



ATIEC 2021

16 September
2021

BEST

Semantics and SWIM

Presentation by: Scott Wilson,
EUROCONTROL

Smart.
Secure.
Shareable.
Aviation
Information.



**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

Content

Introduction: SWIM and Semantics

BEST

research

outcomes

leveraging

Next Steps

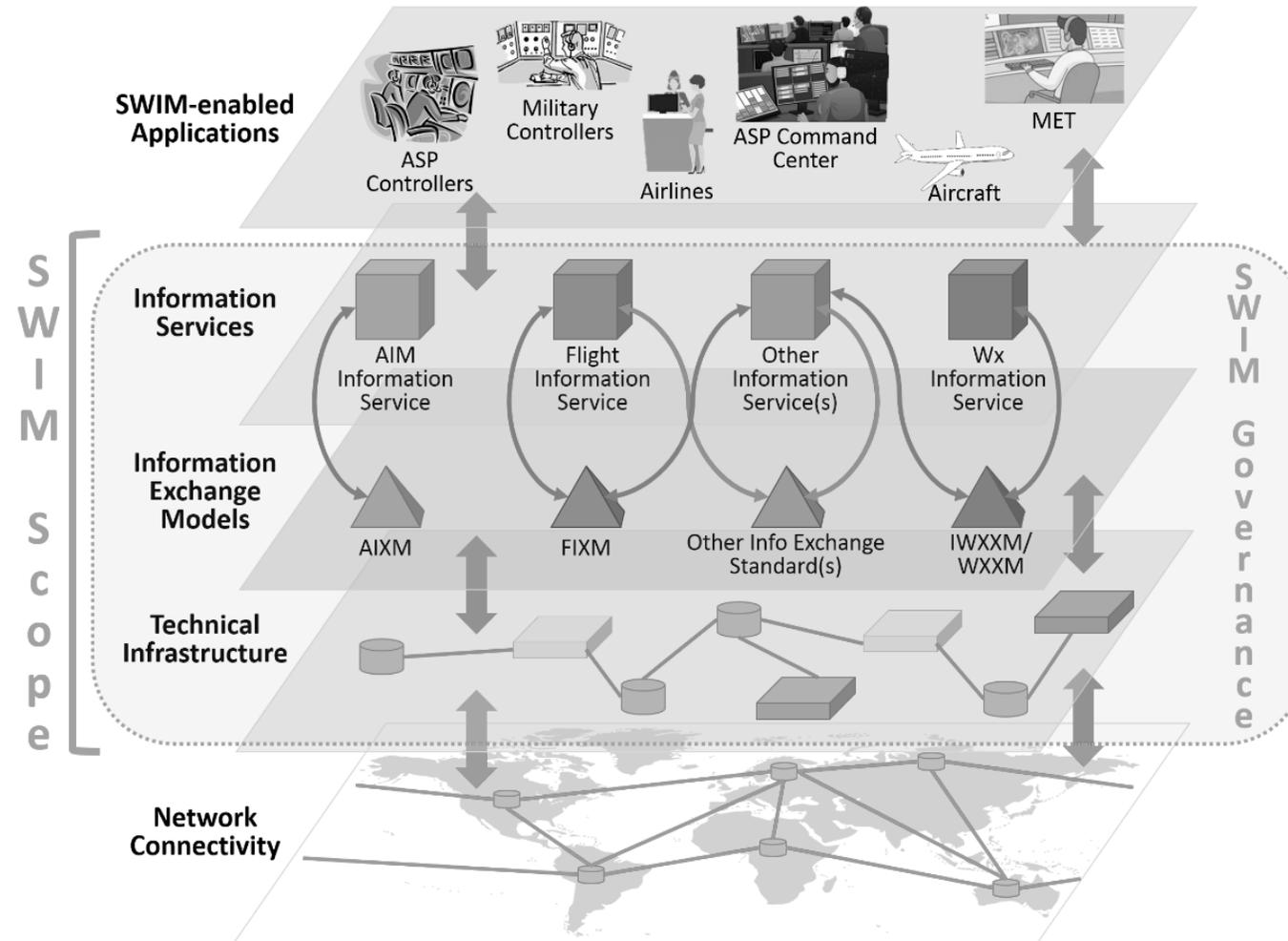


**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

What is SWIM?

