

Enclosure 2

**EUROCONTROL Specification
for
SWIM Information Definition**

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<p>This specification contains requirements for information definitions, meaning the formal descriptions of exchanged information, in the context of Initial System Wide Information Management (iSWIM). This contributes to semantic interoperability of information.</p>			
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Contact Person(s)		e-mail	Unit
Scott Wilson		swim@eurocontrol.int	ATM/STR/SWM

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Publications

EUROCONTROL Headquarters
96 Rue de la Fusée
B-1130 BRUSSELS

Tel: +32 (0)2 729 4715
Fax: +32 (0)2 729 5149
E-mail: publications@eurocontrol.int

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EXECUTIVE SUMMARY

This specification contains requirements for information definitions in the context of Initial System Wide Information Management (iSWIM) in Europe.

Information definitions, the formal descriptions of exchanged information, are produced or reused by operational stakeholders. They act as the means whereby the exchanged information is clearly defined, harmonised, understood and shared. Examples of information definitions are the description of information exchanged by services, standardised information exchange models, data catalogues used to list details on the exchanged information, and information exchanges captured as part of a business process model.

The requirements come in two broad categories: general requirements for information definitions and requirements on how to document semantic correspondence to the ATM Information Reference Model (AIRM).

The general requirements include, for example, the need for an edition and a reference date.

The semantic correspondence requirements are necessary for semantic interoperability, which is the ability of computer systems to exchange data with unambiguous, shared meaning. The requirements ensure that information definitions conform to the semantics of the AIRM, the common reference language for iSWIM.

1. Introduction

1.1 Purpose

This specification contains requirements for information definitions in the context of Initial System Wide Information Management (iSWIM) in Europe.

Information definitions, the formal descriptions of exchanged information, are produced or reused by operational stakeholders. They act as the means whereby the exchanged information is clearly defined, harmonised, understood and shared. Examples of information definitions are the description of information exchanged by services, standardised information exchange models, data catalogues used to list details on the exchanged information, and information exchanges captured as part of a business process model.

The requirements come in two broad categories: general requirements for information definitions and requirements on how to document semantic correspondence to the ATM Information Reference Model (AIRM) [RD 2].

The general requirements include, for example, the need for an edition and a reference date.

The semantic correspondence requirements are necessary for semantic interoperability, which is the ability of computer systems to exchange data with unambiguous, shared meaning. The requirements ensure that information definitions conform to the semantics of the AIRM, the common reference language for iSWIM.

1.2 Scope

This specification places general and semantic interoperability requirements on information definitions. To achieve semantic interoperability, information definitions need to conform to the semantics of the AIRM.

This specification does not include requirements on the content or structure of the AIRM as these are maintained in a separate AIRM Rulebook [RD 3].

Furthermore, it is not in the scope of this specification to impose a specific format or notation (such as Unified Modeling Language (UML) or Extensible Markup Language (XML) Schema) on information definitions.

1.3 Applicability

iSWIM supports “*information exchanges that are built on standards and delivered through an internet protocol (IP)-based network by SWIM enabled systems*”[RD 1]. It lists four areas for information exchanges:

- Aeronautical information exchange
- Meteorological information exchange
- Cooperative network information exchange
- Flight information exchange

The Pilot Common Project Regulation (PCP) [RD 1] requires that service implementations in support of the listed information exchanges “*be compliant with the applicable version of [the ATM] Information Reference Model (AIRM), the AIRM Foundation Material and the Information Service Reference Model (ISRM) Foundation Material*” (see sections 5.1.3, 5.1.4, 5.1.5 and 5.1.6 of the Annex to the Pilot Common Project).

Satisfying the requirements of this specification can be considered as a means of compliance for the enabling ATM functionality iSWIM as defined by the PCP [RD 1] in relation to the AIRM and its “*Foundation Material*”.

This specification can also be adopted outside of the specific PCP context by those seeking to achieve the benefits of SWIM.

1.4 Target Audience

The target audience for this specification includes, but is not limited to:

- Operational stakeholders implementing services supporting the exchange of information over SWIM This audience includes:
 - Business experts procuring systems and services;
 - Operational experts using systems and services to fulfil operational needs; and
 - Technical experts designing and implementing systems and services.
- Oversight authorities.

