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Guidance on the Aviation Metadata Profile

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i. Abstract and Preface

This paper explains how to map the Requirements for Aviation Metadata [1] into a metadata profile.

ii. Keywords

ogcdoc metadata aviation iso19115

iii. Document terms and definitions

This document uses the standard terms defined in Subclause 5.3 of [OGC 05-008], which is based on the ISO/IEC Directives, Part 2. Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this standard.

iv. Document contributor contact points

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v. Forward

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Guidance on the Aviation Metadata Profile

1 Introduction

This paper explains how to map the Requirements for Aviation Metadata [1] into a metadata profile.

A profile is a set of one or more base standards or subsets of base standards and, where applicable, the identification of chosen clauses that are necessary for accomplishing a particular function [9]

It assumes that the ISO 19115:2003 [4, 5] will be used to create metadata profile.

The choice of standards upon which to base the profile is very important. Indeed, the standards may impose choices that go beyond the actual user requirements. Therefore, the profile may be larger than the requirements would indicate. This paper therefore seeks to balance the requirements with the practical implementation of those requirements.

2 Scope – Applicability

The discussion paper focuses on metadata for a dataset. It does not cover service metadata.

3 References

[1] Requirements for Aviation Metadata

[2] ICAO Annex 15 (13th Edition) – Aeronautical Information Services

[3] The EU Aeronautical Data Quality Implementing Rule (COMMISSION REGULATION (EU) No 73/2010, 26 January 2010)

[4] ISO 19115:2003 – Geographic Information – Metadata

[5] ISO 19115:2003 – Geographic Information – Metadata – Technical Corrigendum

[6] COMMISSION REGULATION (EC) No 1205/2008 - INSPIRE Metadata

[7] Corrigendum to Commission Regulation (EC) No 1205/2008

[8] INSPIRE Metadata Implementing Rules: Technical Guidelines

[9] Final Draft Report, February 2006, Hydrographic Information Harmonization Working Group (HIHWG)

[10] The FAA Whitepaper “Metadata Profile AIXM 5.1 Draft” (from March 26, 2010)

[11] ISO 639-2:1998, Codes for the representation of names of languages — Part 2: Alpha-3 code

[12] ISO 8601:2004 Data elements and interchange formats — Information interchange — Representation of dates and times

[13] ISO 19136:2007 – Geography Markup Language

[14] ISO 19139:2003 - Geographic information — Metadata — XML schema implementation

4 Aviation Profile of ISO 19115

4.1 Comparison of ISO 19115 and Aviation Metadata

The following table compares the core requirements of ISO 19115 (see Table 3 in [4]) to the requirements outlined in the “Requirements for Aviation Metadata” [1].

ISO 19115	Metadata Elements	Comments
Dataset Title (M)	Resource Title	
Dataset reference date (M)	Temporal Reference	
Dataset Responsible Party (O)	Responsible Party	
Geographic location of the dataset (by four coordinates or by geographic identifier) (C)	Geographic Bounding Box	
Dataset language (M)	Resource Language	
Dataset character set (C)		
Dataset topic category (M)	Topic Category	
Spatial resolution of the dataset (O)	Spatial Reference System	

Abstract describing the dataset (M)	Resource Abstract	
Distribution format (O)		
Additional extent information for the dataset (vertical and temporal) (O)		
Spatial representation type (O)		
Reference system (O)	Responsible Party Role	
Lineage (O)	Lineage	
On-line resource (O)		
Metadata file identifier (O)		
Metadata standard name (O)		
Metadata standard version (O)		
Metadata language (C)	Metadata Language	
Metadata character set (C)		
Metadata point of contact (M)	Metadata Point of Contact	
Metadata date stamp (M)	Metadata Date	
	Accuracy of Numerical Data	See open issues.
	Cyclic Redundancy Check	
	Temporal Reference System	Not in the core ISO 19115 but can be mapped to other parts of ISO 19115

	Conditions Applying to Access and Use	Not in the core ISO 19115 but can be mapped to other parts of ISO 19115
	Limitations on Public Access	Not in the core ISO 19115 but can be mapped to other parts of ISO 19115

4.2 Conclusion

It would appear that with the possible exception of the requirement for the "Accuracy of Numerical Data", the Requirements for Aviation Metadata can be satisfied using ISO 19115:2003.

5 Basic Mapping

The following tables map the Requirements for an Aviation Metadata to ISO 19115 elements.

The tables are arranged:

- Requirements

  Reference. This gives the paragraph number in xxx

  Element Name. This is the metadata element name in XXX

  Obligation/Condition. States whether the element is mandatory.

  Multiplicity. The number of occurrences of the element.

- ISO 19115

  Number. The number that identifies the metadata element inside tables in ISO 19115.

  Name. The name of the metadata element in ISO 19115.

  Definition. The current ISO 19115 description.

  XPath. This xpath expression identifies the metadata element within the ISO 19115 UML model.

  Data Type. The data type allowed.

  Domain. The list of allowable values

  Example. An example of a value that is acceptable.

- Implementing Instructions.

- See Diagrams. This refers to the diagrams contained in Annex B which give the UML representation of the metadata element.