SWIM emphasizes interoperability





**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

What is

What does it mean?

semantics?

Semantics

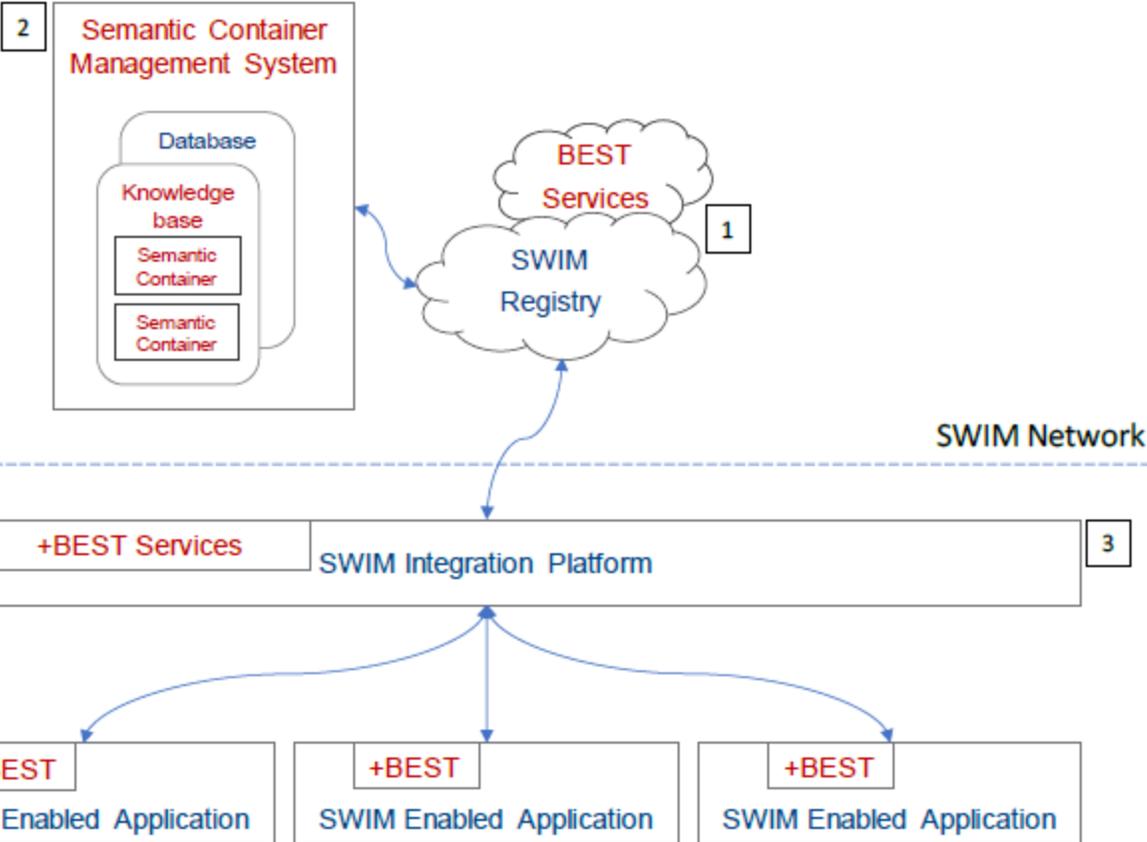
the meaning of language constructs

Semantic interoperability

the ability of computer systems to exchange data with unambiguous, shared meaning

Semantic technology

enables machine computable logic, inferencing, knowledge discovery, and data federation between information systems



It is BEST?

VIM by making smart use of



2021

Smart.

Secure.

Shareable.

Aviation Information.



What is SWIM?

SWIM is the answer to achieving *global interoperability* and *service orientation* in air traffic management.



**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

What was researched?