1.5 Conventions

In this specification:

- Requirements using the operative verb **shall** indicate that they must be implemented to achieve the minimum objectives of this specification.
- Requirements using the operative verb **should** indicate that they are recommended to achieve the best possible implementation of this specification.
- Requirements using the operative verb **may** indicate options.

Each requirement is detailed in a table with the following structure.

Title	Title of the requirement, used as a short name for the requirement for mnemonic and readability purposes.
Identifier	Unique identifier of the requirement.
Requirement	Statement expressing the requirement.
Rationale	Justification of the existence of the requirement.
Verification	Quality characteristics to be assessed when inspecting an information definition with regards to the requirement. This field can have as value any combination of the following: <ul style="list-style-type: none"> • Completeness • Consistency • Correctness
Examples/Notes	Examples in support of the requirement or additional notes to clarify the requirement.

Table 1 – Requirements structure

1.6 Abbreviations

Abbreviation	Term
AIRM	ATM Information Reference Model
AIS	Aeronautical Information Services
AIXM	Aeronautical Information Exchange Model
AMXM	Aerodrome Mapping Exchange Model
ATM	Air Traffic Management
ERAF	EUROCONTROL Regulatory and Advisory Framework
EU	European Union
FIXM	Flight Information Exchange Model
ICAO	International Civil Aviation Organization
IP	Internet Protocol
IR	Implementing Regulation
ISO	International Organization for Standardization
ISRM	Information Service Reference Model
iSWIM	Initial SWIM
JSON	JavaScript Object Notation
PCP	Pilot Common Project
SESAR	Single European Sky ATM Research
SKOS	Simple Knowledge Organization System
SWIM	System-Wide Information Management
UML	Unified Modeling Language
URN	Uniform Resource Name
XML	Extensible Markup Language

Table 2 – List of abbreviations

1.7 Definitions

Term	Definition	Source
AIRM concept	An information concept or data concept that is represented and managed in the AIRM.	-
AIRM conformant information definition	An information definition that conforms to the semantics of the AIRM.	-
completeness	The degree to which the content contains the expected information.	Adapted from ISO/IEC 25012:2008 [RD 6]
concept	A representation of a notion, a unit of thought.	Adapted from SKOS [RD 9]
consistency	The degree to which the content is free from contradiction and is coherent within itself and with referenced resources.	Adapted from ISO/IEC 25012:2008 [RD 6]
correctness	The degree to which the content correctly represents the true value.	Adapted from ISO/IEC 25012:2008 – Accuracy [RD 6]
data	A representation of fact, concept, or instruction represented in a formalized form suitable for communication, interpretation or processing either by human and/or by automated systems.	-
data concept	A specification of a concept using descriptive text and a given data type.	Adapted from SKOS [RD 9]
data type	A specification of a value domain with operations allowed on values in this domain. <i>Example: Integer, Real, Boolean, String, Date and SG Point (conversion of data into a series of codes).</i> <i>Note: Data types include primitive predefined types and user-definable types.</i>	ISO/TS 19103:2005 [RD 5]
information	Any communication or representation of knowledge such as facts, data, or opinions in any medium or form, including textual, numerical, graphic, cartographic, narrative, biometric or audio.	-
information concept	A specification of a concept using descriptive text only.	Adapted from SKOS [RD 9]
information definition	A formal representation of information concepts or data concepts.	-
information exchange model	A document in a formal language identifying the information that is agreed to be shared between two or more organisations or groups. <i>Note: The document may be in, for example, UML or XML.</i>	-