- Example. This is a fragment of the XML based on ISO 19139.

5.1 Identification

5.1.1 Resource Title

Requirement	Reference	5.1.1
	Element Name	Resource Title
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	360
	Name	title
	Definition	Name by which the cited resource is known
	XPath	gmd:MD_Metadata/gmd:identification/ gmd:MD_DataIdentification/gmd:citation/ gmd:CI_Citation/gml:title/gco:CharacterString
	Data type	CharacterString
	Domain	Free text
	Example	SDO Update 27
Implementing Instructions		-
See Diagrams		2, 3

5.1.1.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          <gmd:title>
            <gco:CharacterString>SDO
     Update</gco:CharacterString>
          </gmd:title>
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
```

```
...
</gmd:MD_Metadata>
```

5.1.2 Resource Abstract

Requirement	Reference	5.1.2
	Element Name	Resource Abstract
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	25
	Name	abstract
	Definition	Brief narrative summary of the content of the resource(s)
	XPath	gmd:MD_Metadata/gmd:identification/ gmd:MD_DataIdentification/ /gmd:abstract/gco:CharacterString
	Data type	CharacterString
	Domain	Free text
	Example	Updates to the following Airport: EBBR, EBBT
Implementing Instructions		This is useful when the dataset is large but may be of less use when the dataset contains only one feature.
See Diagrams		2

5.1.2.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
     ...
      <gmd:abstract>
        <gco:CharacterString>Updates to the following Airport:
     EBBR, EBBT </gco:CharacterString>
      </gmd:abstract>
     ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```


5.1.3 Resource Language

Requirement	Reference	5.1.3
	Element Name	Resource Language
	Obligation / Condition	Mandatory if the resource contains textual information
	Multiplicity	0..*
ISO 19115	Number	39
	Name	language
	Definition	Language(s) used within the dataset
	XPath	gmd:MD_Metadata/gmd:identification/ gmd:MD_DataIdentification/gmd:language/ gmd:LanguageCode
	Data type	CharacterString
	Domain	Codelist: ISO 639-2
	Example	eng
Implementing Instructions		ISO 19115 is stricter than the Aviation Requirements which can be assumed to be in English.
See Diagrams		2

5.1.3.1 Example

The example below gives the most interoperable approach where the content of LanguageCode repeats the value of the codelist:

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
    ...
      <gmd:language>
        <gmd:LanguageCode
      codeListValue="./resources/codeList.xml#LanguageCode"
      codeList="eng">eng</gmd:LanguageCode>
      </gmd:language>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.2 Classification of Aviation Data

5.2.1 Topic Category

Requirement	Reference	5.2.1
	Element Name	Topic Category
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	41
	Name	topicCategory
	Definition	Main theme(s) of the dataset
	XPath	gmd:MD_Metadata/gmd:identification/ gmd:MD_DataIdentification/gmd:topicCategory/ gmd:MD_TopicCategoryCode
	Data type	CharacterString
	Domain	Enumeration based on ISO 19115.
	Example	transportation
Implementing Instructions		This will be fixed to “transportation” for most Aviation Metadata.
See Diagrams		2

5.2.1.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
    ...
      <gmd:topicCategory>

      <gmd:MD_TopicCategoryCode>transportation</gmd:MD_TopicCat
      egoryCode>
       </gmd:topicCategory>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```


5.3 Geographic Location

5.3.1 Geographic Bounding Box

Requirement	Reference	5.3.1
	Element Name	Geographic Bounding Box
	Obligation / Condition	Mandatory
	Multiplicity	1..*
ISO 19115	Number	344
	Name	westBoundLongitude
	Definition	Western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent/gmd:geographicElement/ gmd:EX_GeographicBoundingBox/ gmd:westBoundLongitude/gco:Decimal
	Data type	Decimal
	Domain	-180.00 <= West Bounding Longitude Value <= 180.00
	Example	3.93
ISO 19115	Number	345
	Name	eastBoundLongitude
	Definition	Eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent/gmd:geographicElement/ gmd:EX_GeographicBoundingBox/

		gmd:eastBoundLongitude/gco:Decimal
	Data type	Decimal
	Domain	-180.00 <= East Bounding Longitude Value <= 180.00
	Example	7.57
ISO 19115	Number	346
	Name	southBoundLatitude
	Definition	Southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent/gmd:geographicElement/ gmd:EX_GeographicBoundingBox/ gmd:southBoundLatitude/gco:Decimal
	Data type	Decimal
	Domain	-90.00 <= South Bounding Latitude Value <= North Bounding Latitude Value
	Example	52.10
ISO 19115	Number	347
	Name	northBoundLatitude
	Definition	Northern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent/gmd:geographicElement/ gmd:EX_GeographicBoundingBox/ gmd:northBoundLatitude/gco:Decimal

	Data type	Decimal
	Domain	South Bounding Latitude Value <= North Bounding Latitude Value <= 90.00
	Example	54.10
Implementing Instructions		-
See Diagrams		2, 7

5.3.1.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:extent>
        <gmd:EX_Extent>
          <gmd:geographicElement>
            <gmd:EX_GeographicBoundingBox>

      <gmd:westBoundLongitude><gco:Decimal>3.93</gco:Decimal></
      gmd:westBoundLongitude>

      <gmd:eastBoundLongitude><gco:Decimal>7.57</gco:Decimal></
      gmd:eastBoundLongitude>

      <gmd:southBoundLatitude><gco:Decimal>52.10</gco:Decimal><
      /gmd:southBoundLatitude>

      <gmd:northBoundLatitude><gco:Decimal>54.10</gco:Decimal><
      /gmd:northBoundLatitude>
            </gmd:EX_GeographicBoundingBox>
          </gmd:geographicElement>
        </gmd:EX_Extent>
      </gmd:extent>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.3.2 Spatial Reference System

Requirement	Reference	5.3.2
	Element Name	Spatial Reference System
	Obligation / Condition	Mandatory if not contained as part of the data itself
	Multiplicity	0..1
ISO 19115	Number	13
	Name	referenceSystemInfo

	Definition	Description of the spatial and temporal reference systems used in the dataset
	XPath	gmd:MD_Metadata/gmd:referenceSystemInfo
	Data type	RS_Identifier
	Domain	RS_Identifier.
	Example	EPSG::4326
Implementing Instructions		It is recommended to use EPSG codes. If the Geography Markup Language [13] is used to exchange the data, then the spatial reference system will appear in the data itself, not in the metadata.
See Diagrams		1, 6

5.3.2.1 Example

The following example shows the spatial reference system within the metadata.