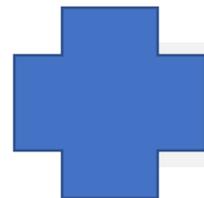
automated generation of Web Ontology Language (OWL) ontologies from existing information standards



automated alignment checking



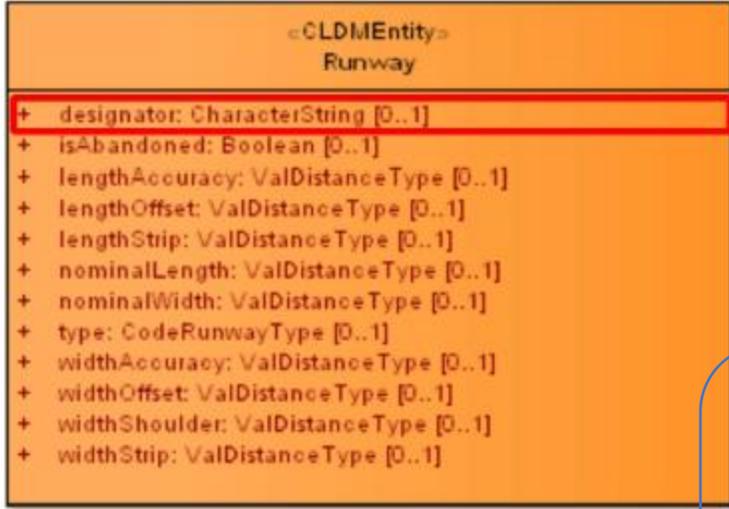
create semantic container descriptions



scalability, modularization, governance aspects



UML Representation



OWL Representation

```
<!-- http://www.best-project.org/owl/AIRM#Runway-designator -->  
<owl:DatatypeProperty rdf:about="&airm;Runway-designator">  
  <rdf:type rdf:resource="&owl;FunctionalProperty"/>  
  <rdfs:label>designator</rdfs:label>  
  <rdfs:comment>The designator of a runway, used to uniquely identify  
  <rdfs:subPropertyOf rdf:resource="&airm;Runway_DP_" />  
  <rdfs:range rdf:resource="&xsd:string" />  
</owl:DatatypeProperty>
```

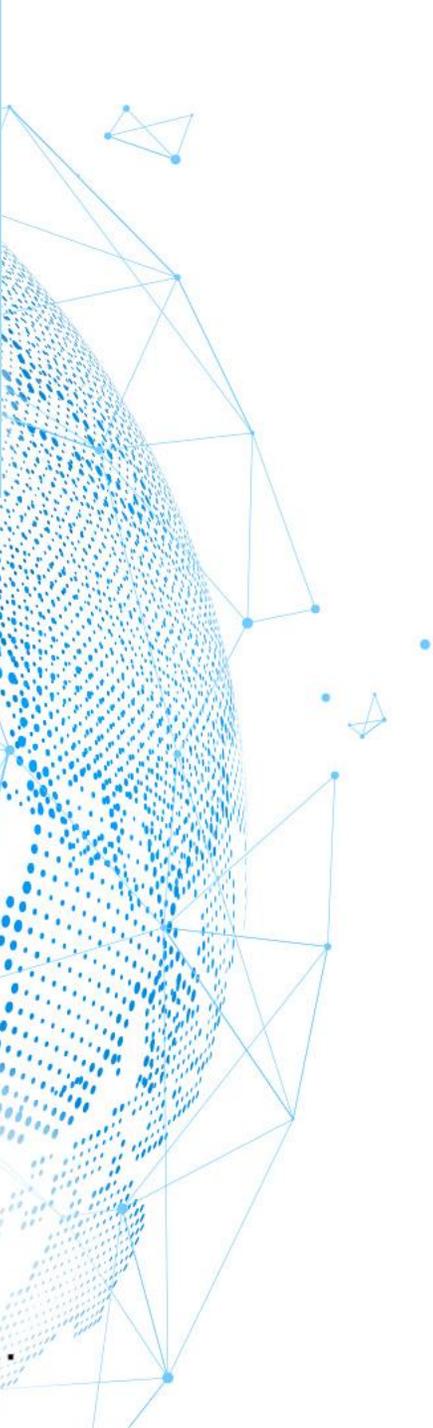
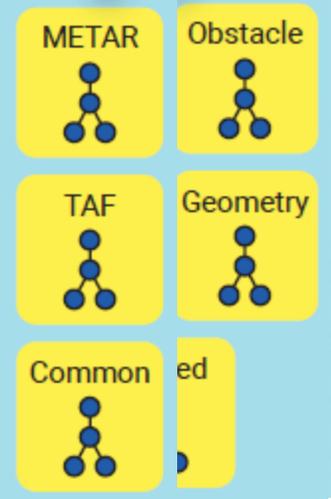


ogy



**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.



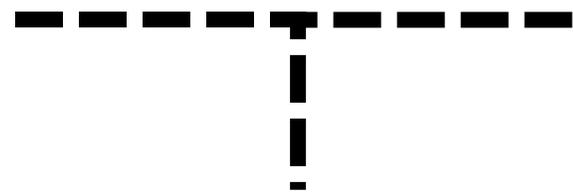
What was done?