Term	Definition	Source
mapping	A set of traces that establishes a semantic correspondence between a concept in an information definition and AIRM concepts.	-
metadata	Data about data. <i>Note: The latest version of the ISO 19115 expands the definition to be "Information about a resource".</i>	ISO 19115:2003/Cor 1:2006 [RD 4]
namespace	A set of elements in which each element has a name unique within that set. The same name may be associated with elements in different sets.	Adapted from Oxford English Dictionary
operational stakeholders	Civil and military: airspace users, air navigation service providers and airport operators. <i>Note: The operational stakeholders are identified in the Annex to the Implementing Regulation.</i>	EU Implementing Regulation No 409/2013 [RD 8]
semantic correspondence	The relation between a concept in an information definition and the AIRM. <i>Note: A semantic correspondence takes the form of a mapping to AIRM concepts based on their meanings, an out-of-scope declaration or a reference to a change request.</i>	-
semantic interoperability	The ability of computer systems and organisations to exchange data with unambiguous, shared meaning	-
trace	A directed link from a concept in an information definition to an AIRM concept.	-

Table 3 – List of terms with definition

1.8 Reference Material

[RD 1] Commission Implementing Regulation (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan

[RD 2] ATM Information Reference Model

[RD 3] ATM Information Reference Model Rulebook

- [RD 4]** International Organization for Standardization – ISO 19115:2003/Cor 1:2006 - Geographic information — Metadata
- [RD 5]** International Organization for Standardization – ISO/TS 19103:2005 - Geographic information — Conceptual schema language
- [RD 6]** International Organization for Standardization – ISO/IEC 25012:2008 - Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Data quality model
- [RD 7]** ICAO Doc 10039 - Manual on System Wide Information Management (SWIM) Concept
- [RD 8]** Commission Implementing Regulation (EU) No 409/2013 of 3 May 2013 on the definition of common projects, the establishment of governance and the identification of incentives supporting the implementation of the European Air Traffic Management Master Plan
- [RD 9]** Simple Knowledge Organization System (SKOS), <http://www.w3.org/TR/2009/REC-skos-reference-20090818/#concepts>
- [RD 10]** Aeronautical Information Exchange Model (AIXM), www.aixm.aero
- [RD 11]** Flight Information Exchange Model (FIXM), www.fixm.aero
- [RD 12]** Aerodrome Mapping Exchange Model (AMXM), www.amxm.aero

1.9 Document Structure

Chapter 1 introduces this document, including its purpose, scope and audience. Chapter 2 gives the conformance statements. Chapter 3 lists the requirements addressing information definitions. Chapter 3 contains a section (3.1) listing general requirements on information definitions and a section (3.2) listing semantic correspondence requirements. Annex A provides the key principles followed by the AIRM to ensure that it is suitable for use in these requirements. Annex B summarises the requirements to be checked when assessing conformity to this specification. Annex C lists contributing subject matter experts.

1.10 Maintenance of the Specification

This EUROCONTROL Specification has been developed under the EUROCONTROL Advisory Framework (ERAF) and is maintained by EUROCONTROL in accordance with this framework.

2. Conformance

The conformity checklist table is available in ANNEX B. It is provided in support of assessing conformance with this specification.

3. Requirements

3.1 General Requirements for Information Definitions

Title	Need for information definitions
Identifier	SWIM-INFO-001
Requirement	Exchanged information shall be documented in an information definition.
Rationale	The requirement for information definitions is essential in order to allow semantic interoperability. Without information definitions, there are no resources to allow the meaning of the information to be clearly defined, harmonised, understood or shared.
Verification	Completeness
Examples/Notes	<p>Examples of information definitions include standardised information exchange models such as the Aeronautical Information Exchange Model (AIXM) [RD 10] and the Flight Information Exchange Model (FIXM) [RD 11].</p> <p>Other examples include:</p> <ul style="list-style-type: none"> • Descriptions of information exchanged by services. • Data catalogues used to list details on the exchanged information. • Information exchanges captured as part of a business process model.

Title	Information definition language
Identifier	SWIM-INFO-002
Requirement	An information definition shall be written in English using the spelling listed as the primary British spelling when conflicting spellings exist.
Rationale	By using a single reference language, the risk of translation ambiguities when comparing information definitions and the concepts they contain is removed.
Verification	Correctness
Examples/Notes	-

Title	Information definition identification
Identifier	SWIM-INFO-003
Requirement	<p>An information definition shall have:</p> <ul style="list-style-type: none"> • A title by which it is known. • An edition. • A reference date for use in citing the information definition.
Rationale	This requirement supports the identification and citation of an information definition.