```
<gmd:MD_Metadata>
...
  <gmd:referenceSystemInfo>
  <gmd:MD_ReferenceSystem>
   <gmd:referenceSystemIdentifier>
    <gmd:RS_Identifier>
     <gmd:code>
      <gco:CharacterString>
     urn:ogc:def:crs:EPSG:4326</gco:CharacterString>
     </gmd:code>
     <gmd:codeSpace>
      <gco:CharacterString>EPSG</gco:CharacterString>
     </gmd:codeSpace>
     <gmd:version>
      <gco:CharacterString>6.18.3</gco:CharacterString>
     </gmd:version>
    </gmd:RS_Identifier>
   </gmd:referenceSystemIdentifier>
  </gmd:MD_ReferenceSystem>
 </gmd:referenceSystemInfo>
...
</gmd:MD_Metadata>
```

The following example shows the spatial reference system embedded in the data itself.

```
<gml:Point srsName="urn:ogc:def:crs:EPSG::4326" gml:id="ID55">
      <gml:pos>52.2889 -32.0350</gml:pos>
</gml:Point>
```


5.4 Temporal Reference

5.4.1 Temporal Extent

Requirement	Reference	5.4.1
	Element Name	Temporal Extent
	Obligation / Condition	Optional but at least one of 5.4.1, 5.4.2, 5.4.3 and 5.4.4 shall be present.
	Multiplicity	0..*
ISO 19115	Number	351
	Name	extent
	Definition	Date and time for the content of the dataset
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent/gmd:temporalElement/ gmd:EX_TemporalExtent/gmd:extent/ gml:TimePeriod
	Data type	TM_Primitive
	Domain	Date described according to ISO 19108
	Example	From: 2010-11-01T01:00:00 Until 2010-12-24T23:59:59
Implementing Instructions		Can have more than one temporal extent.
See Diagrams		1, 6

5.4.1.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:extent>
        <gmd:EX_Extent>
          <gmd:temporalElement>
              <gmd:EX_TemporalExtent>
              <gmd:extent>
                <gml:TimePeriod gml:id="period1">
                  <gml:beginPosition>2010-11-
     01T01:00:00</gml:beginPosition>
```



```
                    <gml:endPosition>2010-12-
      24T23:59:59</gml:endPosition>
                  </gml:TimePeriod>
                </gmd:extent>
              </gmd:EX_TemporalExtent>
            </gmd:temporalElement>
          </gmd:EX_Extent>
        </gmd:extent>
      </gmd:MD_DataIdentification>
    </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.4.2 Date of Publication

Requirement	Reference	5.4.2
	Element Name	Date of Publication
	Obligation / Condition	Optional but at least one of 5.4.1, 5.4.2, 5.4.3 and 5.4.4 shall be present.
	Multiplicity	0..*
ISO 19115	Number	394
	Name	date
	Definition	Reference date for the cited resource
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:citation/ gmd:CI_Citation/gmd:date/gmd:CI_Date/ gmd:date
	Data type	CI_Date
	Domain	Date described according to ISO 19108
	Example	2010-11-01 or 2010-11-01T12:00:00
Implementing Instructions		Can be a gco:Date or gco:DateTime
See Diagrams		3

5.4.2.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
```



```
          <gmd:CI_Citation>
            <gmd:date>
              <gmd:CI_Date>
                <gmd:date>
                  <gco:DateTime>2010-11-
      01T12:00:00</gco:DateTime>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
      codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
      DateTypeCode"
      codeListValue="publication">publication</gmd:CI_DateTypeC
      ode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:date>
          </gmd:CI_Citation>
        </gmd:citation>
      </gmd:MD_DataIdentification>
    </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.4.3 Date of Last Revision

Requirement	Reference	5.4.3
	Element Name	Date of Last Revision
	Obligation / Condition	Optional but at least one of 5.4.1, 5.4.2, 5.4.3 and 5.4.4 shall be present.
	Multiplicity	1
ISO 19115	Number	394
	Name	date
	Definition	Reference date for the cited resource
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:citation/ gmd:CI_Citation/gmd:date/gmd:CI_Date/ gmd:date
	Data type	CI_Date
	Domain	Date described according to ISO 19108
	Example	2010-11-01 or 2010-11-01T12:00:00
Implementing Instructions		Can be a gco:Date or gco:DateTime

See Diagrams	3

5.4.3.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          <gmd:date>
            <gmd:CI_Date>
              <gmd:date>
                <gco:Date>2010-11-01</gco:Date>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
      codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
      DateTypeCode"
      codeListValue="revision">revision</gmd:CI_DateTypeCode>
                </gmd:dateType>
            </gmd:CI_Date>