Alignment checking using ontology matching

EUROCONTROL

**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.



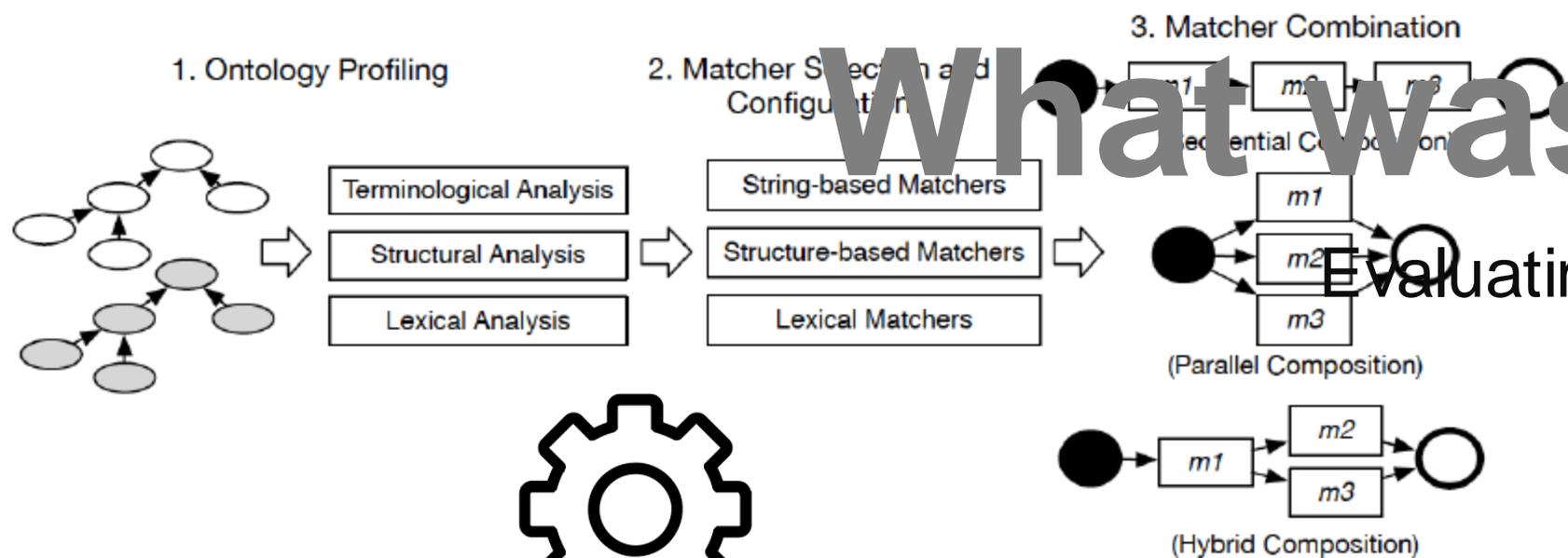
 AIRM

IWXXM

AIXM

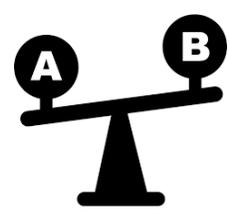
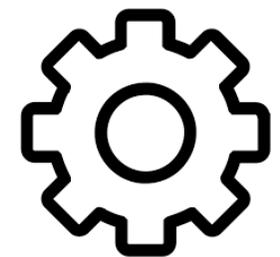
What was done?

Evaluating ontology matching



**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.



Manually created reference alignments



METARs<MUC-FRA,23/2/2017>

--- Membership Condition ---

Data item type: METAR

Origin: DWD

Location: Route MUC-FRA

Time: 2017-02-23

---Administrative Metadata---

Data format: XML

Last change: 2017-02-23T11:00:00

What was done?

