



**Network Manager**  
nominated by  
the European Commission

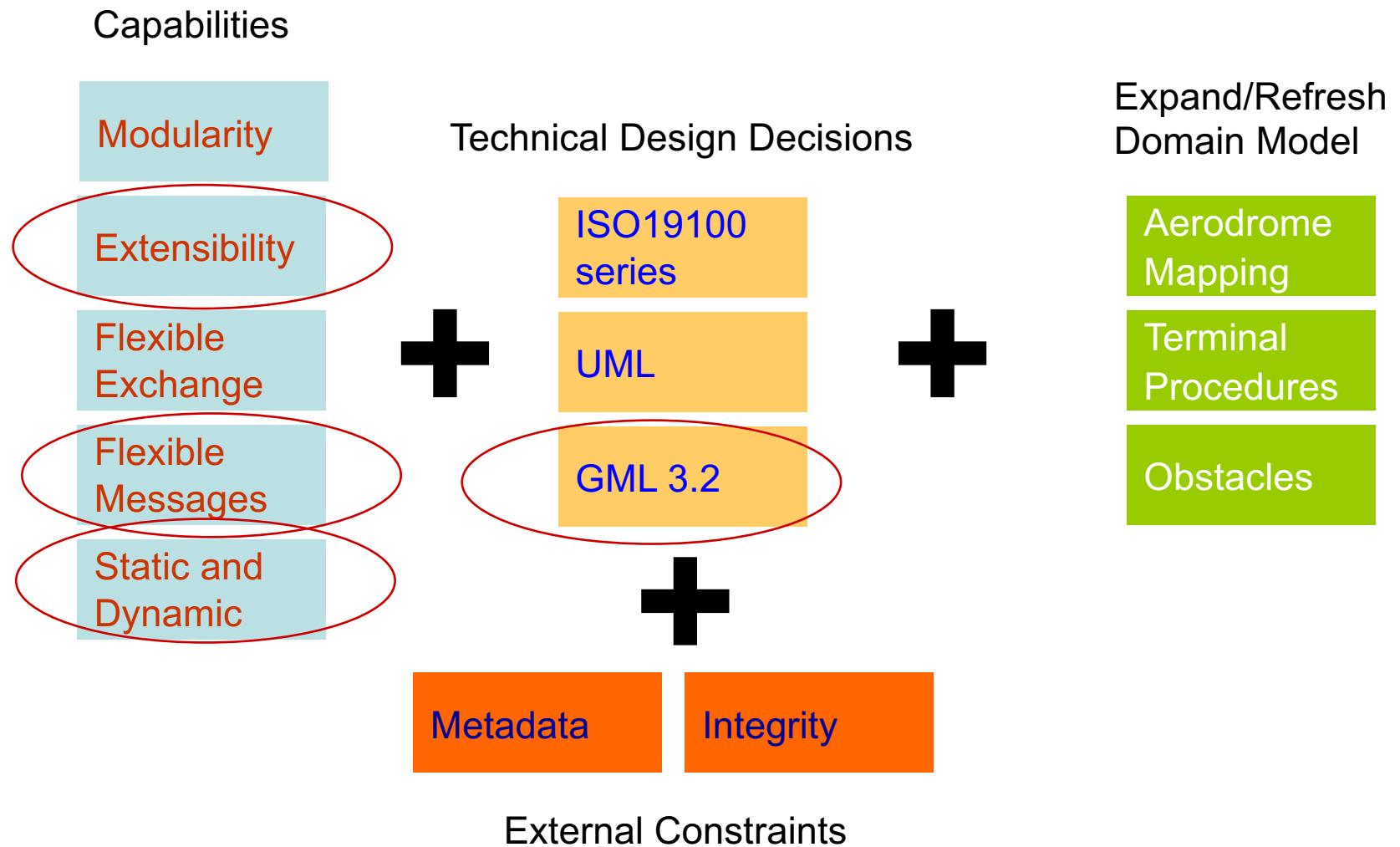


# AFI Region AIXM e-AIP Implementation Workshop Dakar, Senegal, 3-5 October 2016

AIXM 5.1 XML Schema

Razvan GULEAC  
EUROCONTROL

# AIXM 5 – Design Objectives



# Special aspects

- Namespaces
  - aixm:, gml:, etc.
- Object/property model
- Data Types
- Use of XML attributes
  - uom
  - nilReason
- Feature identification and association
  - gml:identifier
  - Xlink:href
- Extensibility
  - Enumerations -> OTHER:...
  - Feature/Object
- Temporality
  - Just covered in session 04