          </gmd:date>
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.4.4 Date of Creation

Requirement	Reference	5.4.4
	Element Name	Date of Creation
	Obligation / Condition	Optional but at least one of 5.4.1, 5.4.2, 5.4.3 and 5.4.4 shall be present.
	Multiplicity	1
ISO 19115	Number	394
	Name	date
	Definition	Reference date for the cited resource
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:citation/ gmd:CI_Citation/gmd:date/gmd:CI_Date/ gmd:date
	Data type	CI_Date

	Domain	Date described according to ISO 19108
	Example	2010-11-01 or 2010-11-01T12:00:00
Implementing Instructions		Can be a gco:Date or gco:DateTime
See Diagrams		3

5.4.4.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          <gmd:date>
            <gmd:CI_Date>
              <gmd:date>
                <gco:Date>2010-11-01</gco:Date>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
      codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
      DateTypeCode"
      codeListValue="creation">creation</gmd:CI_DateTypeCode>
                </gmd:dateType>
            </gmd:CI_Date>
          </gmd:date>
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.4.5 Temporal Reference System

Requirement	Reference	5.4.5
	Element Name	Temporal Reference System
	Obligation / Condition	Mandatory if a reference system other than the Gregorian calendar and Coordinated Universal Time (UTC) is used.
	Multiplicity	0..1
ISO 19115	Number	13
	Name	referenceSystemInfo
	Definition	Description of the spatial and temporal reference systems used in the dataset
	XPath	gmd:MD_Metadata/gmd:referenceSystemInfo

	Data type	RS_Identifier
	Domain	Free Text
	Example	ISO 8601
Implementing Instructions		-
See Diagrams		1, 6

5.4.5.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:referenceSystemInfo>
    <gmd:MD_ReferenceSystem>
      <gmd:referenceSystemIdentifier>
        <gmd:RS_Identifier>
          <gmd:code>
            <gco:CharacterString>8601</gco:CharacterString>
          </gmd:code>
          <gmd:codeSpace>
            <gco:CharacterString>ISO</gco:CharacterString>
          </gmd:codeSpace>
        </gmd:RS_Identifier>
      </gmd:referenceSystemIdentifier>
    </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
...
</gmd:MD_Metadata>
```

5.5 Quality and Validity

5.5.1 Lineage

Requirement	Reference	5.5.1
	Element Name	Lineage
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	81
	Name	lineage
	Definition	Non-quantitative quality information about the lineage of the data specified by the scope
	XPath	gmd:MD_Metadata/gmd:dataQualityInfo/ gmd:DQ_DataQuality/gmd:lineage

	Data type	LI_Lineage
	Domain	LI_Lineage
	Example	See below for original survey
Implementing Instructions		Scope should be set to the correct level, usually dataset
See Diagrams		5

5.5.1.1 Example

```
<gmd:MD_Metadata>
...
<gmd:dataQualityInfo>
  <gmd:DQ_DataQuality>
    <gmd:scope gco:nilReason="template"/>
    <gmd:lineage>
      <gmd:LI_Lineage>
        <gmd:processStep>
          <gmd:LI_ProcessStep>
            <gmd:description>
              <gco:CharacterString>captured by
    surveyor</gco:CharacterString>
            </gmd:description>
            <gmd:dateTime>
              <gco:DateTime>2010-09-11T01:00:00</gco:DateTime>
            </gmd:dateTime>
            <gmd:processor>
              <gmd:CI_ResponsibleParty>
                <gmd:organisationName>

    <gco:CharacterString>SURVEY4U</gco:CharacterString>
                </gmd:organisationName>
                <gmd:contactInfo>
                  <gmd:CI_Contact>
                    <gmd:address>
                        <gmd:CI_Address>
                        <gmd:electronicMailAddress>

    <gco:CharacterString>bob@survey4u.be</gco:CharacterString
    >
                        </gmd:electronicMailAddress>
                      </gmd:CI_Address>
                    </gmd:address>
                  </gmd:CI_Contact>
                </gmd:contactInfo>
                <gmd:role>
                  <gmd:CI_RoleCode
    codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
    RoleCode"
    codeListValue="originator">originator</gmd:CI_RoleCode>
                </gmd:role>
              </gmd:CI_ResponsibleParty>
            </gmd:processor>
          </gmd:LI_ProcessStep>
        </gmd:processStep>
      </gmd:LI_Lineage>
    </gmd:lineage>
  </gmd:DQ_DataQuality>
```

```
</gmd:dataQualityInfo>
...
</gmd:MD_Metadata>
```