Semantic containers

The **description** includes a membership condition and administrative metadata, such as provenance, quality, and technical metadata.

The **content** is a set of data items from multiple sources that fulfil the membership condition

Content

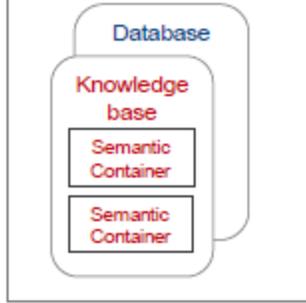
Smart.
Secure.
Shareable.
Aviation
Information.

```
<METAR>
  <raw_text>
    PHTO 161053Z
    24005KT 10SM
    FEW027 BKN070 20/18
    A3013 RMK AO2
    RAB21E46 SLP201
    P0000 T02000178
  </raw_text>
  ...
</METAR>
```

What was done?

Semantic NOTAM - Integrating into SWIM

2 Semantic Container Management System



SWIM Network

Organization



discovering



ATIEC
2021

Smart.
Secure.
Shareable.
Aviation
Information.

applying

integrating



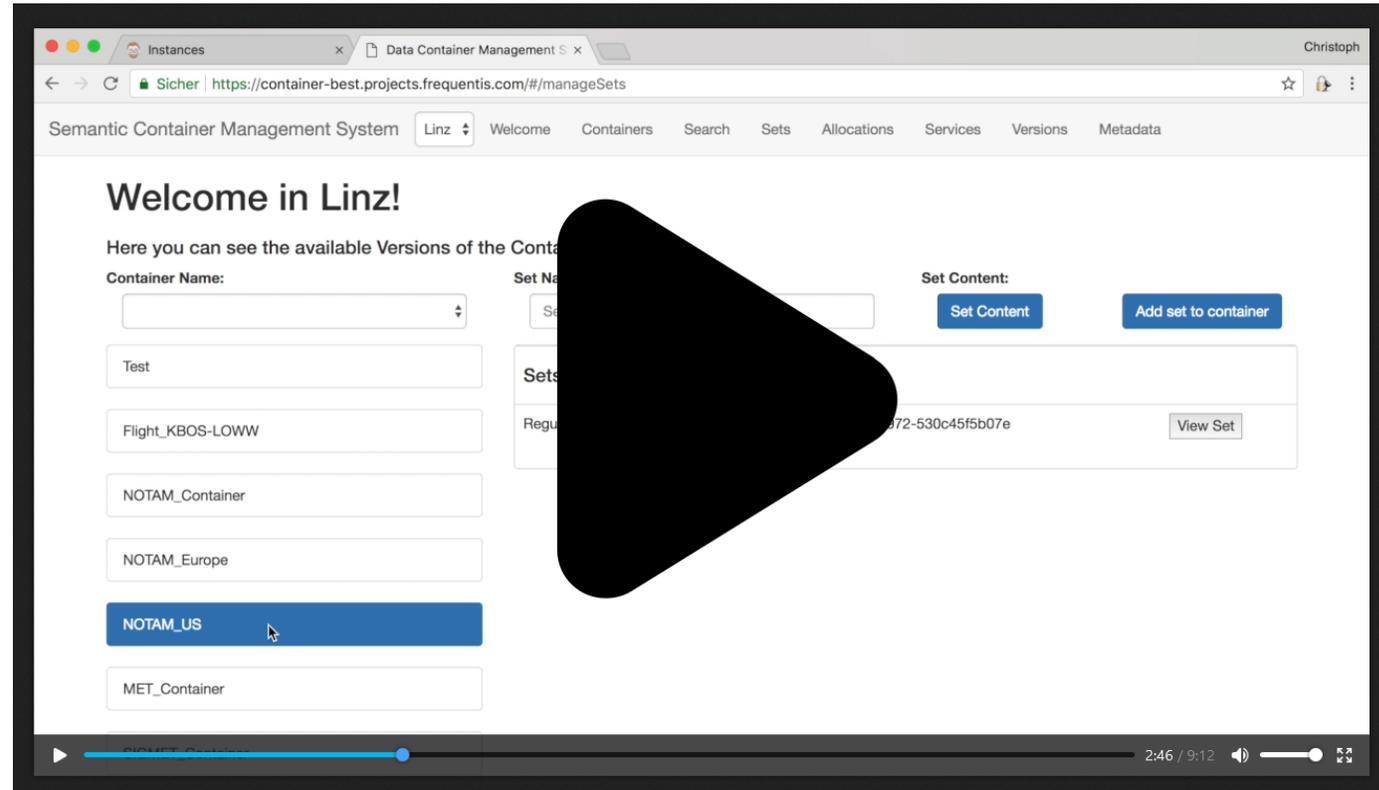
EUROCONTROL

**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

What was done?

