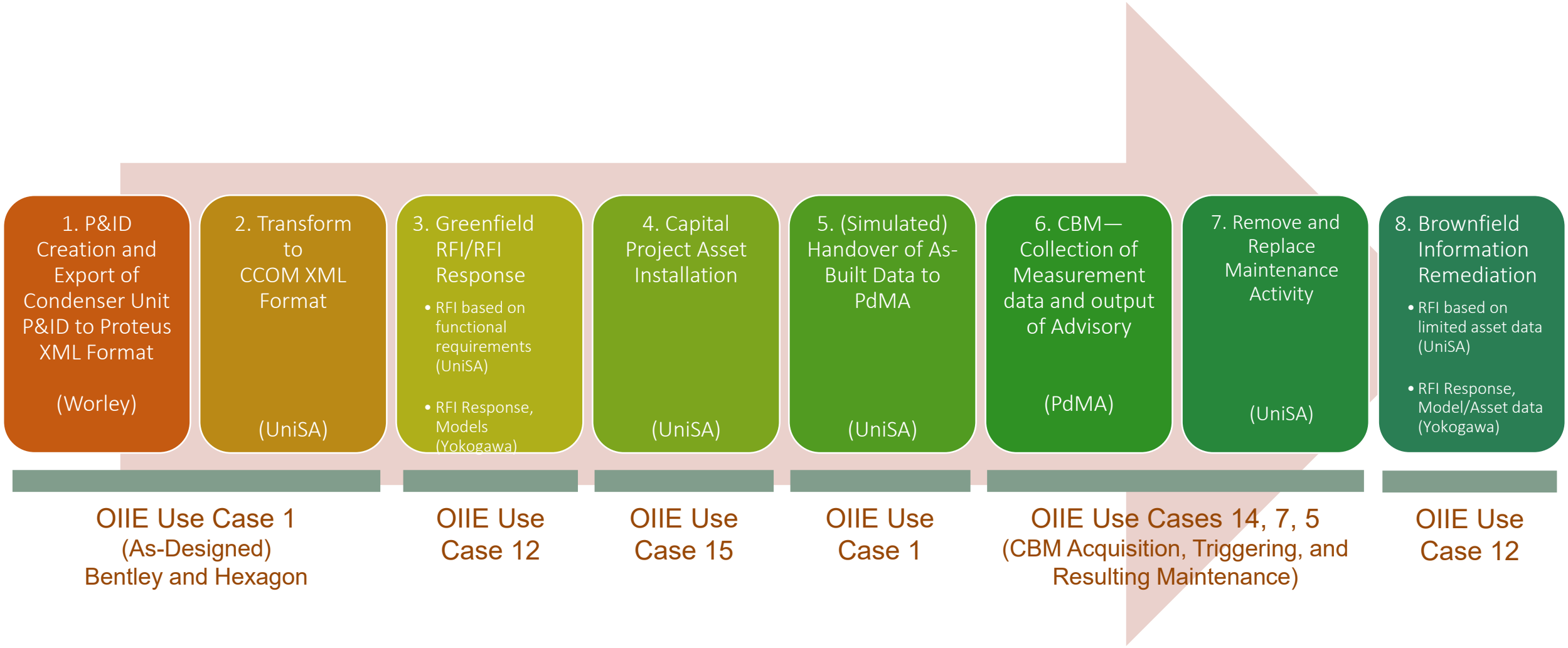
Qualifies for NERA and FEnEx matching funds if R&D is based at UniSA

MIMOSA standardization efforts focus on digitalization and interoperability covering the asset lifecycle, while our collaborating colleagues focus on other aspects of CAPEX and OPEX activities.