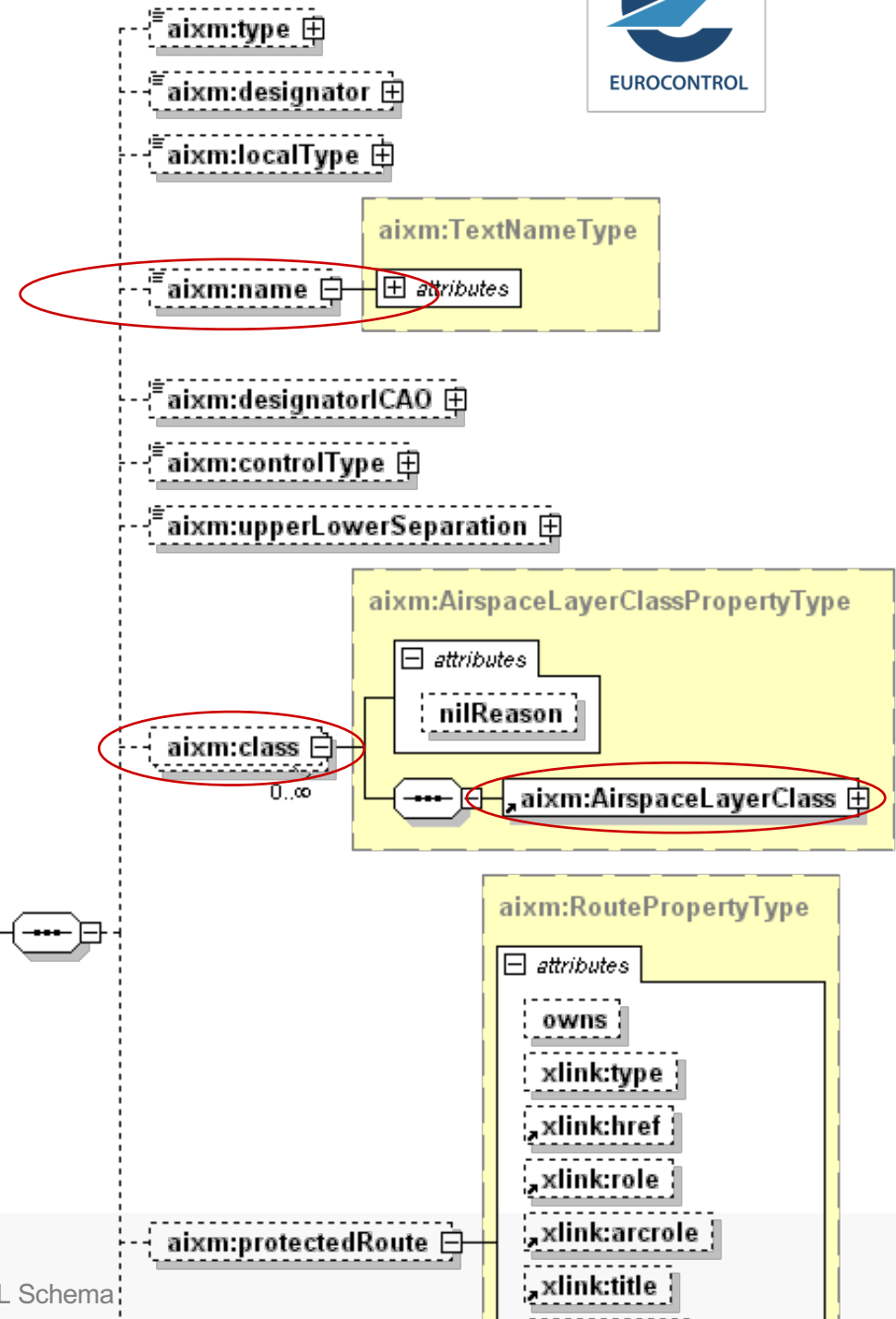
# Namespaces

- **aixm:**
  - version 5.1
    - `xmlns:aixm="http://www.aixm.aero/schema/5.1/index.html"`
- **gml:**
  - `<import namespace="http://www.opengis.net/gml/3.2" schemaLocation="./ISO_19136_Schemas/gml.xsd"/>`
- **xlink:**
  - `<import namespace="http://www.w3.org/1999/xlink" schemaLocation="./xlink/xlinks.xsd"/>`

# Object/property model

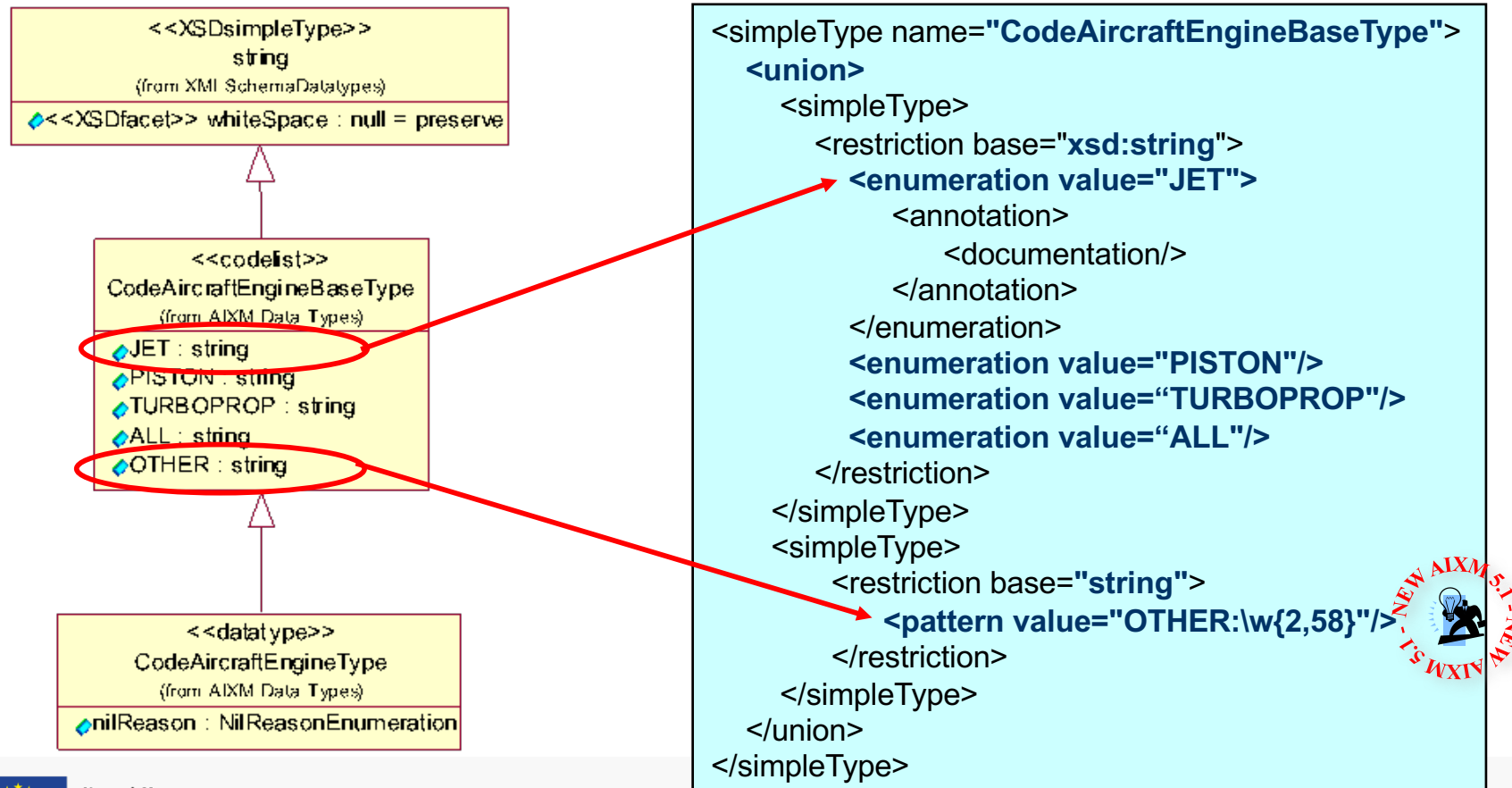
complexType	AirspacePropertyType
element	Airspace
complexType	AirspaceType
complexType	AirspaceTimeSlicePropertyType
element	AirspaceTimeSlice
complexType	AirspaceTimeSliceType
group	AirspacePropertyGroup

AirspacePropertyGroup



# AIXM 5.1 Mapping Rules - Datatypes

- Mapping <<odelist>>



# AIXM 5.1 Mapping Rules - NilReason

## ■ Mapping nilReason

```
<<XSdsimpleType>>
  string
  (from XMLSchemaDatatypes)
  ◆<<XSDfacet>> whiteSpace : null = preserve
```

```
<<enumeration>>
  CodeAircraftEngineBase Type
  (from AIXM Data Types)
  ◆JET : string
  ◆PISTON : string
  ◆TURBOPROP : string
  ◆ALL : string
  ◆OTHER : string
```

```
<<datatype>>
  CodeAircraftEngineType
  (from AIXM Data Types)
  ◆nilReason : NilReasonType
```