Verification	Completeness
Examples/Notes	Examples include the “ <i>Aerodrome Mapping Exchange Model (AMXM), 2.0.0, 2015-08-24</i> ” [RD 12].

Title	Information definition responsible party
Identifier	SWIM-INFO-004
Requirement	An information definition shall be accompanied by statements on the party responsible for the information definition including: <ul style="list-style-type: none"> • The name of the responsible organisation or person. • The contact information of the responsible party. • The role played by the responsible party.
Rationale	This requirement supports the identification of the contact for an information definition.
Verification	Completeness
Examples/Notes	Example roles are “ <i>author</i> ” and “ <i>point of contact</i> ”.

Title	Information definition scope
Identifier	SWIM-INFO-005
Requirement	An information definition shall be accompanied by an abstract describing the scope of the information covered by the information definition.
Rationale	This requirement supports decisions on whether an information definition is suitable for use in a particular situation.
Verification	Completeness
Examples/Notes	An example abstract is provided by the Aeronautical Information Exchange Model: “ <i>The objective of the Aeronautical Information Exchange Model (AIXM) is to enable the provision in digital format of the aeronautical information that is in the scope of Aeronautical Information Services (AIS).</i> ”

Title	Information definition namespace
Identifier	SWIM-INFO-006
Requirement	An information definition shall declare a dedicated namespace for its concepts.
Rationale	A dedicated namespace is needed to disambiguate the content of one information definition from the content of another and from the content of the AIRM.
Verification	Completeness
Examples/Notes	An example namespace is provided by the Aeronautical Information Exchange Model: “ <i>aixm:http://www.aixm.aero/schema/5.1</i> ”.

Title	Information definition concepts
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Identifier	SWIM-INFO-007
Requirement	An information definition shall specify concepts by providing, at a minimum: <ul style="list-style-type: none"> • The name of the concept. • The definition of the concept. • For data concepts only, the data type of the concept.
Rationale	This requirement gives the minimum details needed about a concept (information concepts and data concepts) in order to apply the other requirements such as the ability to establish a semantic correspondence between concepts based on the definitions of the concepts.
Verification	Completeness, Consistency, Correctness
Examples/Notes	This requirement concerns information concepts and data concepts. This requirement is deliberately generic to allow multiple notations and modelling techniques. For example, concepts may be represented as classes in UML, elements in XML Schemas or as rows in a spreadsheet. As the requirement sets out the minimum needed, there is nothing to stop an information definition from including more details such as the relationships between concepts and constraints on the concepts. Furthermore, concepts may be contained in other concepts.

Title	Unique identifiers for concepts
Identifier	SWIM-INFO-008
Requirement	An information definition shall provide unique identifiers, including version information, for each of its concepts.
Rationale	The unique identifiers can be used in statements of semantic correspondence to ensure that mappings are unambiguous.
Verification	Completeness
Examples/Notes	Examples of unique identifiers include the Uniform Resource Name (URN) format provided for each concept in the AIRM: <i>“urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:AirspaceInfrastructure:Airspace:Airspace”</i> Unique identifiers can be provided, for example, as metadata fields attached to the concept in the information definition.

Title	Preservation of meaning
Identifier	SWIM-INFO-009
Requirement	If an information definition contains a concept with the same name as an AIRM concept or a synonym from the AIRM concept's list of synonyms, it shall preserve the meaning of the AIRM concept.