5.5.2 Accuracy of Numerical Data

Requirement	Reference	5.5.2
	Element Name	Accuracy of Numerical Data
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	99
	Name	DQ_Element
	Definition	Aspect of quantitative quality information
	XPath	gmd:MD_Metadata/gmd:dataQualityInfo/ gmd:DQ_DataQuality
	Data type	-
	Domain	-
	Example	-
Implementing Instructions		It is clear that the requirement within the "Requirements for Aviation Metadata" document [1] should be interpreted with ICAO Annex 15 in mind. This means that: Resolution: This should be the number of digits to which a measured or calculated numerical value is expressed. It should be based on the original measurement/calculation. Accuracy should be defined in accordance with the original measurement/calculation. In metadata terms, this should make use of the DQ_...Accuracy construction. This is a complex metadata element. It can be used in many different ways: DQ_AbsoluteExternalPositionalAccuracy can be used to report on the horizontal/vertical accuracy; DQ_QuantatitiveAttributeAccuracy

	can be used to report on the accuracy of attributes
See Diagrams	-

5.5.2.1 Example

```
<gmd:MD_Metadata>
 ...
 <gmd:dataQualityInfo>
  <gmd:DQ_DataQuality>
   <gmd:scope>
    ...
   </gmd:scope>
   <gmd:report>
    <gmd:DQ_QuantitativeAttributeAccuracy>

     <gmd:nameOfMeasure><gco:CharacterString>resolution</gco:C
     haracterString></gmd:nameOfMeasure>
     <gmd:result>
      <gmd:DQ_QuantitativeResult>
       <gmd:valueUnit
     gco:nilReason="inapplicable"></gmd:valueUnit>

     <gmd:value><gco:Record><gco:Integer>4</gco:Integer></gco:
     Record></gmd:value>
      </gmd:DQ_QuantitativeResult>
     </gmd:result>
    </gmd:DQ_QuantitativeAttributeAccuracy>
   </gmd:report>
   ...
  </gmd:DQ_DataQuality>
 </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

5.5.3 Cyclic Redundancy Check

Requirement	Reference	5.5.3
	Element Name	Cyclic Redundancy Check
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	-
	Name	-
	Definition	-
	XPath	-
	Data type	-
	Domain	-

	Example	-
Implementing Instructions		This will require an extension to ISO 19115. See chapter 7 for proposed extension.
See Diagrams		-

5.5.3.1 Example

```
<gmd:MD_Metadata>
 ...
 <gmd:dataQualityInfo>
  <gmd:DQ_DataQuality>
   <gmd:scope>
    ...
   </gmd:scope>
   <extension:CRC>
    <extension:value>582C2727</extension:value>
    <extension:calculationMethod>
     <extension:method>ICAOMethod</extension:method>
     <extension:items>//aixm:ARP//gml:pos</extension:items>
    </extension:calculationMethod>
   </extension:CRC>
   ...
  </gmd:DQ_DataQuality>
 </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

5.6 Constraints Related to Access and Use

5.6.1 Conditions Applying to Access and Use

Requirement	Reference	5.6.1
	Element Name	Conditions Applying to Access and Use
	Obligation / Condition	Mandatory only if conditions on access or use apply
	Multiplicity	0..*
ISO 19115	Number	70
	Name	accessConstraints
	Definition	Access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource or metadata
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/

		gmd:resourceConstraints/ gmd:MD_LegalConstraints/ gmd:accessConstraints
	Data type	MD_RestrictionCode
	Domain	Codelist from ISO 19115
	Example	license
ISO 19115	Number	74
	Name	classification
	Definition	Name of the handling restrictions on the resource or metadata
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/ gmd:resourceConstraints/ gmd:MD_SecurityConstraints/gmd:classification
	Data type	MD_ClassificationCode
	Domain	Codelist from ISO 19115
	Example	restricted
Implementing Instructions		Use the correct type of constraint. These can be Legal Constraints or Security Constraints
See Diagrams		8

5.6.1.1 Example

The following example shows a Legal Constraint and a Security Constraint.

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:resourceConstraints>
        <gmd:MD_LegalConstraints>
          <gmd:accessConstraints>
            <gmd:MD_RestrictionCode
     codeList="./resources/codeList.xml#MD_RestrictionCode"
     codeListValue="license">license</gmd:MD_RestrictionCode>
          </gmd:accessConstraints>
        </gmd:MD_LegalConstraints>
      </gmd:resourceConstraints>
```

```
      <gmd:resourceConstraints>
        <gmd:MD_SecurityConstraints>
          <gmd:classification>
            <gmd:MD_ClassificationCode
      codeList="./resources/codeList.xml#MD_ClassificationCode"
      codeListValue="restricted">restricted</gmd:MD_Classificat
      ionCode>
          </gmd:classification>
        </gmd:MD_SecurityConstraints>
      </gmd:resourceConstraints>
     ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.6.2 Limitations on Public Access

This metadata element shall provide information on any limitation on public access to the aviation resource and the reasons for them.