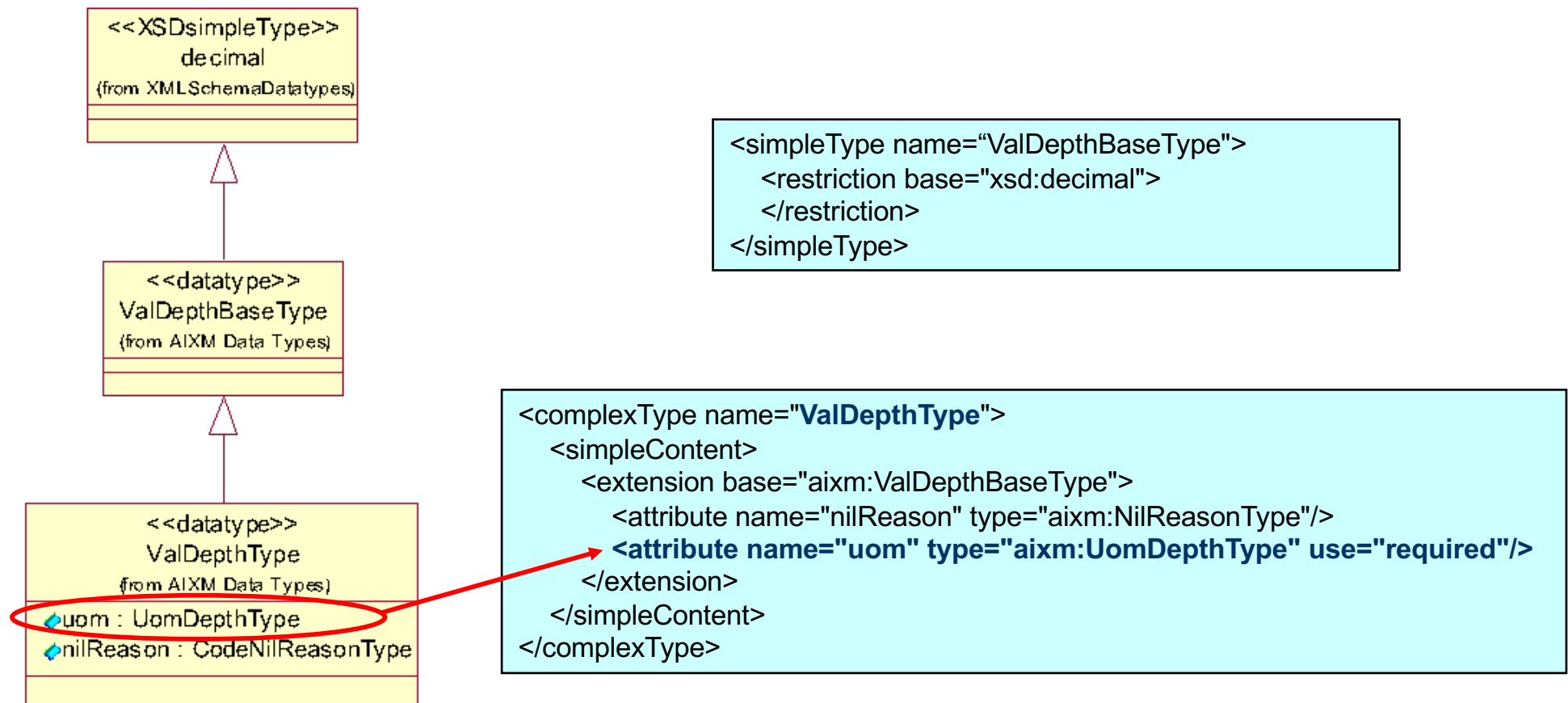
```
<simpleType name="CodeAircraftEngineBaseType">
  <union>
    <simpleType>
      <restriction base="xsd:string">
        <enumeration value="JET">
          .....
        </enumeration>
      </restriction>
    </simpleType>
    <simpleType>
      <restriction base="string">
        <pattern value="OTHER:\w{2,58}" />
      </restriction>
    </simpleType>
  </union>
</simpleType>
```

```
<complexType name="CodeAircraftEngineType">
  <simpleContent>
    <extension base="aixm:CodeAircraftEngineBaseType">
      <attribute name="nilReason" type="aixm:NilReasonType" />
    </extension>
  </simpleContent>
</complexType>
```



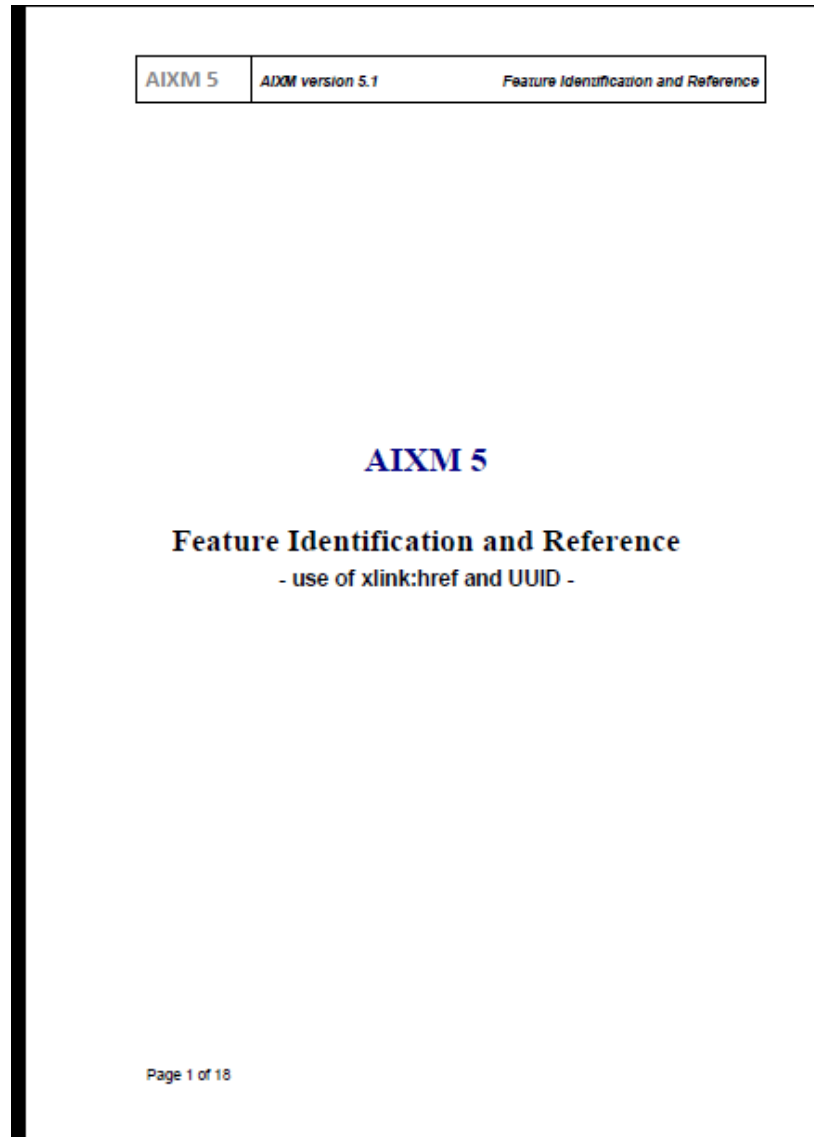
# AIXM 5.1 Mapping Rules - UOM

- Mapping Units of Measurement





# Feature identification and reference



# Feature identification

```
<gml:identifier  
    codeSpace="urn:uuid:">a82b3fc9-4aa4-4e67-8def-  
aaea1ac595j</gml:identifier>
```