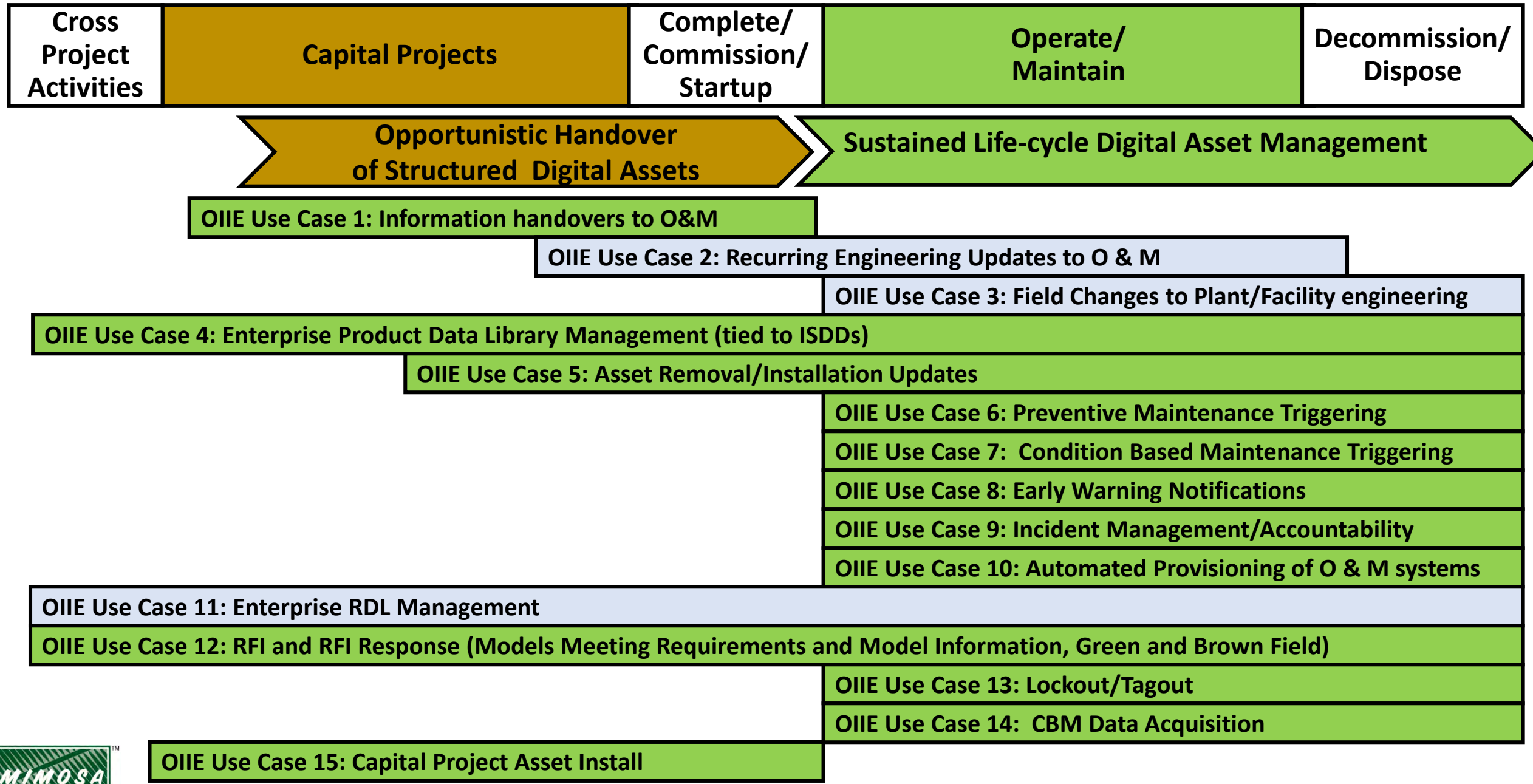


Derived from ISO TC 184
Manufacturing Asset Management Integration Task Force Final Report (2008)

Build on Success from OIIE OGI Pilot Phase 3.1



Standard OIIE OGI Use Cases



OIIE Standardized Use Case Architecture

Standardized Methodology to Define and Re-use OIIE Components

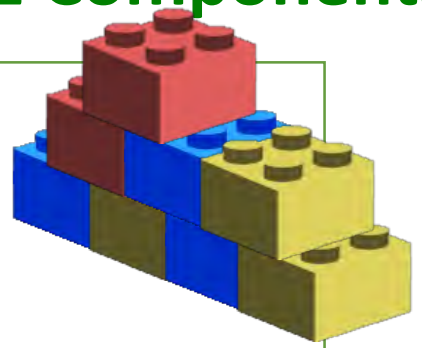
User Stories

User Stories

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

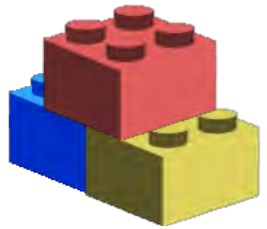
Use Cases

- Background
- Scope
- Preconditions
- Successful End Condition
- Actors
- Triggers
- Process Workflows
- Scenarios



Scenarios

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



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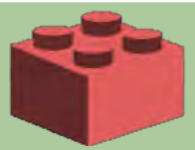

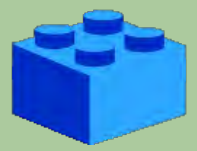

- Individual Message Exchange
- Specific Data Content
- Required Data Processing
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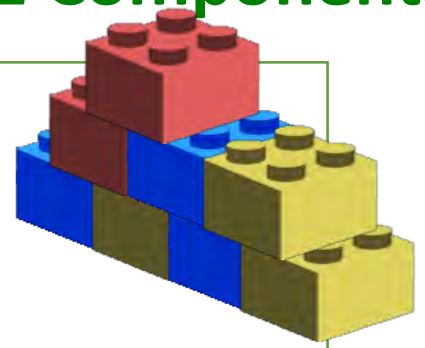

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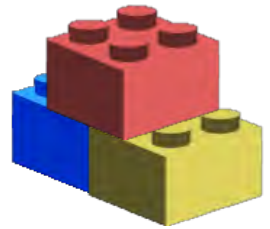

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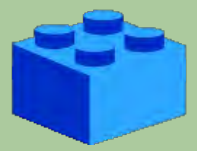