The value domain of this metadata element is free text.

[Source: ADQ, Annex 1, Part C, (i)]

Requirement	Reference	5.6.2
	Element Name	Limitations on Public Access
	Obligation / Condition	Mandatory only if limitations exist
	Multiplicity	0..*
ISO 19115	Number	68
	Name	useLimitation
	Definition	Limitation affecting the fitness for use of the resource or metadata. Example, “not to be used for navigation”.
	XPath	
	Data type	CharacterString
	Domain	Free text
	Example	remember to look at NOTAMS!
Implementing Instructions		-
See Diagrams		8

5.6.2.1 Example

```
<gmd:MD_Metadata>
```



```
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:resourceConstraints>
        <gmd:MD_Constraints>
          <gmd:useLimitation>
            <gco:CharacterString>remember to look at
     NOTAMS!</gco:CharacterString>
          </gmd:useLimitation>
        </gmd:MD_Constraints>
      </gmd:resourceConstraints>
     ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.7 Organizations Responsible for the Establishment, Management, Maintenance and Distribution of Aviation Data Sets

5.7.1 Responsible Party

Requirement	Reference	5.7.1
	Element Name	Responsible Party
	Obligation / Condition	Mandatory
	Multiplicity	1..*
ISO 19115	Number	29
	Name	pointOfContact
	Definition	Identification of, and means of communication with, person(s) and organizations associated with the dataset
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:pointOfContact
	Data type	CI_ResponsibleParty
	Domain	Data is a series of CharacterStrings
	Example	Organization: EAD
Implementing Instructions		Only organization name and email address are mandated.
See Diagrams		2, 3

5.7.1.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:pointOfContact>
        <gmd:CI_ResponsibleParty>
          <gmd:organisationName>
            <gco:CharacterString>EAD</gco:CharacterString>
          </gmd:organisationName>
          <gmd:contactInfo>
            <gmd:CI_Contact>
              <gmd:phone>
                <gmd:CI_Telephone>
                  <gmd:voice>
                    <gco:CharacterString>+32
    02...</gco:CharacterString>
                  </gmd:voice>
                </gmd:CI_Telephone>
              </gmd:phone>
              <gmd:address>
                <gmd:CI_Address>
                  <gmd:deliveryPoint>
                    <gco:CharacterString>delivery point
    1</gco:CharacterString>
                  </gmd:deliveryPoint>
                  <gmd:deliveryPoint>
                    <gco:CharacterString>delivery point
    2</gco:CharacterString>
                  </gmd:deliveryPoint>
                  <gmd:city>

    <gco:CharacterString>Brussels</gco:CharacterString>
                  </gmd:city>
                  <gmd:administrativeArea>

    <gco:CharacterString>Brussels</gco:CharacterString>
                  </gmd:administrativeArea>
                  <gmd:postalCode>
                    <gco:CharacterString>postal
    code</gco:CharacterString>
                  </gmd:postalCode>
                  <gmd:country>

    <gco:CharacterString>Belgium</gco:CharacterString>
                  </gmd:country>
                  <gmd:electronicMailAddress>

    <gco:CharacterString>operator@organisation.org</gco:Chara
    cterString>
                  </gmd:electronicMailAddress>
                </gmd:CI_Address>
              </gmd:address>
            </gmd:CI_Contact>
          </gmd:contactInfo>
          <gmd:role>
            <gmd:CI_RoleCode
    codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
    RoleCode"
    codeListValue="originator">originator</gmd:CI_RoleCode>
          </gmd:role>
        </gmd:CI_ResponsibleParty>
       </gmd:pointOfContact>
```



```
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

5.7.2 Responsible Party Role

Requirement	Reference	5.7.2
	Element Name	Responsible Party Role
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	379
	Name	role
	Definition	Function performed by the responsible party
	XPath	gmd:MD_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:pointOfContact/ gmd:CI_ResponsibleParty/gmd:role
	Data type	CharacterString
	Domain	Codelist
	Example	originator
Implementing Instructions		-
See Diagrams		2, 3

5.7.2.1 Example:

See previous example.

5.8 Metadata on Metadata

5.8.1 Metadata Point of Contact

Requirement	Reference	5.8.1
	Element Name	Metadata Point of Contact
	Obligation / Condition	Mandatory
	Multiplicity	1..*

ISO 19115	Number	8
	Name	contact
	Definition	Party responsible for the metadata information
	XPath	gmd:MD_Metadata/gmd:contact
	Data type	CI_ResponsibleParty
	Domain	Data is a series of CharacterStrings
	Example	Organization: EAD
Implementing Instructions		Only organization name and email address are mandated.
See Diagrams		1, 3

5.8.1.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:contact>
    <gmd:CI_ResponsibleParty>
      <gmd:organisationName>
        <gco:CharacterString>EAD</gco:CharacterString>
      </gmd:organisationName>
      <gmd:contactInfo>
        <gmd:CI_Contact>
          <gmd:address>
            <gmd:CI_Address>
              <gmd:electronicMailAddress>

     <gco:CharacterString>operator@organisation.org</gco:Chara
     cterString>
              </gmd:electronicMailAddress>
            </gmd:CI_Address>
          </gmd:address>
        </gmd:CI_Contact>
      </gmd:contactInfo>
      <gmd:role>
        <gmd:CI_RoleCode
     codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
     RoleCode" codeListValue="pointOfContact">pointOfContact
      </gmd:CI_RoleCode>
      </gmd:role>
    </gmd:CI_ResponsibleParty>
  </gmd:contact>
...
</gmd:MD_Metadata>
```