Rationale	<p>This requirement ensures that the definitions that are agreed in the AIRM are used consistently by information definitions.</p> <p>This removes the risk of semantic misalignment, possible reinterpretations and drift of meaning between different information definitions.</p>
Verification	Consistency
Examples/Notes	<p>The preservation of meaning requirement does allow some differences in the definitions of the concepts. For example, a definition in an information definition may have to be “rewritten” to take account of different terms used in the information definition as compared to the AIRM. To illustrate this:</p> <p>The AIRM’s “Runway” concept has a property called “associatedAerodrome” that is defined as “The aerodrome the runway is associated with”. An information definition uses the term “AirportHeliport” rather than “Aerodrome”. As “AirportHeliport” is a synonym of “Aerodrome”, the meaning shall be preserved. However, the information definition could rewrite the definition as “The AirportHeliport the runway is associated with.”</p> <p>If a concept does not use the same name (or a synonym) as an AIRM concept, SWIM-INFO-010 applies.</p>

Title	Principles for definitions for concepts
Identifier	SWIM-INFO-010
Requirement	<p>An information definition should apply the following principles for the definitions of its concepts when not using the definition from the AIRM.</p> <ul style="list-style-type: none"> • The definition should be concise, clear, and whenever possible no longer than one sentence. • The definition should state what the concept is, rather than what it is not. • The definition should not use words whose definitions refer back to the concept in question, or begin with the term itself. • The definition should not be a paraphrase of the term, but rather a description the concept.
Rationale	Interoperability is dependent on detailed definitions that are well understood, and understood in the same way by all participants. At a very minimum, the definitions should be of good quality. This requirement promotes good quality definitions.
Verification	Correctness
Examples/Notes	-

Title	Semantics of metadata
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Identifier	SWIM-INFO-011
Requirement	An information definition that defines metadata fields should base its metadata on the metadata semantics of the AIRM.
Rationale	Interoperability does not only concern the exchanged information. It also concerns the information about the exchanged information.
Verification	Consistency
Examples/Notes	The AIRM imports the ISO 19115 [RD 4] metadata standard. Example of metadata that may be exchanged are the lineage of the information and access rights to the information.

Title	Use of data types
Identifier	SWIM-INFO-012
Requirement	A data type used in the context of a data concept in the information definition shall be compatible with the semantics of the data type of the semantically correspondent AIRM concept.
Rationale	Data types are part of the semantics and agreement on them is essential to facilitate interoperability. A “name” concept that is defined as a string type is semantically different from a “name” that is a numeric type.
Verification	Consistency
Examples/Notes	The AIRM imports ISO 19103 [RD 5] for its basic data types. These include: Boolean, CharacterString and Real. XML supports e.g. boolean, string and real.

3.2 Semantic Correspondence Requirements for Information Definitions

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 conformation information definition.
Verification	Completeness
Examples/Notes	This requirement covers information concepts and data concepts. This requirement allows an information definition to: <ul style="list-style-type: none"> • 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

	<p>semantic correspondences.</p> <p>The forms that a semantic correspondence can take are given in SWIM-INFO-014.</p>
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Title	Forms of semantic correspondence
Identifier	SWIM-INFO-014
Requirement	<p>A semantic correspondence shall be:</p> <ul style="list-style-type: none"> • A mapping from a concept in the information definition to a concept or concepts in the AIRM; or • A declaration that the concept in the information definition is out-of-scope of the AIRM; or • A reference to a change request for the AIRM that intends to change the AIRM to cover the concept from the information definition.
Rationale	<p>This requirement ensures that the expression of semantic correspondence becomes verifiable.</p> <p>It allows gaps with the AIRM to be identified so that they can be managed. A reference to the change request is designed to allow an information definition to cause an evolution of the AIRM.</p>
Verification	Completeness
Examples/Notes	<p>There are several methods for documenting a semantic correspondence. For example, this requirement can be satisfied in a tabular format using the unique identifier of the concept in the information definition and the unique identifier of the related AIRM concept.</p> <p>Semantic correspondences could also be represented using:</p> <ul style="list-style-type: none"> • UML trace relationships; or • Metadata fields attached to the concept in the information definition that contains the unique identifier of the AIRM concept.