*version 4 UUID based on random number generation, is recommended*

```
<aixm:Airspace gml:id="uuid.a82b3fc9-4aa4-4e67-8def-aaea1ac595j">  
    <gml:identifier codeSpace="urn:uuid:">a82b3fc9-4aa4-4e67-8def-  
aaea1ac595j</gml:identifier>  
    <aixm:timeSlice>  
        <aixm:AirspaceTimeSlice gml:id="ID00001">
```

# Feature reference

- 3.2 Concrete local references within a message

...

```
<aixm:AirTrafficControlService gml:id="uuid.d4d33081-  
54ad-4c1a-9519-b5b67de561ae">
```

...

```
<aixm:clientAirspace xlink:href="#uuid.a82b3fc9-4aa4-  
4e67-8def-aae1ac595j"/>
```

...

# Feature reference

- 3.3 Concrete external references

```
<aixm:clientAirspace  
xlink:href="http://aim.faa.gov/services/AirspaceService#  
uuid.a82b3fc9-4aa4-4e67-8def-aae1ac595j"/>
```

```
<aixm:clientAirspace  
xlink:href="http://aim.faa.gov/services/AirspaceService?  
get=a82b3fc9-4aa4-4e67-8def-  
aae1ac595j#xmlns(ns1=http://www.opengis.net/gml/3.2)xml  
ns(ns2=http://www.aixm.aero/schema/5.1)xpointer(//ns2:Air  
space[ns1:identifier='a82b3fc9-4aa4-4e67-8def-  
aae1ac595j'])"/>
```

# Feature references

- 3.4 Abstract references

- Using UUID

```
... <aixm:clientAirspace xlink:href="urn:uuid:a82b3fc9-4aa4-4e67-8def-aaea1ac595j"/>...
```

- Using natural keys

```
... <aixm:clientAirspace  
xlink:href="urn:aixm:Airspace(gml:timePosition=2010-04-07T09:00;aixm:type=D;aixm:designator=EBD25A)"/>...
```

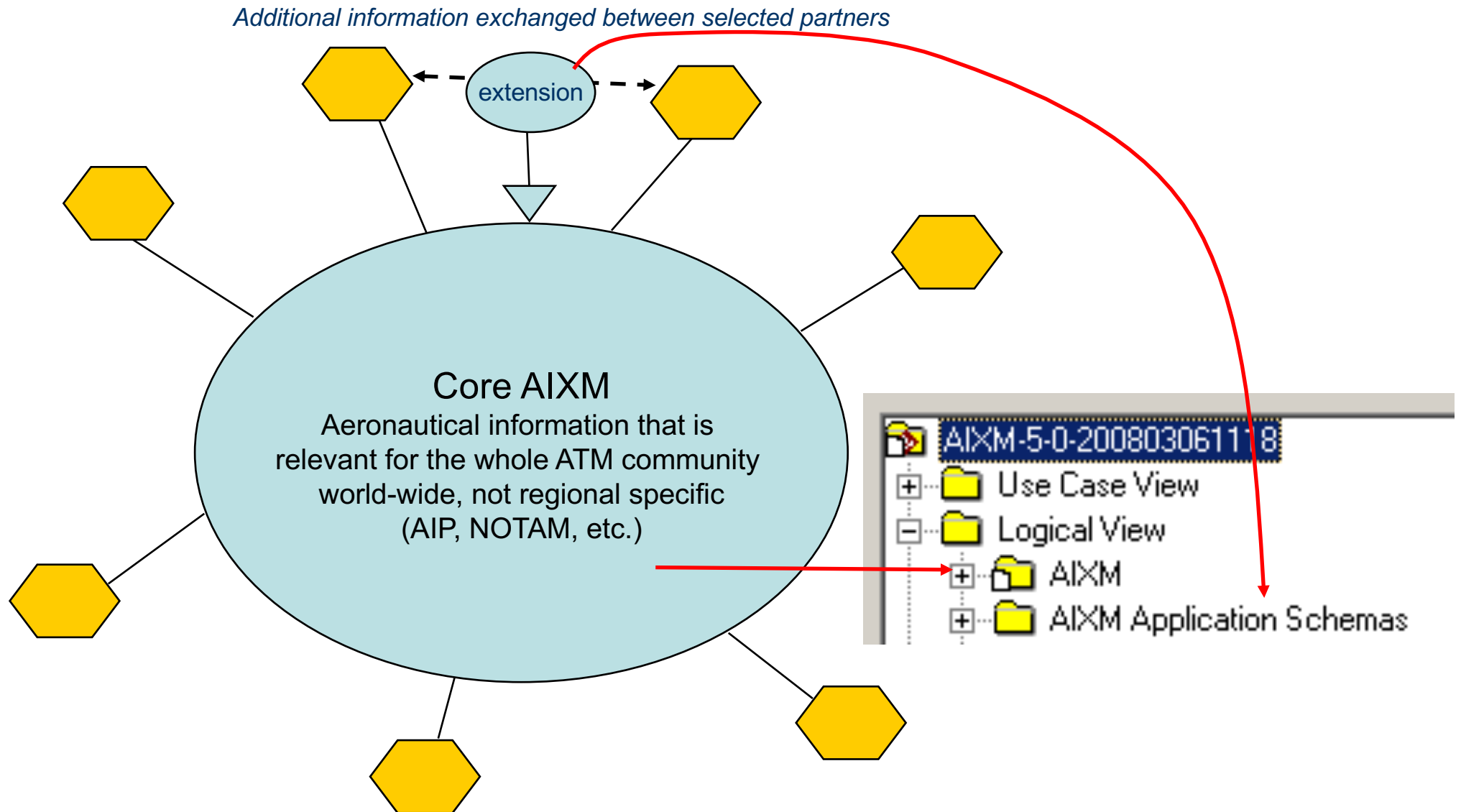
# Feature references

- 3.5 Use of xlink:title
  - human-friendly name of the feature for display purposes
  - not for feature identification in automatic processing!

```
... <aixm:clientAirspace xlink:href="urn:uuid:a82b3fc9-4aa4-4e67-8def-aaea1ac595j" xlink:title="Gabbs North MOA" />...
```

Highly recommended for debugging

# AIXM 5.1 extensions



# Extensions – feature/object

AIXM 5 AIXM version 5.1 AIXM Application Schema

## AIXM

### AIXM Application Schema Generation

AIXM 5 AIXM version 5.1 AIXM Application Schema

## 2 Extending AIXM Features / Objects

### 2.1 UML Package for Extensions

To extend AIXM, a new package must be created under the AIXM Application Schemas package. This package will contain all the information you need for your extension.

