

# Deliverable D1.1: *Experimental ontology modules formalising concept definition of ATM data*

## What is the contribution of this deliverable to the overall goals of BEST?

→ Please refer to the document “BEST Results: Overview” to get an overall picture of the relationship between BEST deliverables and project objectives.

Deliverable D1.1 is responsible for developing the ontology infrastructure in the BEST Project. This infrastructure includes an ATM Information Reference Model (AIRM) ontology and a set of ontology modules, each representing different sub-areas of ATM information exchange. These ontology modules are transformed from the exchange models Aeronautical Information Exchange Model (AIXM) and ICAO Meteorological Information Exchange Model (IWXXM). All ontologies are formalised in an ontology language called Web Ontology Language (OWL).

The ontologies developed in BEST:

- are used as a metadata vocabulary for describing and supporting retrieval of relevant aeronautical information by techniques developed by D2.1 and D2.2.
- are used to tune and evaluate the AIRM Compliance Validator application developed by D1.2
- represent the basis of formulating ontology modularisation guidelines in D5.2.

## Current Status of the Deliverable

Completed and approved by funding authority (SJU).

## What items does the deliverable contain?

When we talk about a “Deliverable” in BEST, we mean not only the formal document describing the work done, but also any associated technical artefacts such as software, models, ontologies, diagrams etc.

See also: “Explanatory Notes” following the table.

Item#	Brief Description	What it can be used for
Provided separately (i.e. not in the formal deliverable document)		
1	Monolithic ontology expressed in OWL describing the AIRM (ATM Information Reference Model).	Compliance validation. The monolithic AIRM ontology is the target against which objects under assessments (OuAs) can be checked for compliance.

Item#	Brief Description	What it can be used for
2	Ontology modules expressed in OWL each describing different aspects of ATM information exchange. (Derived from the AIRM).	Provide a metadata vocabulary for describing and supporting retrieval of relevant aeronautical information by applications developed in other work packages of the project.
3	Ontology module expressed in OWL each describing different aspects of a sub-area of ATM information exchange: <i>Aeronautical Information</i> . (Derived from the AIXM exchange module).	
4	Ontology modules expressed in OWL each describing different aspects of a sub-area of ATM information exchange: <i>Meteorological Information</i> . (Derived from the IWXXM exchange module).	
5	Transformation scripts	Allow (full and partial) automation of process of generating ontologies from UML and other forms. Used to generate items 1-3 above.
Provided in the formal deliverable document		
6	Textual and diagrammatic overview of Items 1-4 (chapter 4).	Presents the ontologies through statistics about the ontologies and screen shots from an ontology editor depicting their structures.
7	Explanation about how the ontologies were developed (chapter 3).	Describes in detail the transformation rules guiding the transformation from UML to OWL.
8	Overview of information models relevant to ATM (chapter 2).	Describes which elements from the different information models are included in the transformation to OWL and how the UML models are processed into an intermediate representation (XMI) before executing the transformation.
9	Background information about ontologies and other semantic technologies (chapter 2)	Gives introductory information about ontologies along with a description on how semantic technologies relate to each other.

Item#	Brief Description	What it can be used for
10	Introduction to modularisation	Describes what we mean by ontology modules, why modularisation is important and how it can be accomplished.

Explanatory notes:

1. Items 1-4 constitute the ontology infrastructure that acts as an enabler for development of other project results.
2. A “monolithic” ontology (Item 1) is one describing a *complete domain* and contained within a single model. There are no external references to other ontologies.
3. The monolithic AIRM ontology (item 1) was produced by fully automated transformation of a UML representation of the AIRM.
4. Ontology “modules” (Items 2, 3 and 4) are self-contained but coherent knowledge models, each responsible for describing a single, narrower knowledge domain, and typically taking part in a network of interdependent modules in order to represent a larger knowledge domain.
5. The AIRM ontology modules (item 2) were automatically extracted from the AIRM ontology.
6. The AIXM ontology modules (item 3) were semi-automatically extracted from the AIXM model.
7. The IWXXM ontology modules (item 4) were manually developed.

## What details can I find in the deliverable document?

Details about what?	Reference
Definition of ontologies	Chapter 2.1
Distinction between monolithic ontologies and ontology modules	Chapter 2.3
Transformation rules Overview of mappings according to standard from Object Management Group (OMG) that informatively specifies how to transform from UML to OWL	Chapter 3.2.2 Chapter 3.2.2, table 3.
Illustration of the applied development approach	Chapters 2.6 and figure 5 presents an illustration that shows the overall workflow of the transformation. Chapter 3.1 and figure 6 details this workflow and includes what results (i.e. ontologies) the workflow produces.
How we validate the ontology infrastructure	Chapter 4.3

## How can I access parts of the deliverable that are not part of the formal document?

All ontologies are available as Web Ontology Language (OWL) files from the project web site in a compressed zip file: <http://project-best.eu/downloads/ontologies/ontologies.zip>

The transformation scripts used for transforming from UML to OWL are available in a compressed zip file from: <http://project-best.eu/downloads/ontologies/xslt/xslt.zip>