Title	Out-of-scope declaration
Identifier	SWIM-INFO-015
Requirement	A semantic correspondence declaring that a concept in an information definition is out-of-scope of the AIRM shall provide a rationale.
Rationale	An out-of-scope declaration is not verifiable without information about the rationale.
Verification	Completeness
Examples/Notes	<p>The following rationales were used in SESAR related work:</p> <ul style="list-style-type: none"> • container (e.g. XML complexTypes) • messaging (e.g. Aeronautical Fixed Telecommunication)

	<p>Network address)</p> <ul style="list-style-type: none"> • network (e.g. datalink protocol version, IP address) • system (e.g. technical identifiers, availability flags) • non-atm (e.g. human resource related information) • local (e.g. data only making sense for on specific service instance) • other (not covered by the other categories)
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Title	Mapping of information concepts to the matching AIRM concept
Identifier	SWIM-INFO-016
Requirement	The mapping of an information concept shall contain a trace from the information concept in the information definition to the AIRM concept that has an equivalent or wider meaning.
Rationale	This is a basic trace to establish the semantic correspondence between concepts. Without such a trace the mapping is pointless.
Verification	Correctness
Examples/Notes	<p>An example of trace to an AIRM concept with an equivalent meaning is provided by AIXM. It contains an information concept called "AirportHeliport" that is defined as "A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft/helicopters." This traces to the AIRM concept "Aerodrome" that has exactly the same definition.</p> <p>In cases where the trace is to an AIRM concept that has a wider meaning, SWIM-INFO-018 also applies. An example of a trace to an AIRM concept with a wider meaning can be found in SWIM-INFO-018.</p>

Title	Mapping of data concepts to the matching AIRM concepts
Identifier	SWIM-INFO-017
Requirement	The mapping of a data concept shall contain a trace from the data concept in the information definition to the AIRM concept that has an equivalent or wider meaning and a trace to the data type in the AIRM that has an equivalent or wider meaning.
Rationale	<p>This includes a basic trace to establish the semantic correspondence between concepts. Without such a trace the mapping is pointless.</p> <p>The requirement adds a second trace for data concepts, as the constraint on value space expressed by the data type is also important to the semantics.</p>
Verification	Correctness
Examples/Notes	An example is an information definition contains a data concept called "Target Startup Approval Time" that is a time.

	<p>Two traces are needed for this mapping:</p> <ul style="list-style-type: none"> • One trace to the AIRM concept called “StartUp”. • One trace to the AIRM data type called “DateTime”. <p>In cases where the trace is to an AIRM concept that has a wider meaning, SWIM-INFO-018 also applies. An example of a trace to an AIRM concept with a wider meaning can be found in SWIM-INFO-018.</p> <p>It may be possible to combine these traces into one single statement depending on the tracing techniques adopted.</p> <p>This requirement implies that implementations using technology that provides no typing (for example, JSON) will need to specify the applicable value range constraints at design time relative to the AIRM data type to demonstrate semantic correspondence.</p>
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Title	Additional traces to clarify the mapping of narrower concepts
Identifier	SWIM-INFO-018
Requirement	The mapping of a concept to an AIRM concept that has a wider meaning shall contain additional traces to AIRM concepts to fully describe the narrowing of the concept being mapped.
Rationale	This requirement accounts for the diversity in data modelling strategy.
Verification	Correctness
Examples/Notes	<p>This requirement requires additional traces to those required by SWIM-INFO-016 (for information concepts) and SWIM-INFO-017 (for data concepts).</p> <p>In practice, additional traces need to be provided for all qualifiers in the definition of a concept in an information definition that are absent in the definition of an AIRM concept. This ensures that the mapping is precise.</p> <p>An example is an information definition that contains a data concept called “Target Startup Approval Time” that is a time.</p> <p>Three traces are needed for this mapping to be unambiguous. The first two traces are those required by SWIM-INFO-017 and the third is an additional trace to ensure the mapping is unambiguous:</p> <ul style="list-style-type: none"> • One trace to the AIRM concept called “StartUp”. • One trace to the AIRM data type called “DateTime”. • One additional trace to the “CodePlanningStatusType” value “TARGET” in order capture the “Target” qualifier in the concept. This is required as “StartUp” has a wider meaning than “Target Startup”. <p>It is laborious to repeat traces established for concepts that contain</p>