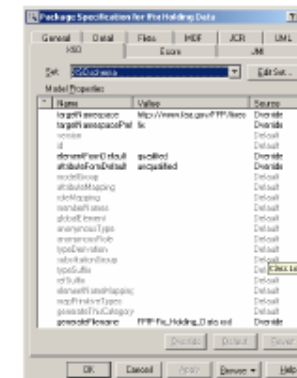
#### 2.1.1 Package Structure

Different types of sub-packages are used to control the generation of appropriate XML schemas (XSD). The Extension sub-package contains the extensions to AIXM Core features and objects. If the extension requires new data types, then a second sub-package, the Extension Data Types, is created containing any new data types and codelists needed. The final sub-packages that are needed are the message packages. Multiple packages may be required based on the number of different message schemas needed. Most Application Schema Packages will have at least one request package and one response package.

- FFP Fix
- Fix Extension
- Fix Extension Data Types
- Fix Holding Data
- Fix Holding Data Record

#### 2.1.2 Package Specifications and Namespaces

The extension package must have the appropriate XSD tool attributes set so the script can generate the namespaces correctly. Below is an example of how these attributes are set for the Fix Holding Data sub-package.



There are five properties that are needed for each new Application Schema package being used to generate XML Schemas. These properties are highlighted below with the Source as 'Override'.

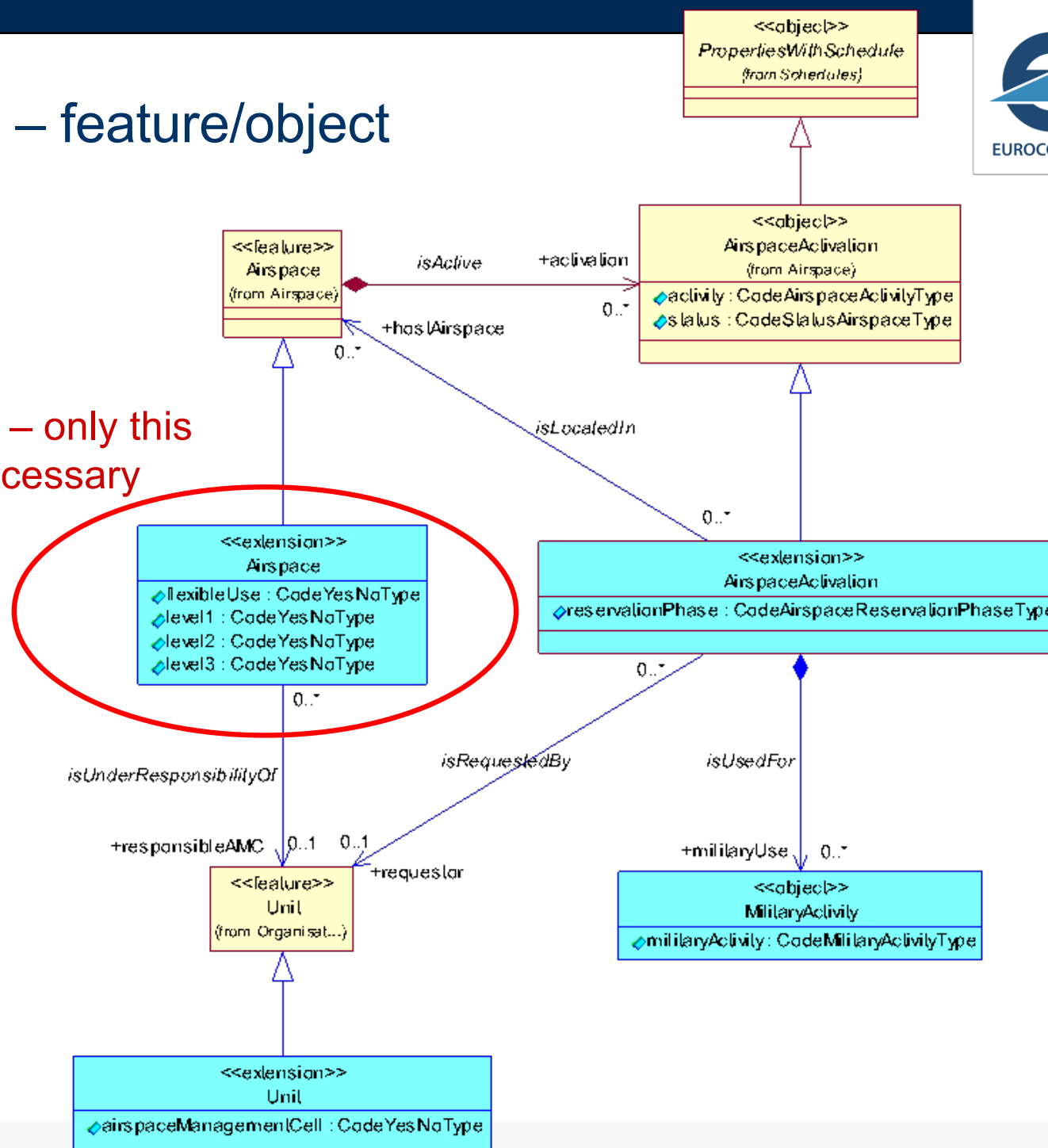
To modify the value of these properties, open the Package Specification and navigate to the XSD tab. The targetNamespace and targetNamespacePrefix property values are determined by the COI and used in accordance with other related schemas and will determine if an external import is included or imported.

Additionally, denote the generateFilename property as applicable so the schema is named consistently each time it is generated with the UML to XSD scripts.