Semantic NOTAM



Video is available in the video booth

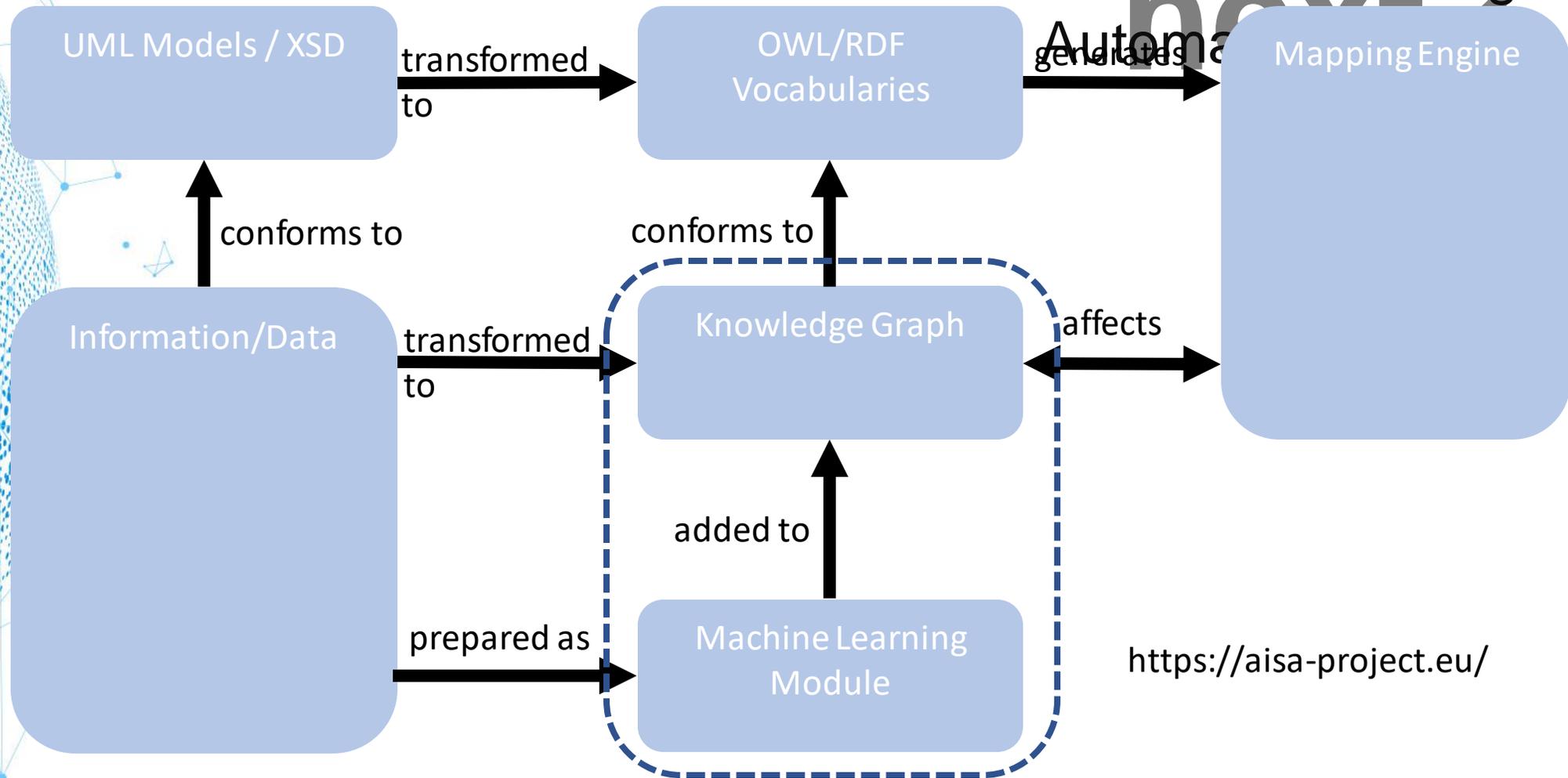


**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

What happened

AI Situational Awareness Foundation for Advancing



<https://aisa-project.eu/>



ATIEC
2021

Smart.
Secure.
Shareable.
Aviation
Information.