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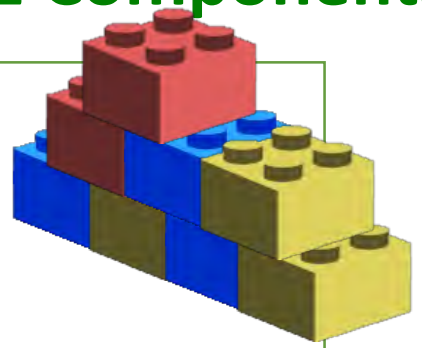

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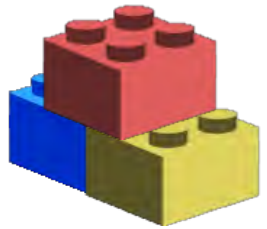

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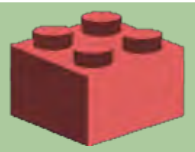

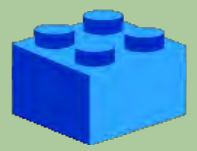

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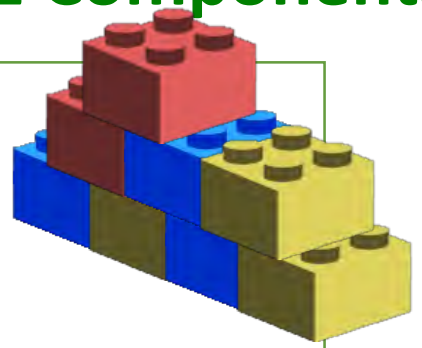

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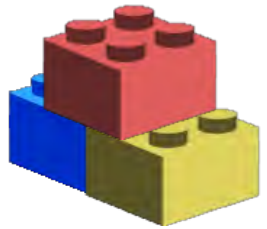

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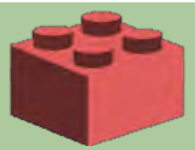

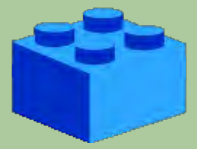

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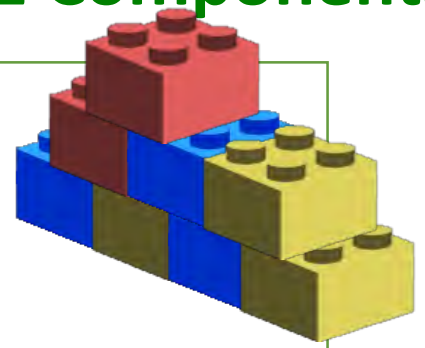

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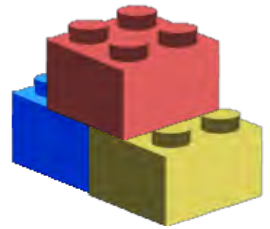

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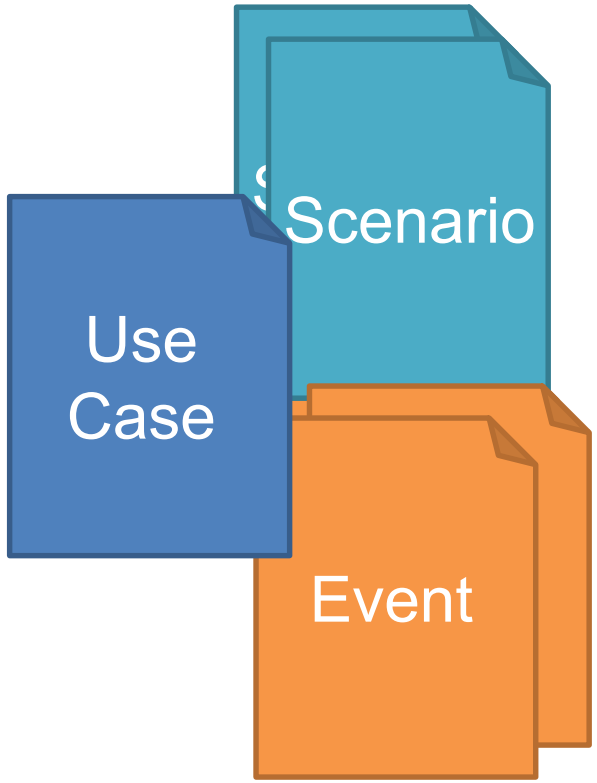
What can be done with the Use Cases, Scenarios, and Events?



Problem/ Requirements

??