5.8.2 Metadata Date

Requirement	Reference	5.8.2
	Element Name	Metadata Date

	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	9
	Name	dateStamp
	Definition	Date that the metadata was created
	XPath	gmd:MD_Metadata/gmd:dateStamp
	Data type	Date
	Domain	Date described according to ISO 19108
	Example	2010-11-01
Implementing Instructions		-
See Diagrams		1

5.8.2.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:dateStamp>
    <gco:Date>2010-11-08</gco:Date>
  </gmd:dateStamp>
...
</gmd:MD_Metadata>
```

5.8.3 Metadata Language

Requirement	Reference	5.8.3
	Element Name	Metadata Language
	Obligation / Condition	Mandatory
	Multiplicity	1
ISO 19115	Number	3
	Name	language
	Definition	Language used for documenting metadata
	XPath	gmd:MD_Metadata/gmd:language
	Data type	CharacterString

	Domain	Codelist: ISO 639-2
	Example	eng
Implementing Instructions		-
See Diagrams		1

5.8.3.1 Example

```
<gmd:MD_Metadata>
...
  <gmd:language>
    <gmd:LanguageCode
      codeList="./resources/codeList.xml#LanguageCode"
      codeListValue="eng">eng</gmd:LanguageCode>
  </gmd:language>
...
</gmd:MD_Metadata>
```

6 General Rules

6.1 Use of gco:nilReason attribute

It is accepted that some metadata elements do not make sense at all levels with an aviation dataset. For example, a full abstract will not be necessary if the message contains only one Feature. In this case it is acceptable to use the gco:nilReason attribute.

```
<gmd:MD_Metadata>
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          ...
      <gmd:abstract gco:nilReason="inapplicable"/>
     ...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

6.2 Metadata and data in separate files

The requirements allow the metadata to be in a separate file from the data. This is supported by ISO 19115.

7 Cyclic Redundancy Check Extension

There is no obvious place to store the CRC value and how it was calculated in ISO 19115. An extension is therefore proposed. The most comfortable place for this is the DQ_DataQuality metadata element.

Metadata element	Comments

DQ_DataQuality				
	+ scope: DQ_Scope			
	+ CRC			Extension to ISO 19115
		+ value		This metadata element shall be used to store the CRCValue itself.
		+ calculationMethod		This metadata element shall be used to record how the value was calculated. It will need a method plus a record of which elements were used within the method.
			+ method	
			+ items	

8 Open issues

Section 5.5.2 of the Requirements concerns the Accuracy of Numerical Data. The exact meaning of this is unclear. In particular, the requirement related to “the resolution” is unclear. This paper assumes is it the original resolution of the measurement.

It must be remembered that the accuracy of measurements can be part of the data itself in some cases. The confidence level could default to the ICAO standards e.g. 95% or 90%.