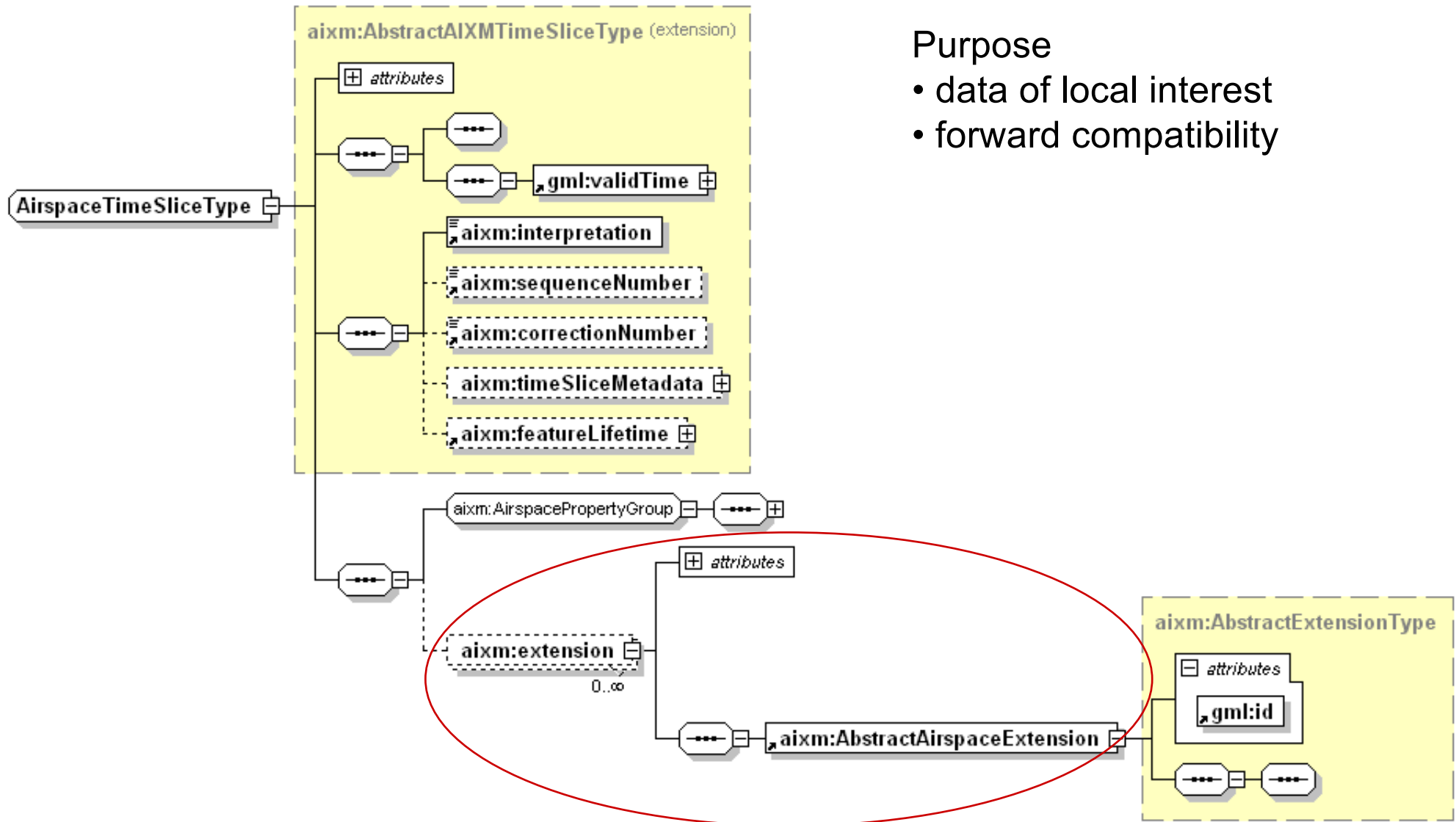


# Extensions – feature/object

EAD – only this  
is necessary



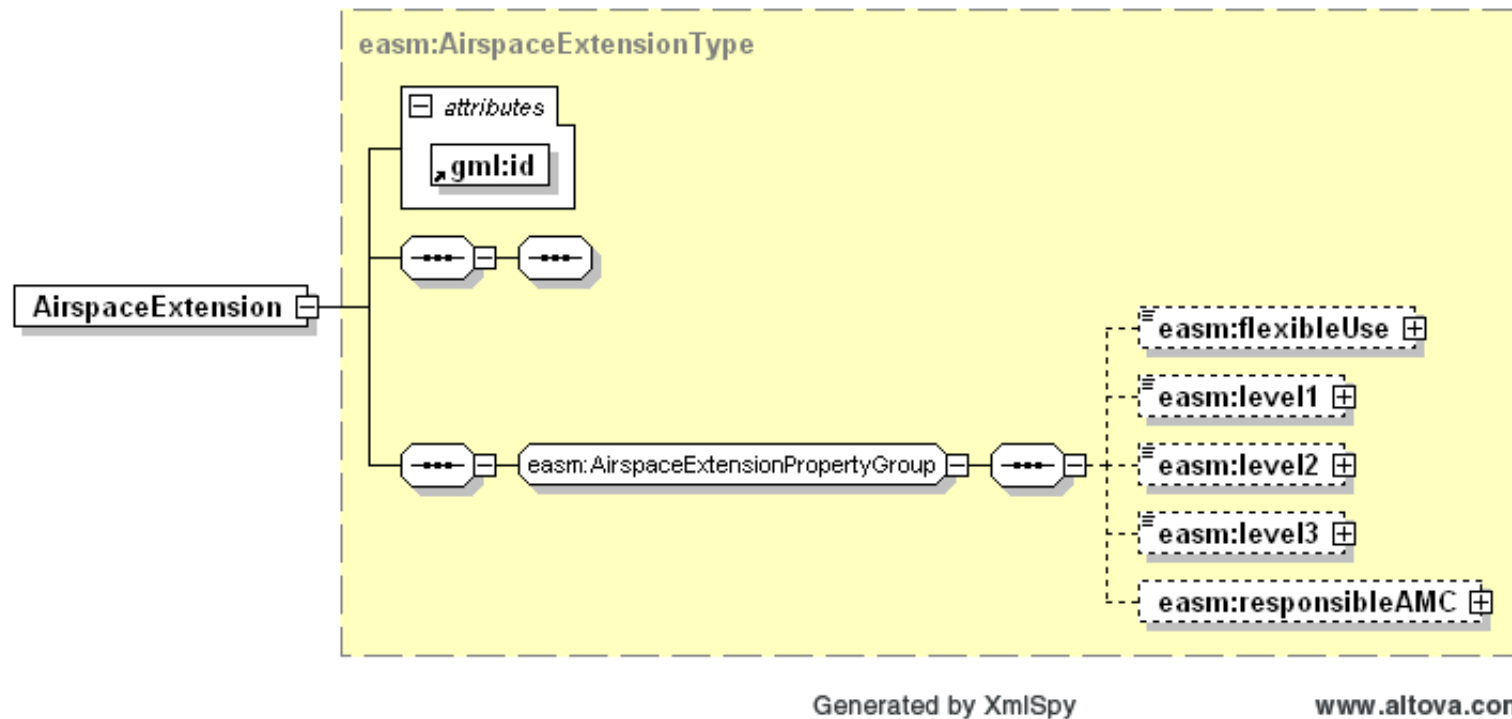
# Extensions – feature/object



## Purpose

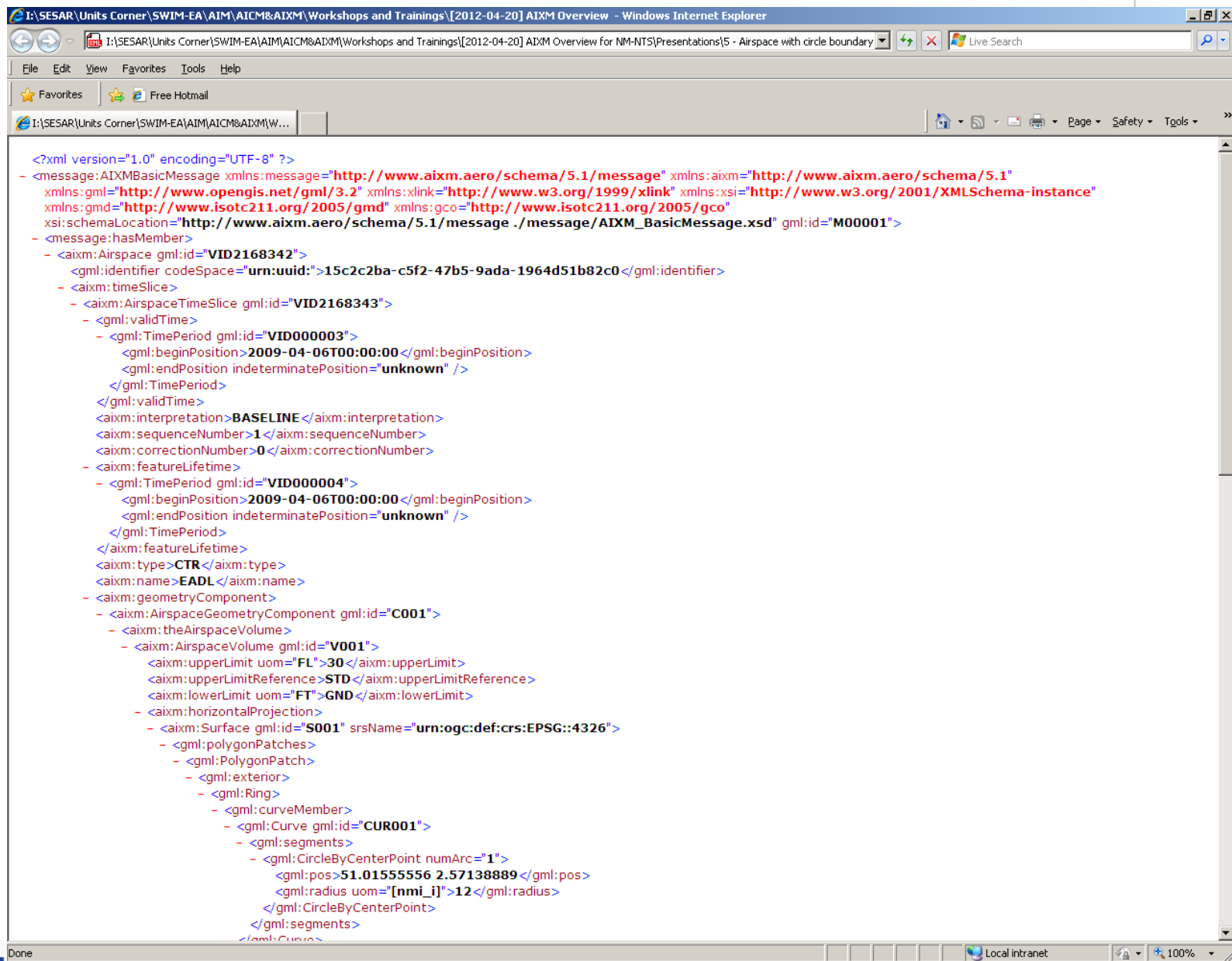