Software Engineer

Solution

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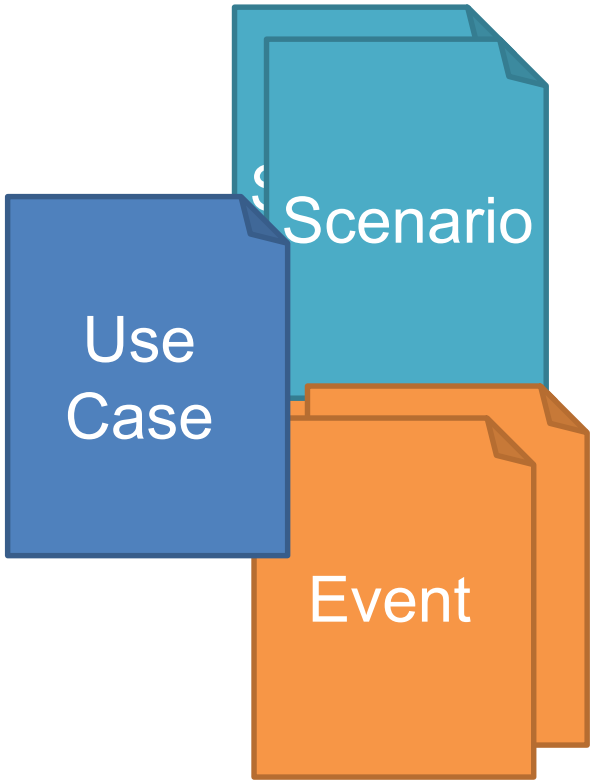
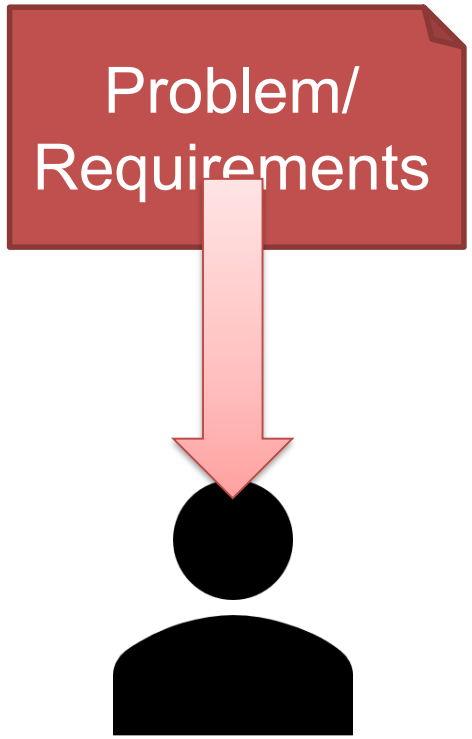
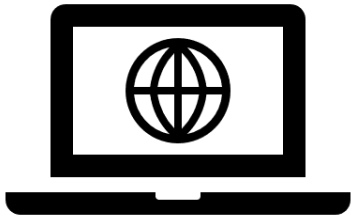




Software Engineer



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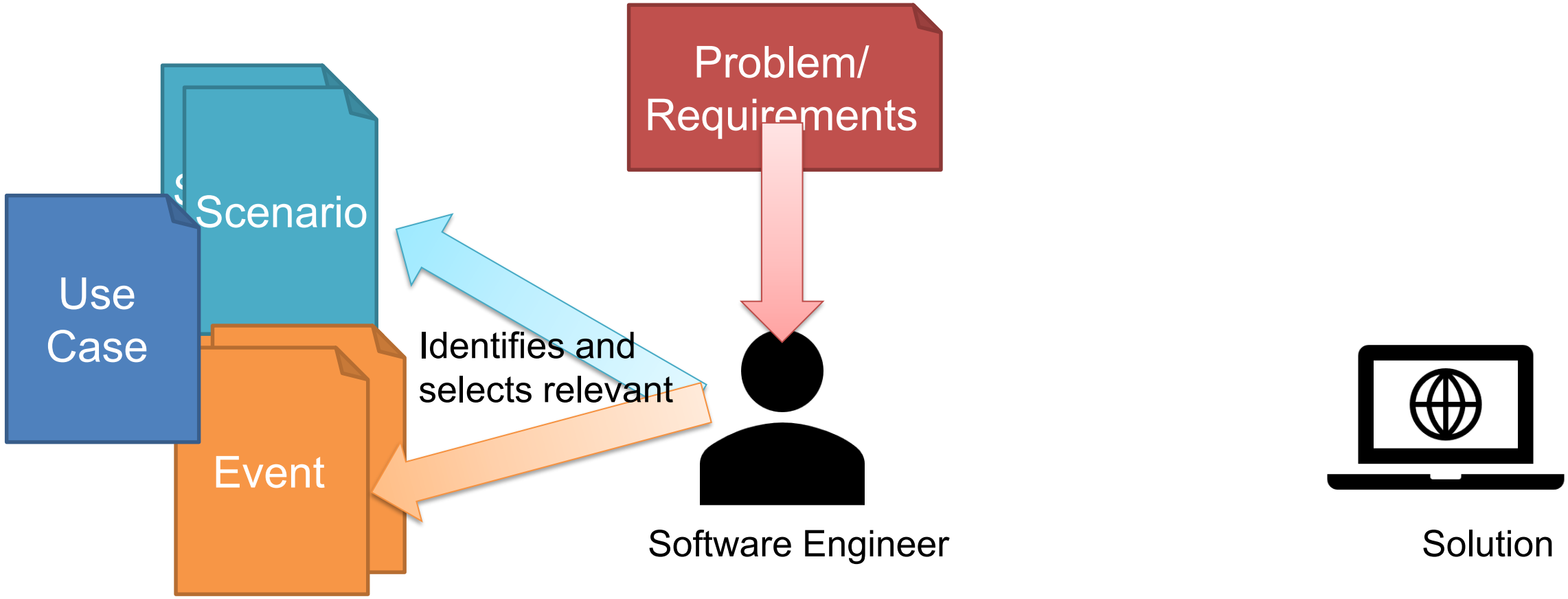

