SWIM-INFO-013 Establish semantic correspondence

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Requirement

Title	Establish semantic correspondence
Identifier	SWIM-INFO-013
Requirement	An information definition **shall** document a semantic correspondence for each of its concepts.
Rationale	Documentation of semantic correspondence is the evidence that an information definition is an AIRM conformant information definition.
Verification	Completeness
Examples/Notes	*Note*: This requirement covers information concepts and data concepts. *Note*: This requirement allows an information definition to: • be accompanied by a standalone resource containing the statements of semantic correspondence; or • have statements of semantic correspondence embedded in it; or • be accompanied by a reference to an already existing set of semantic correspondences. *Note*: The forms that a semantic correspondence can take are given in SWIM-INFO-014. *Note*: It is important to ensure that the syntax used for mappings is self-explaining or appropriately explained. To this end, extra information can accompany the information definition in order to ensure that the mappings can be understood without having to read external documentation or make assumptions on how the mappings are technically and procedurally implemented. *Example*: A statement that the “container’s traces” are considered as part of the concept mappings (as discussed in SWIM-INFO-018).
Level of Implementation	*Mandatory*

Guidance

Documenting semantic correspondences

This requirement basically requests the semantic correspondences. A semantic correspondence is the relation between a concept in an information definition and the AIRM.

This requirement ensures that the relations are documented. This allows them to be shared e.g. by being added to the SWIM Registry. The requirement allows an information definition to:

- be accompanied by a standalone resource containing the statements of semantic correspondence; or
- have statements of semantic correspondence embedded in it;
- be accompanied by a reference to an already existing set of semantic correspondences.

Best Practice

It is a best practice to only use one version of the AIRM when documenting semantic correspondences.

Standalone resource

The Aeronautical Information Exchange Model (AIXM) performed its initial semantic correspondence analysis using a spreadsheet. The figure below shows what this looked like. The left hand side of the diagram shows the concepts exported from the AIXM UML model. The concepts are *AerialRefuelling, AerialRefuellingAnchor, AerialRefuellingPoint, AerialRefuellingTrack, AuthorityForAerialRefuelling*. The right hand side of the diagram contains an export of the matching AIRM concepts.

In this example, the traces contain information not required by the specification. The spreadsheet contains the “Degree of Correspondence” column that is *ExactCopy* (when the definition in the information definition is an exact match of each AIRM concepts), or *Restriction* (when the information concepts has a narrower definition than the AIRM concept). This extra detail can be seen as evidence that *SWIM-INFO-016* and *SWIM-INFO-017* are really followed.

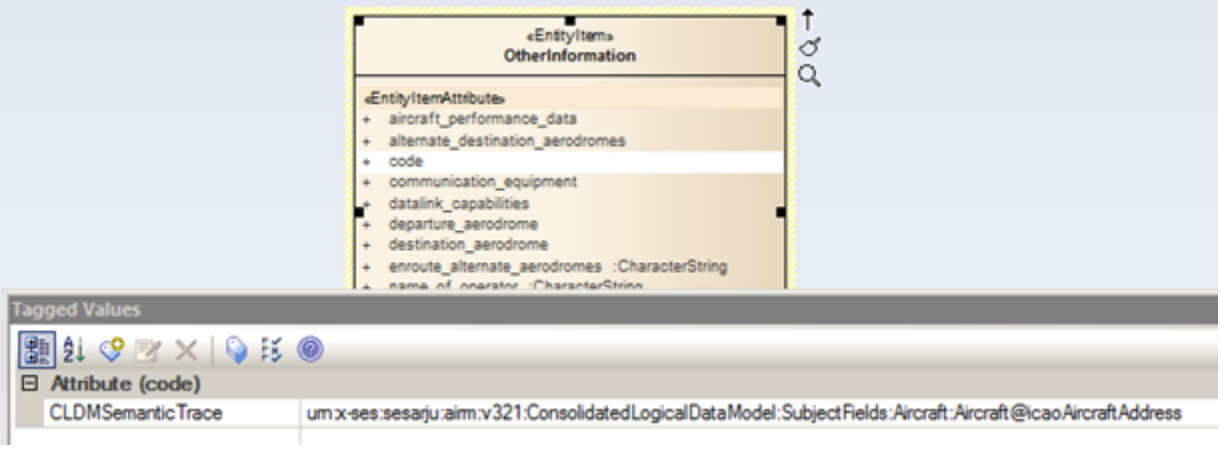
However, the important thing here is that the mapping artefact is a standalone document.