- data of local interest
- forward compatibility

# Extensions – feature/object



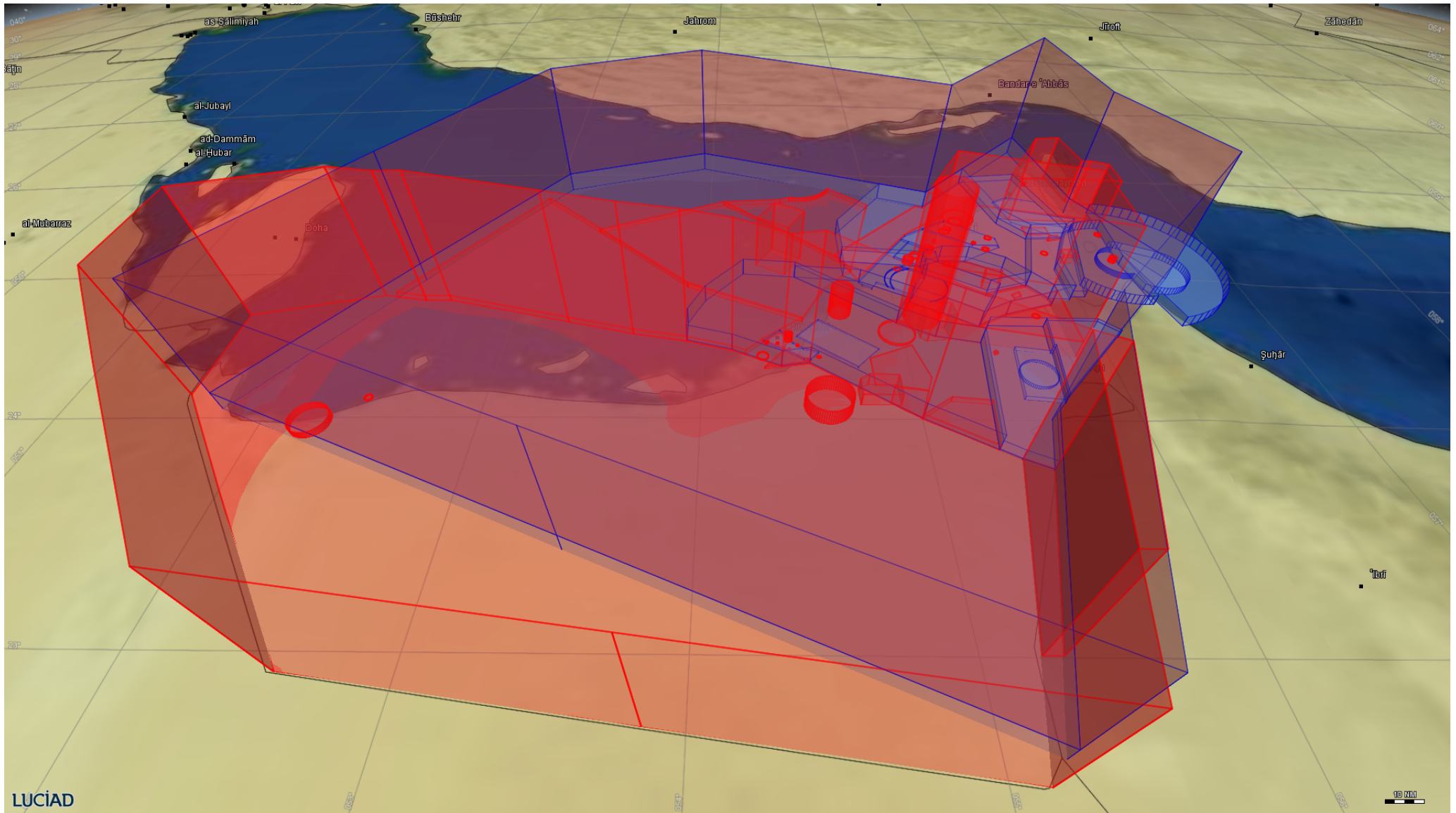
```
<element name="AirspaceExtension" type="easm:AirspaceExtensionType"
substitutionGroup="aixm:AbstractAirspaceExtension"/>
```