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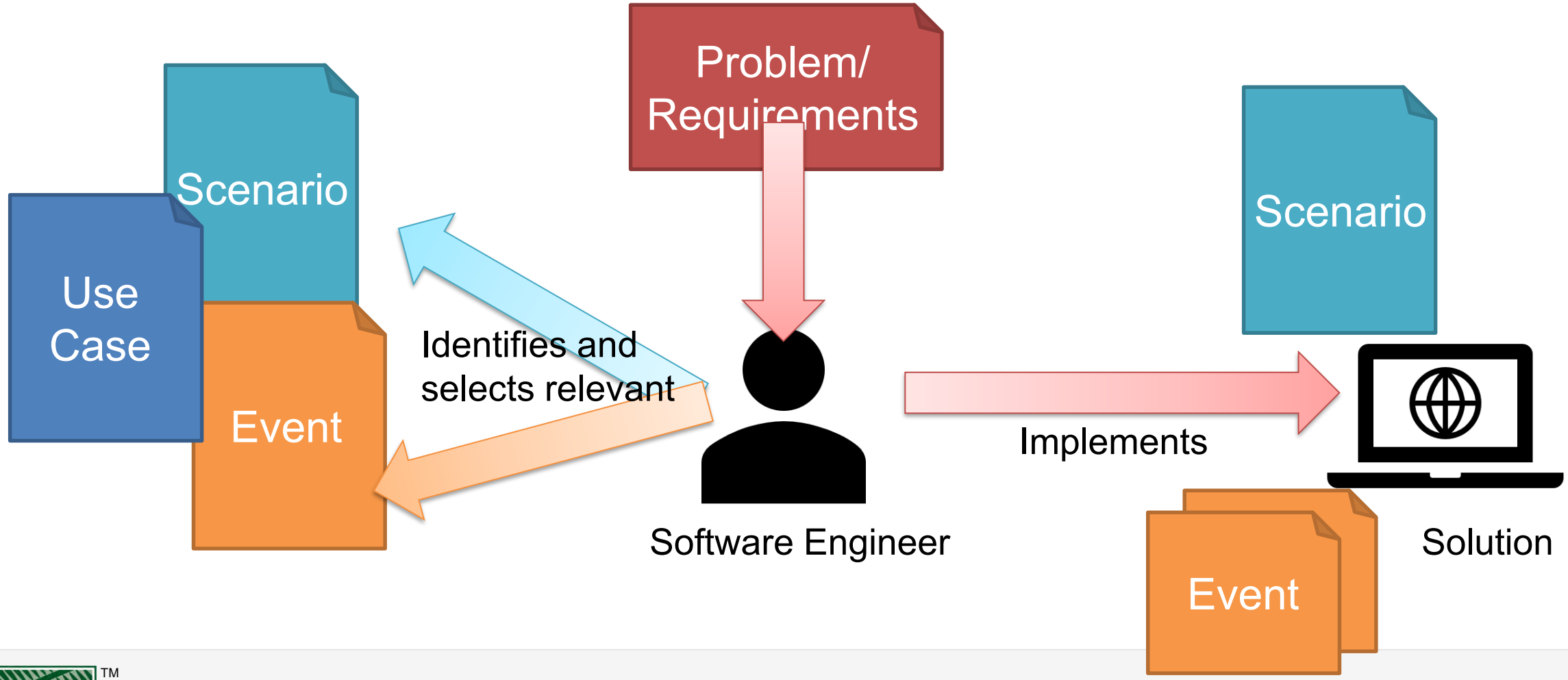

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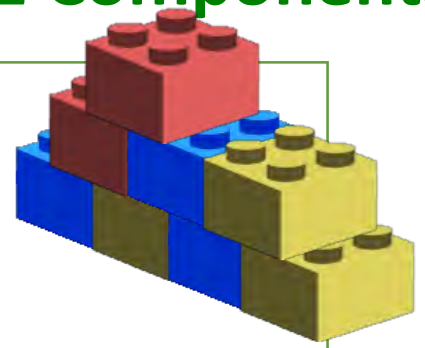

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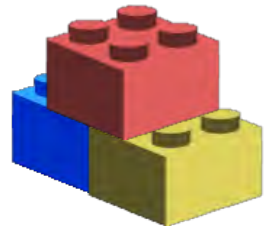
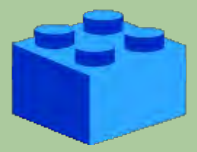
- ISBM Configuration
- (OIIE) Events