	<p>the concept being traced. Therefore, the concept being traced can treat the parent traces as part of its own mapping.</p> <p>To continue the example: An information definition contains a data concept called “Startup Approval Time” and a contained concept (e.g. modelled by specialisation in UML) called “Target Startup Approval Time”. In this case, the first two traces will be established for “Startup Approval Time” and can be treated as part of the mapping of the “Target Startup Approval Time” concept.</p>
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Title	Use of the AIRM’s unique identifiers in traces
Identifier	SWIM-INFO-019
Requirement	A trace shall use the unique identifier provided by the AIRM concept at its end-point.
Rationale	This requirement determines the path of the end-point regardless of the format in which the AIRM is represented.
Verification	Correctness
Examples/Notes	-

ANNEX A – Principles for AIRM

This specification relies on the AIRM as the common reference language to be used to achieve semantic interoperability. The content of the AIRM and the building of the AIRM are not in the scope of this specification. However, it is important to note that the AIRM applies the following principles that create confidence that it serves the needs of semantic interoperability.

- The AIRM covers the ATM information and the necessary ATM-related information that is exchanged via interoperable SWIM information services.
- The AIRM is consistent with the ICAO SWIM Concept (ICAO Doc 10039 [RD 7]).
- The AIRM uses an agreed set of international standards for basic types, such as free-text types, spatial types and temporal types to ensure that these common concepts are defined once.
- The AIRM is independent of specific technologies, implementations, or other concrete details.
- The AIRM contains a standard to define the semantics of the metadata fields for datasets/data.
- The AIRM has version control and deprecation mechanisms in place to ensure that the content of the AIRM is managed in a transparent way.
- The AIRM evolution is managed by a change control board to which stakeholders can submit change requests.

ANNEX B – Conformity Checklist

This annex summarises the requirements to be checked when assessing conformity to this specification. Table 4 lists each requirement in the specification using its identifier and title. It then states the level of implementation to be achieved (see Table 5). In some cases the implementation is conditional which means that the requirement is to be implemented when the condition applies.

Identifier	Title	Level of Implementation
General Requirements		
SWIM-INFO-001	Need for information definitions	M
SWIM-INFO-002	Information definition language	M
SWIM-INFO-003	Information definition identification	M
SWIM-INFO-004	Information definition responsible party	M
SWIM-INFO-005	Information definition scope	M
SWIM-INFO-006	Information definition namespace	M
SWIM-INFO-007	Information definition concepts	M
SWIM-INFO-008	Unique identifiers for concepts	M
SWIM-INFO-009	Preservation of meaning	M Conditional
SWIM-INFO-010	Principles for definitions for concepts	R
SWIM-INFO-011	Semantics of metadata	R
SWIM-INFO-012	Use of data types	M
Requirements for semantic correspondence		
SWIM-INFO-013	Establish semantic correspondence	M
SWIM-INFO-014	Forms of semantic correspondence	M
SWIM-INFO-015	Out-of-scope declaration	M Conditional
SWIM-INFO-016	Mapping of information concepts to the matching AIRM concept	M Conditional
SWIM-INFO-017	Mapping of data concepts to the matching AIRM concepts	M Conditional
SWIM-INFO-018	Additional traces to clarify the mapping of narrower concepts	M Conditional
SWIM-INFO-019	Use of the AIRM's unique identifiers in traces	M

Table 4 – Conformity checklist

Level of Implementation	Operative verb used in requirement	Meaning
M = Mandatory	shall	The requirement must be implemented to achieve the minimum objectives of this specification.
R = Recommended	should	The requirement is recommended to be implemented to achieve the best possible implementation of this specification.
O = Optional	may	The requirement indicates options.

Table 5 – Level of implementation

ANNEX C – List of Contributors

This specification was prepared by EUROCONTROL with the assistance of the following subject matter experts:

Name	Organisation
Agathe Drouin	METEO FRANCE
Dominique Guillerm	EUROCONTROL CMC
Gianluca Marrazzo	LEONARDO
Harald Milchrahm	FREQUENTIS
Joe Gorman	SINTEF
Mickaël Guillot	DSNA
Monica Vlad	ASBU FOR FUTURE
Peter Rudolph	ASBU FOR FUTURE
Stefan Keller	DFS

Table 6 – List of subject matter experts