Term
URN
Definition

Concepts that are semantically
correspondent with it

What happened

AIRM semantic correspondence viewer

locationIndicatorICAO

urn:aero:airm:1.0.0:LogicalModel:Subjects:BaseInfrastructure:AerodromeInfrastructure:Aerodrome@locationIndicatorICAO
A four-letter code group formulated in accordance with rules prescribed by ICAO and assigned to the aerodrome.

type: CharacterString

Show correspondences

Model	Concept
FIXM 4.2.0	locationIndicator
AMXM 2.0.0	idarpt
AIXM 5.1.1	locationIndicatorICAO



<https://airm.aero/developers/semantic-correspondences.html>

AERONAUTICAL_INFORMATION_EXCHANGE

http://reference.swim.aero/information-services/service-categories/CodeRegulatedInformationExchangeType#AERONAUTICAL_INFORMATION_EXCHANGE

The Aeronautical information exchange regulated in Commission Implementing Regulation (EU) 2021/116, Common Project One.



METEOROLOGICAL_INFORMATION_EXCHANGE

http://reference.swim.aero/information-services/service-categories/CodeRegulatedInformationExchangeType#METEOROLOGICAL_INFORMATION_EXCHANGE

The Meteorological information exchange regulated in Commission Implementing Regulation (EU) 2021/116, Common Project One.

2021

Smart.
Secure.
Shareable.
Aviation
Information.

The screenshot displays the 'Taxonomy' application interface. On the left, a tree view shows a hierarchy of concepts, with 'AERONAUTICAL_INFORMATION_EXCHANGE' selected. The main panel on the right provides detailed information for this concept:

- Labels and Description:**
 - preferred label: AERONAUTICAL_INFORMATION_EXCHANGE (en)
 - alternative label: Aeronautical Information Exchange (en)
 - type: Concept
 - definition: The Aeronautical Information exchange regulated in Commission Implementing Regulation (EU) 2021/116, Common Project One. (en)
- Hierarchical Relationships:**
 - top concept of: CodeRegulatedInformationExchangeType
- Associative Relationships:**
 - related concept: AERONAUTICAL_INFORMATION
 - preferred label: AERONAUTICAL_INFORMATION (en)
 - alternative label: Aeronautical Information (en)
 - type: Concept
 - definition: Information resulting from the assembly, analysis and formatting of aeronautical data. (en)
 - top concept of: CodeInformationDomainType
 - related concept: AERONAUTICAL_INFORMATION_EXCHANGE
- Matching Relationships:**
 - has broader match: aeronautical

<https://reference.swim.aero/information-services/service-categories.html>



**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

What are the next

Looking ahead

Continue to leverage semantic technologies

publish more vocabularies e.g. topics to classify ICAO digital data sets

realize opportunities for automated alignment checking

Gather more detailed requirements

identify opportunities at data level

Validate new ideas and tools as they emerge



EUROCONTROL

**ATIEC
2021**

Smart.
Secure.
Shareable.
Aviation
Information.

THANK YOU
 GRACIAS ARIGATO SHUKURIA
 TASHAKKUR ATU
 MERASTAWHY
 GOZAIMASHITA
 EFCHARISTO
 KOMAPSUMNIDA
 MAALKE
 GRAZIE
 MEHRBANI
 PALDIES
 BOLZIN
 MERCY
 BIYAN SHUKRIA
 DANKSCHEEN
 SPASSIBO
 HURUH
 SNACHALHYA
 CHALTU
 YAQHANYELAY
 WAREEJA
 MATTEKA
 YUSPAGARATAM
 HUI
 UNALCHEESI
 HATUR SE
 SIKOMO
 MAKETAU
 MINMONCHAR