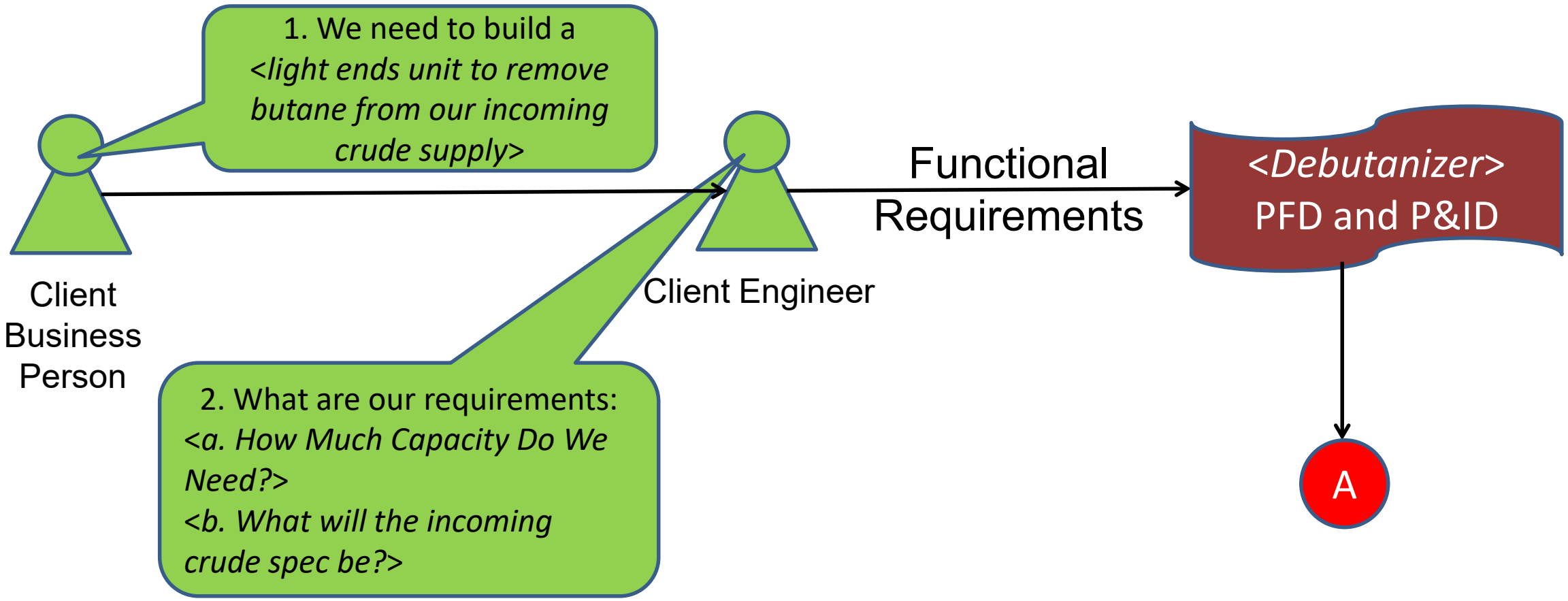
(OIIE) Events



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

MIMOSA™

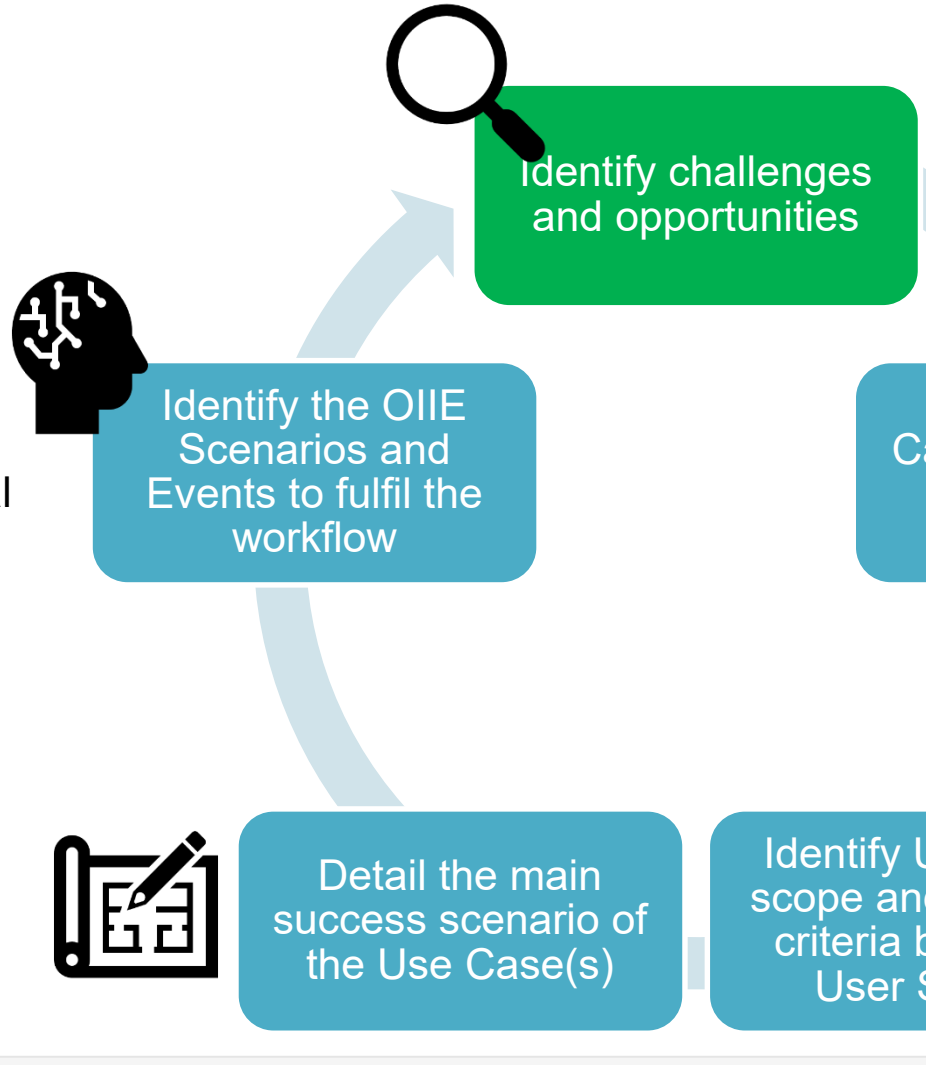
Story M100: Start Unit Functional Requirements