Information Definition				AIRM		
Concept name	Concept Definition	Concept Identifier	Degree of correspondence	AIRM Concept Name	AIRM Concept Definition	AIRM Concept Identifier
AerialRefuelling	A procedure used by the military to transfer fuel from one aircraft to another during flight.	urn:x-ses-oua:aixm:v511:AIXM Features:Aerial Refuelling:AerialRefuelling	ExactCopy	AerialRefuelling	A procedure used by the military to transfer fuel from one aircraft to another during flight.	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:RouteAndProcedure:AerialRefuelling
AerialRefuellingAnchor	A prescribed pattern, established by air refuelling points, along which air-to-air refuelling of aircraft is performed.	urn:x-ses-oua:aixm:v511:AIXM Features:Aerial Refuelling:AerialRefuellingAnchor	ExactCopy	AerialRefuellingAnchor	A prescribed pattern, established by air refuelling points, along which air-to-air refuelling of aircraft is performed.	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:RouteAndProcedure:AerialRefuellingAnchor
AerialRefuellingPoint	A geographic position or radio navigation fix along an air refuelling anchor pattern or air refuelling track.	urn:x-ses-oua:aixm:v511:AIXM Features:Aerial Refuelling:AerialRefuellingPoint	Restriction	CodeSignificantPointDesigna	A code indicating a specific type of significant point, in direct relation with the designator allocated to that point.	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:Codelists:CodeSignificantPointDesignatorType
AerialRefuellingTrack	A sequence of points that define the trajectory to be flown during an aerial refuelling operation.	urn:x-ses-oua:aixm:v511:AIXM Features:Aerial Refuelling:AerialRefuellingTrack	ExactCopy	AerialRefuellingTrack	A sequence of points that define the trajectory to be flown during an aerial refuelling operation.	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:RouteAndProcedure:AerialRefuellingTrack
AeronauticalGroundLight	A light specifically provided as an aid to air navigation, with the exception of obstacle lights and lights forming part of surface or approach lighting systems	urn:x-ses-oua:aixm:v511:AIXM Features:Navaids Points:Visual Navigation:AeronauticalGroundLight	ExactCopy	AeronauticalGroundLight	A light specifically provided as an aid to air navigation, with the exception of obstacle lights and lights forming part of surface or approach lighting systems	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:NavigationInfrastructure:AeronauticalGroundLight

Embedded

The specification also allows the semantic correspondence statements to be embedded into the information definition.

The figure below is taken from a SESAR deliverable. It shows a snippet of a larger UML diagram. It shows how the *code* attribute in the *OtherInformation* cl ass traces to the *Aircraft.icaoAircraftAddress* in the AIRM. The unique identifier of the AIRM (see *SWIM-INFO-019*) has been used to fill in the tagged value for the concept being traced.



It is also possible to embed the trace in XML schemas (see *SWIM-INFO-014* and the complete example for further examples of this approach).

Example of embedded trace

```
<xs:annotation>
 <xs:documentation>
  <semanticCorrespondence>
   <mapping>
    <trace>-AIRM unique identifier-</trace>
   </mapping>
  </semanticCorrespondence>
 </xs:documentation>
</xs:annotation>
```

Reference

Both of the above options assume that the semantic correspondence document is being created from scratch for an information definition. However, a key principle of SWIM is the promotion of reuse. Therefore, the specification allows this requirement to be satisfied by a reference to an existing set of semantic correspondences.

This means that if a service payload is composed of elements entirely built on an exchange model (such as FIXM, AIXM, IWXXM) then the requirement may be satisfied by making reference to that model's existing semantic correspondence document.

However, if the service payload has additional constructs with respect to the exchange model, the semantic correspondence document must be created for the additional constructs. In other words, the semantic correspondence document may actually be a blend of new and references documents.

Ensuring the documentation is understandable

The specification does not give details on the syntax and method for the semantic correspondence statements. However, it notes that it is important to ensure that the syntax used for mappings is self-explaining or appropriately explained. To this end, extra information can accompany the information definition in order to ensure that the mappings can be understood without having to read external documentation or make assumptions on how the mappings are implemented.

It is important to remember that the target audience for the semantic correspondence statements is a human reader.



Tools can be developed by organisations in support of the creation of the semantic correspondence statements. One such development has been explored by the BEST project. It is hoped that more tools will become available over time.

Verification Support

Completeness

Check that:

- **[ ]** The information definition has a semantic correspondence statement for each concept.