

OIE Scenario 1 – Publish As-Designed/As-Built Engineering Network/Segment/Tag data from ENG to REG-LOCATION

This scenario details the batch handover of design information that occurs most often at two gates in the capital project lifecycle – Approved for Construction and Approved for Commissioning & Closeout. This information originates from the Engineering Design Systems (which stores Plant Breakdown Structures, Logical P&IDs and PFDs) and is sent to the O&M Structural Registry.

Actors

Engineering Design System	Send plant breakdown structure, logical P&ID, and PFD topology data
Structural Registry	Receive and register O&M-related network, segment, and tag data
Commissioning Team	Receive and review the plant breakdown structure, logical P&ID, and PFD topology and trigger the pre-commissioning of O&M systems

Data Content

The information exchanged are those necessary to properly provision O&M systems. Master data includes several functional sub-categories. The logical structural arrangement of the plant (hereafter referred to as a topology) is derived from P&ID and PFD information and forms the basis for the asset registry of many O&M. For the components in the structure, it should contain the identification properties (ID, tag, name), categorical properties (in relation to the reference data described above), interconnections, flow and intended physical sequence of equipment, data sheet properties that represent the requirements of installed equipment, controls and instrumentation, and associated metadata. Where topologies show interconnections between functional segments, breakdown structures show decomposition of segments. Breakdown structures are a hierarchical view of a system to show the composition of the functional segment.

To provide a level of traceability and diagrammatic arrangement for systems that require it (typically HMI applications), the relationship between the logical structural elements and their originating diagram as well as associated data (e.g. positioning and scale) are also exchanged. Document data is also included, such as the information in the title block, canvas size and origin position, to provide context.

P&ID Data Requirements

- Functional location, identifier, tag and classification
- Engineering properties
- Transmitter OPC tag
- Transmitter range and unit of measure
- Plant breakdown structure

- Nozzles/ports and classification
- Directed connections between nozzles/ports
- Canvas dimensions
- X, Y coordinates for functional locations
- Symbol orientation

Engineering Data Sheet Requirements

Where possible, the engineering properties of functional locations describing the requirements of the installed equipment will conform to a standardized ISDD (Industry Standard Datasheet Definition) for each equipment/device class. Where no standardized ISDD is available, the engineering properties may conform to an agreed upon enterprise datasheet definition conforming to the ISDD specification.

The specific ISDDs to be utilized are agreed upon a priori according to [Use Case 11](#).

MIMOSA CCOM Reference Types

For the purposes of reference data management, the following MIMOSA CCOM types may be referenced:

- AssetType
- PropertySetDefinition
 - Data Sheet related definitions must be related to the PropertySetType 'Engineering Data Sheet' (UUID: 4d568f12-8f82-4203-bb13-48643cecbb82) either directly, or through the parent hierarchy of an PropertySetType taxonomy.
 - Non-Data Sheet related properties may also be referenced, for example, for X, Y coordinates.
- PropertySetType
 - Data Sheet related attribute sets must be related to the type 'Engineering Data Sheet' (UUID: 4d568f12-8f82-4203-bb13-48643cecbb82) either directly or through an PropertySetType taxonomy.
 - Non-Data Sheet related properties may also be referenced, for example, for X, Y coordinates.
- PropertyType/PropertyDefinition
- BreakdownStructureType
- ConnectionType
- MeasurementLocationType
- MeshType
- SegmentType
- UnitType

NOTE For versions of MIMOSA CCOM prior to 4.1, the types referring to 'Property' use the term 'Attribute' instead.

System Interoperability Events

This scenario requires the sending/receipt of the following Events:

- [Publish ISO 15926 Engineering Design Data](#)
- [Publish Functional Location Data](#)
- [Publish Engineering Diagram Data](#)
- [Publish Breakdown Structure Data](#)

Data Formats

The data published from and sent by the Engineering Design System must comply with ISO 15926 standardized templates and reference data.

The data published to and received by the Structural Registry must conform to MIMOSA CCOM BODs.

Infrastructural Components

Transform Engine

Data transformation is required for this scenario and the OpenO&M-ISO 15926 Transform Engine converts the necessary data from an ISO 15926 format in the Reference Environment to the MIMOSA CCOM format in the Execution Environment. A one-way mapping from ISO 15926 to MIMOSA CCOM is required. Identifier transformation is only required for updates to data already sent from the Reference Environment to the Execution Environment.