Use Case Structure

- **Overview**: short paragraph to identify the Use Case
- **Background**: context describing the purpose of the Use Case
- **Scope**: the bounds of the Use Case
- **Success Condition**: what it means for the use case to be successful
- **Preconditions**: other use cases, etc., that must have taken place
- **Actors**: Business and System actors participating in the Use Case
- **Triggers**: events, etc., that indicate the Use Case should be carried out
- **Main Success Flow**: textual steps and BPMN diagram of main workflow—linked to Scenarios used to realise it

Use Case Development Process



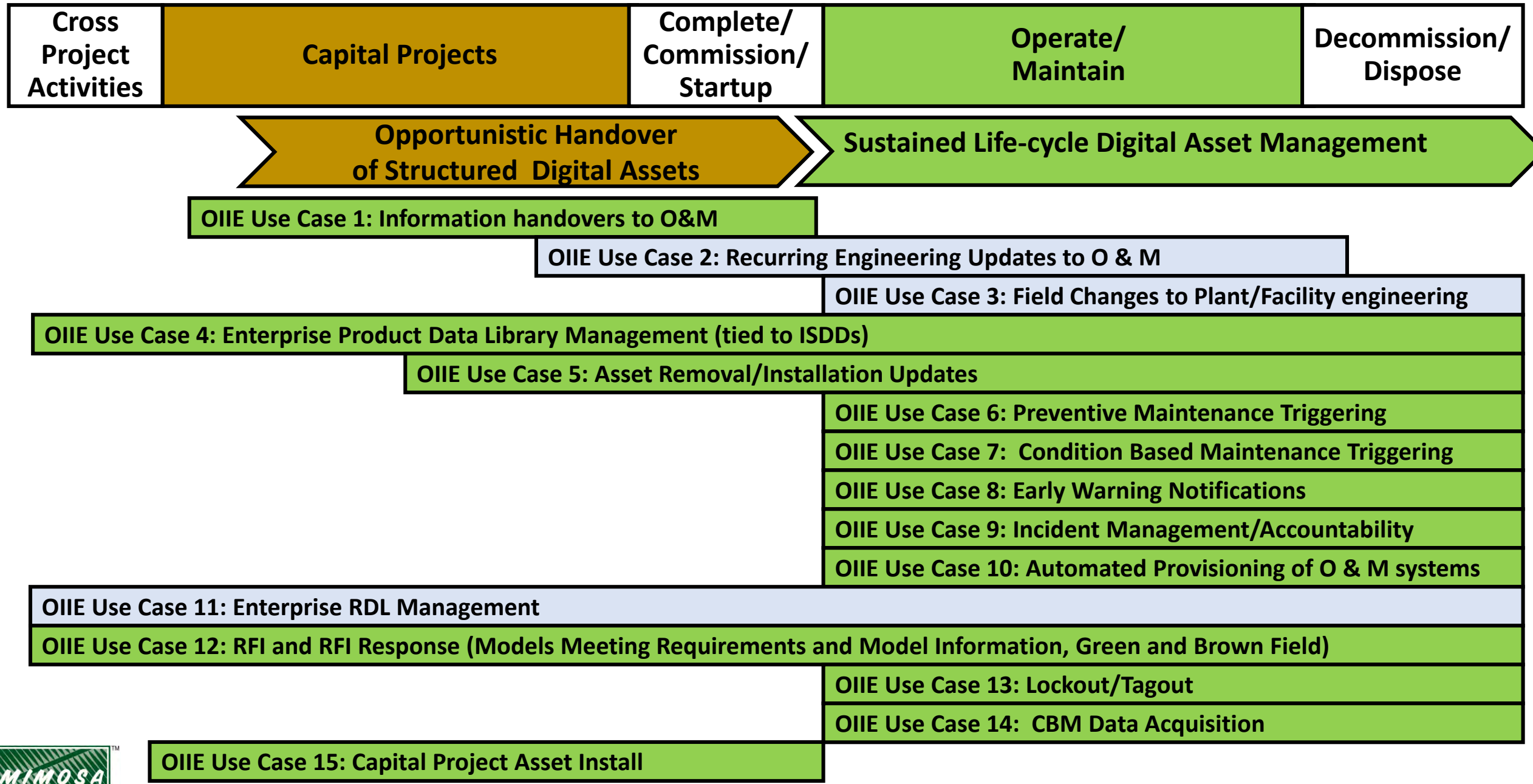
- Brainstorm or known industry issue

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

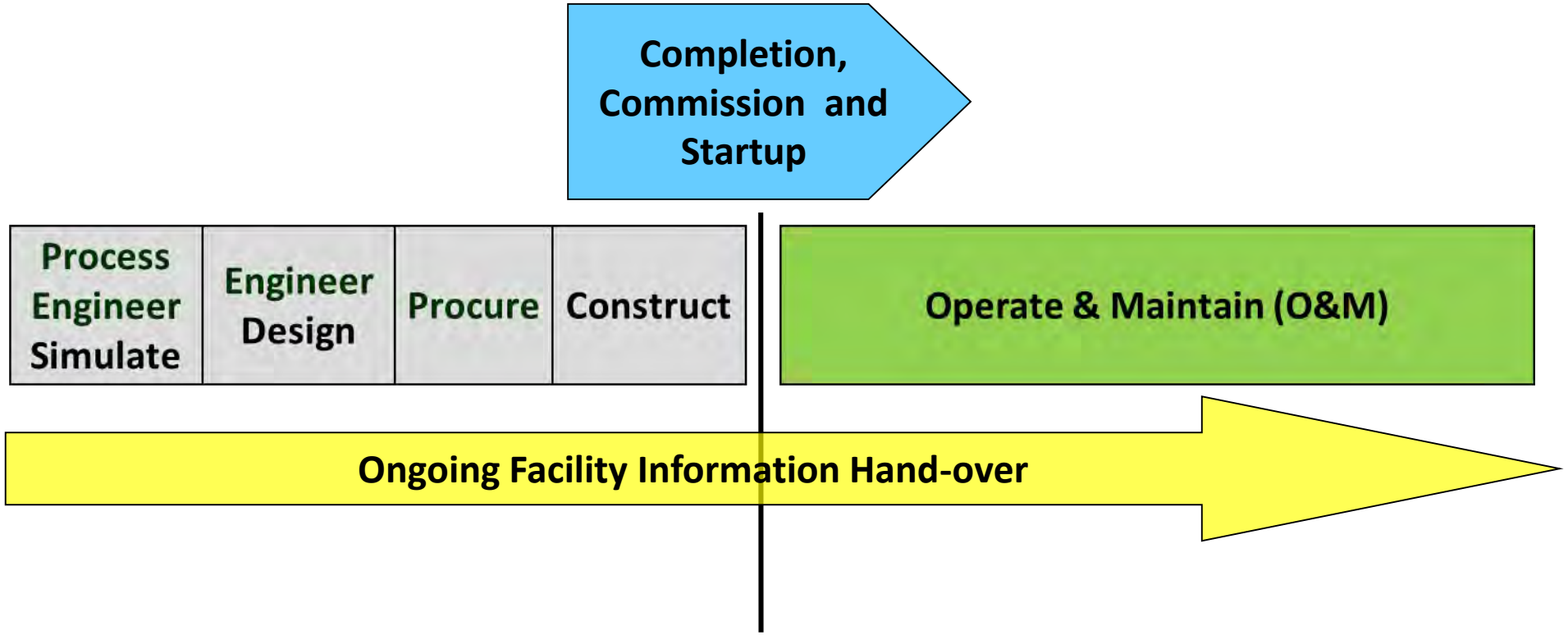
- Draft Background context.
- Scope, success criteria, triggers, and preconditions of the Use Case
- Allocate business functions, interactions, etc., to Use Cases within bounded scope.

- Performed by technical team in parallel
- Begin detailing technical requirements

Standard OIIE OGI Use Cases



Using Chat – Biggest Opportunity / Challenge in each area



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

OIIE Capital Project Working Group – Next Steps

- We will compile and issue the meeting minutes
- Please respond to the follow-up survey
- Share this initiative with others
- Send your ideas for next meeting agenda topics to dmcneil@ipaglobal.com
- Accept the next meeting invitation and register for a specific problem area team ← Topic Specific working groups

THANK YOU

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