# AIXM XML Sample



```
<?xml version="1.0" encoding="UTF-8" ?>
- <message:AIXMBasicMessage xmlns:message="http://www.aixm.aero/schema/5.1/message" xmlns:aixm="http://www.aixm.aero/schema/5.1"
  xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:gco="http://www.isotc211.org/2005/gco"
  xsi:schemaLocation="http://www.aixm.aero/schema/5.1/message ./message/AIXM_BasicMessage.xsd" gml:id="M00001">
- <message:hasMember>
- <aixm:Airspace gml:id="VID2168342">
  <gml:identifier codeSpace="urn:uuid:">15c2c2ba-c5f2-47b5-9ada-1964d51b82c0</gml:identifier>
- <aixm:timeSlice>
- <aixm:AirspaceTimeSlice gml:id="VID2168343">
  <gml:validTime>
  - <gml:TimePeriod gml:id="VID0000003">
    <gml:beginPosition>2009-04-06T00:00:00</gml:beginPosition>
    <gml:endPosition indeterminatePosition="unknown" />
  </gml:TimePeriod>
  </gml:validTime>
  <aixm:interpretation>BASELINE</aixm:interpretation>
  <aixm:sequenceNumber>1</aixm:sequenceNumber>
  <aixm:correctionNumber>0</aixm:correctionNumber>
- <aixm:featureLifetime>
  - <gml:TimePeriod gml:id="VID0000004">
    <gml:beginPosition>2009-04-06T00:00:00</gml:beginPosition>
    <gml:endPosition indeterminatePosition="unknown" />
  </gml:TimePeriod>
  </aixm:featureLifetime>
  <aixm:type>CTR</aixm:type>
  <aixm:name>EADL</aixm:name>
- <aixm:geometryComponent>
- <aixm:AirspaceGeometryComponent gml:id="C001">
  <aixm:theAirspaceVolume>
  - <aixm:AirspaceVolume gml:id="V001">
    <aixm:upperLimit uom="FL">30</aixm:upperLimit>
    <aixm:upperLimitReference>STD</aixm:upperLimitReference>
    <aixm:lowerLimit uom="FT">GND</aixm:lowerLimit>
  - <aixm:horizontalProjection>
  - <aixm:Surface gml:id="S001" srsName="urn:ogc:def:crs:EPSG::4326">
    <gml:polygonPatches>
    - <gml:PolygonPatch>
      <gml:exterior>
      - <gml:Ring>
        - <gml:curveMember>
        - <gml:Curve gml:id="CUR001">
          <gml:segments>
          - <gml:CircleByCenterPoint numArc="1">
            <gml:pos>51.01555556 2.57138889</gml:pos>
            <gml:radius uom="[nmi_i]">12</gml:radius>
            <gml:CircleByCenterPoint>
            </gml:segments>
          </gml:Curve>
```

# Luciad AIXM Viewer

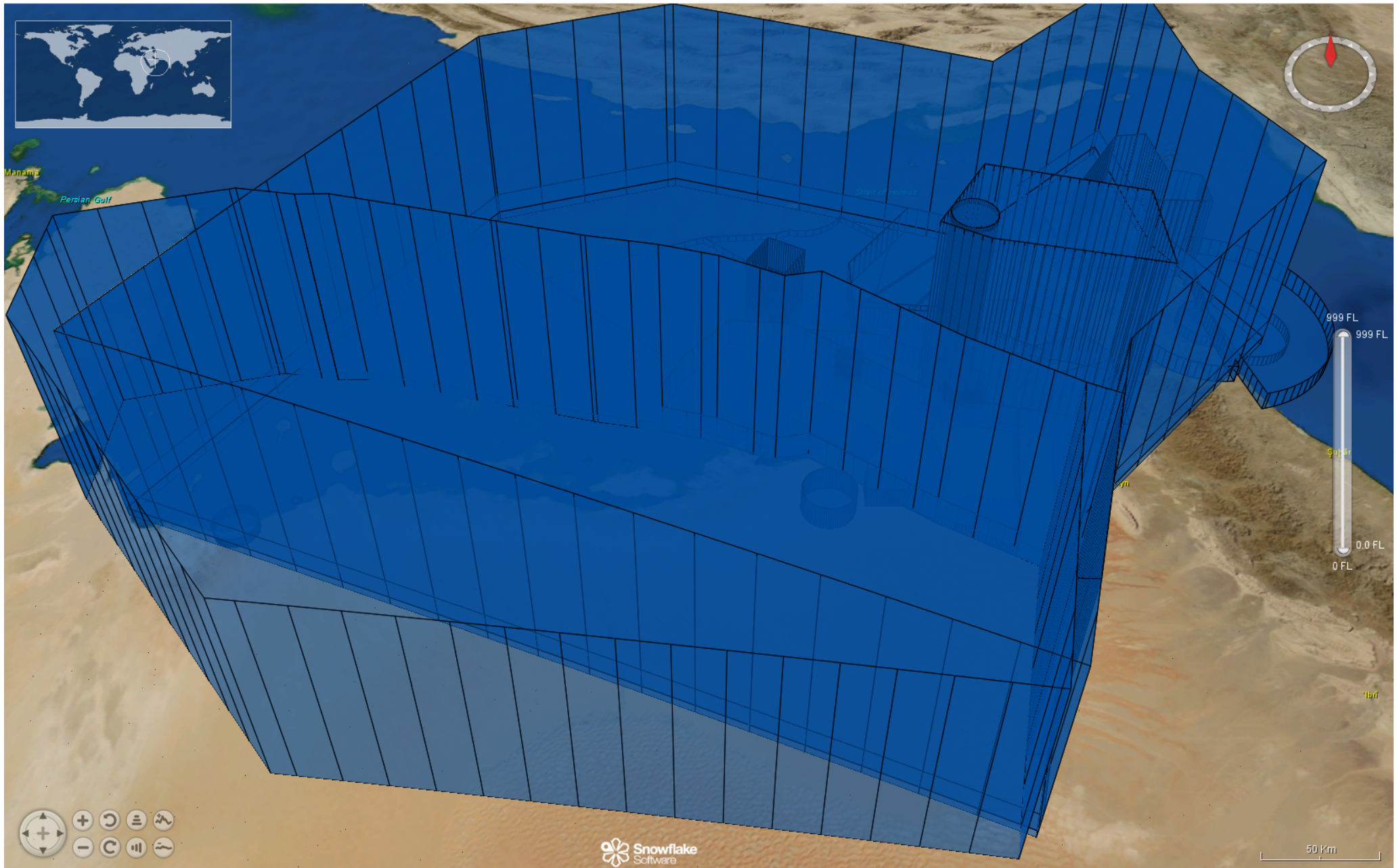


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AIXM 5.1 XML Schema



# Snowflake ATM Viewer





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# Questions?