Transformation Rules

The following is a general set of rules describing the required transformation of ISO 15926 data to MIMOSA CCOM format.

- Plant Items become Segments with the identifier placed in the IDInInfoSource field (with a corresponding RegistrationInfoSource); tag placed in the Tag field and classification mapped to a SegmentType.
- Attributes/properties for a functional location need to be placed on an Engineering Data Sheet. Where possible, the data sheet will conform to a specified ISDD; otherwise, the data sheet can have a single top-level parameter group with all Attributes contained within that group.
- For instruments that are allocated a range, these are placed on an Engineering Data Sheet.
- Transmitters have a corresponding Measurement Location created. Any OPC tag properties are placed in the MeasurementSourceAddress field.
- Nozzles become Measurement Location Ports on the Plant Item Segment identified in the assembly relationship.
- Topological connections become PortConnections within a PortMesh. For connections without a corresponding port, a port of a suitable type (e.g. directed fluid, electrical, mechanical) should be created and connected.

- X, Y coordinates and canvas dimensions are placed on a P&ID Data Sheet attached to the respective Plant Item Segment or Document Asset.

SDAIR

In this Scenario, an SDAIR may participate as an explicit actor in the role of the Structural Registry.

ISBM

The communication between all systems occurs via the ISBM using publish-subscribe services.

Due to the large volume of data output from these source systems, data may be sent to the Structural Register incrementally. The ISBM may also provide alternative transfer mechanisms for performance and scalability purposes.

Implementation Requirements

The Engineering Design System must implement a client for the ISBM Provider Publication and Channel Management (only the GetChannel operation) Services.

The Structural Registry must implement a client for the ISBM Consumer Publication and Channel Management (only the GetChannel operation) Services. The Structural Registry may implement the ISBM Notify Listener Service for message notification.

The Transform Engine must implement a client for the ISBM Provider Publication, Consumer Publication and Channel Management (only the GetChannel operation) Services. The Transform Engine may implement the ISBM Notify Listener Services for message notification.

Suggested Channel/Topic Configuration

A channel should be created for the handover of engineering data and should conform to the following format:

```
/Enterprise/Enterprise Subdivision/.../ISO18435:D0.2/Publication
```

For example:

```
/Enterprise/Refinery A/Area A/Light Ends Area/ISO18435:D0.2/Publication
```

As outlined in the document [ISBM Guidelines](#), topics should match the message content. Correspondingly, the following topic format should be used:

```
OIIE:S1:V2.1/StandardSchemaName{:Version}
```

For example:

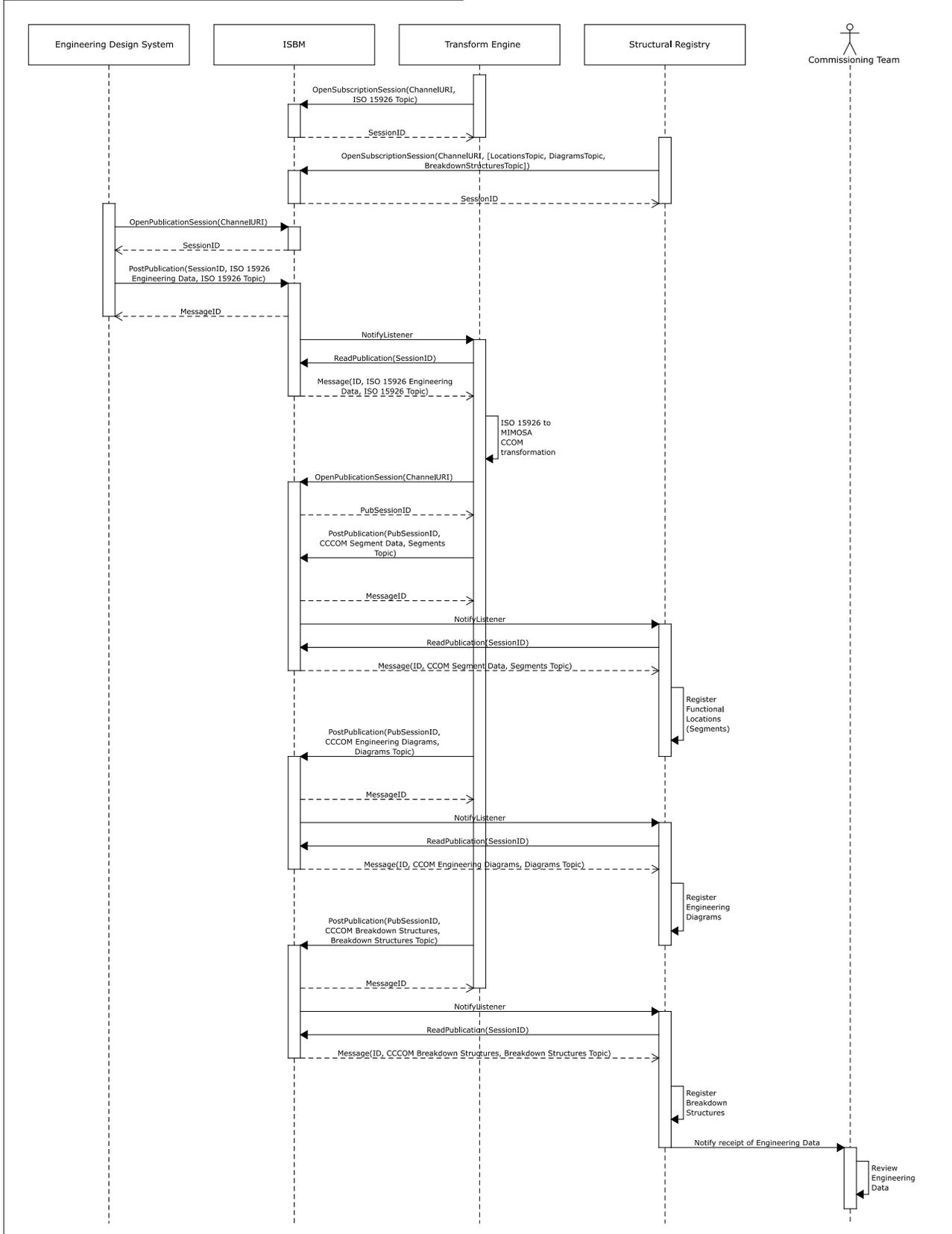
```
OIIE:S1:V2.1/ISO15926:XMPLANT:V3.3.3
OIIE:S1:V2.1/ISO15926:PROTEUS:V3.3.3
OIIE:S1:V2.1/ISO15926:OWL:Part8
OIIE:S1:V2.1/CCOM-XML:SyncEngineeringDiagram:V1.0
OIIE:S1:V2.1/CCOM-XML:SyncSegments:V1.0
OIIE:S1:V2.1/CCOM-XML:SyncBreakdownStructures:V1.0
```

Event Sequence

The following diagram represents a simplified exemplar interaction between the systems required to achieve this Scenario. The system actors are assumed to have OIIE/ISBM adaptors implemented as required, with services

according to the ISBM Implementation Requirements described above. For simplicity, it is assumed that each system/adaptor implements the optional Notify Listener service.

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Version Applicability/Alignment

Scenarios describe general data requirements and, hence, they are aligned to specific versions of CCOM and/or other MIMOSA standards. For example, older versions of CCOM may not include the data elements required by newer Scenarios, while older Scenarios may become obsolete or have their data requirements change over time.

This Scenario is applicable to the following versions of CCOM:

- CCOM 4.x

NOTE The data content requirements and transformation rules have been updated to reflect CCOM 4.x and are **no longer applicable** to CCOM 3.2.3 (part of OSA-EAI 3.2.3).

NOTE Use of 'x' in the version number indicates a variable version. For example, "4.x" indicates applicability to all versions of CCOM with the MAJOR version '4', regardless of MINOR and PATCH versions.

Document Versioning

Version	Date	Major Changes
2.1	2020-12-08	Updated to use OpenO&M template
2.0	2019-01-20	Updated for new Use Case Architecture and CCOM 4.x alignment.
1.0	2019-01-03	Initial import from website documentation.