Annex A: Complete example

The following example contains all of the metadata elements mentioned in the text including all of the optional elements. It is structured using ISO 19139 [14] which is the XML representation of ISO 19115.

```
<?xml version="1.0" encoding="utf-8"?>
<gmd:MD_Metadata
      xsi:schemaLocation="http://www.isotc211.org/2005/gmd
      http://schemas.opengis.net/iso/19139/20060504/gmd/gmd.xsd
http://www.isotc211.org/2005/srv
      http://schemas.opengis.net/iso/19139/20060504/srv/srv.xsd
      " xmlns:gmd="http://www.isotc211.org/2005/gmd"
      xmlns:srv="http://www.isotc211.org/2005/srv"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xmlns:gml="http://www.opengis.net/gml"
      xmlns:gts="http://www.isotc211.org/2005/gts"
      xmlns:gco="http://www.isotc211.org/2005/gco"
      xmlns:xlink="http://www.w3.org/1999/xlink">
 <gmd:language>
  <gmd:LanguageCode
      codeList="./resources/codeList.xml#LanguageCode"
      codeListValue="eng">eng</gmd:LanguageCode>
 </gmd:language>
 <gmd:contact>
  <gmd:CI_ResponsibleParty>
   <gmd:organisationName>
    <gco:CharacterString>EAD</gco:CharacterString>
   </gmd:organisationName>
   <gmd:contactInfo>
    <gmd:CI_Contact>
     <gmd:address>
      <gmd:CI_Address>
       <gmd:electronicMailAddress>

      <gco:CharacterString>operator@organisation.org</gco:Chara
      cterString>
       </gmd:electronicMailAddress>
      </gmd:CI_Address>
     </gmd:address>
    </gmd:CI_Contact>
   </gmd:contactInfo>
   <gmd:role>
    <gmd:CI_RoleCode
     codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
     RoleCode" codeListValue="pointOfContact">pointOfContact
     </gmd:CI_RoleCode>
   </gmd:role>
  </gmd:CI_ResponsibleParty>
 </gmd:contact>
 <gmd:dateStamp>
  <gco:Date>2010-11-08</gco:Date>
 </gmd:dateStamp>
 <gmd:referenceSystemInfo>
  <gmd:MD_ReferenceSystem>
   <gmd:referenceSystemIdentifier>
    <gmd:RS_Identifier>
     <gmd:code>
      <gco:CharacterString>
     urn:ogc:def:crs:EPSG:4326</gco:CharacterString>
```



```
      </gmd:code>
      <gmd:codeSpace>
       <gco:CharacterString>EPSG</gco:CharacterString>
      </gmd:codeSpace>
      <gmd:version>
       <gco:CharacterString>6.18.3</gco:CharacterString>
      </gmd:version>
     </gmd:RS_Identifier>
    </gmd:referenceSystemIdentifier>
   </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
  </gmd:referenceSystemInfo>
  <gmd:referenceSystemInfo>
   <gmd:MD_ReferenceSystem>
    <gmd:referenceSystemIdentifier>
     <gmd:RS_Identifier>
      <gmd:code>
       <gco:CharacterString>8601</gco:CharacterString>
      </gmd:code>
      <gmd:codeSpace>
       <gco:CharacterString>ISO</gco:CharacterString>
      </gmd:codeSpace>
     </gmd:RS_Identifier>
    </gmd:referenceSystemIdentifier>
   </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
  <gmd:identificationInfo>
   <gmd:MD_DataIdentification>
    <gmd:citation>
     <gmd:CI_Citation>
      <gmd:title>
       <gco:CharacterString>SDO Update 27</gco:CharacterString>
      </gmd:title>
      <gmd:date>
       <gmd:CI_Date>
        <gmd:date>
         <gco:Date>2010-11-01</gco:Date>
        </gmd:date>
        <gmd:dateType>
         <gmd:CI_DateTypeCode
      codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
      DateTypeCode"
      codeListValue="creation">creation</gmd:CI_DateTypeCode>
        </gmd:dateType>
       </gmd:CI_Date>
      </gmd:date>
      <gmd:date>
       <gmd:CI_Date>
        <gmd:date>
         <gco:DateTime>2010-11-01T12:00:00</gco:DateTime>
        </gmd:date>
        <gmd:dateType>
         <gmd:CI_DateTypeCode
      codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
      DateTypeCode"
      codeListValue="publication">publication</gmd:CI_DateTypeC
      ode>
        </gmd:dateType>
       </gmd:CI_Date>
      </gmd:date>
      <gmd:date>
       <gmd:CI_Date>
        <gmd:date>
         <gco:Date>2010-11-01</gco:Date>
```



```
      </gmd:date>
      <gmd:dateType>
       <gmd:CI_DateTypeCode
    codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
    DateTypeCode"
    codeListValue="revision">revision</gmd:CI_DateTypeCode>
      </gmd:dateType>
     </gmd:CI_Date>
    </gmd:date>
   </gmd:CI_Citation>
  </gmd:citation>
  <gmd:abstract>
   <gco:CharacterString>Updates to the following Airport:
    EBBR, EBBT</gco:CharacterString>
  </gmd:abstract>
  <gmd:pointOfContact>
   <gmd:CI_ResponsibleParty>
    <gmd:organisationName>
     <gco:CharacterString>EAD</gco:CharacterString>
    </gmd:organisationName>
    <gmd:contactInfo>
     <gmd:CI_Contact>
      <gmd:phone>
       <gmd:CI_Telephone>
        <gmd:voice>
         <gco:CharacterString>+32 02...</gco:CharacterString>
        </gmd:voice>
       </gmd:CI_Telephone>
      </gmd:phone>
      <gmd:address>
       <gmd:CI_Address>
        <gmd:deliveryPoint>
         <gco:CharacterString>delivery point
    1</gco:CharacterString>
        </gmd:deliveryPoint>
        <gmd:deliveryPoint>
         <gco:CharacterString>delivery point
    2</gco:CharacterString>
        </gmd:deliveryPoint>
        <gmd:city>
         <gco:CharacterString>Brussels</gco:CharacterString>
        </gmd:city>
        <gmd:administrativeArea>
         <gco:CharacterString>Brussels</gco:CharacterString>
        </gmd:administrativeArea>
        <gmd:postalCode>
         <gco:CharacterString>postal
    code</gco:CharacterString>
        </gmd:postalCode>
        <gmd:country>
         <gco:CharacterString>Belgium</gco:CharacterString>
        </gmd:country>
        <gmd:electronicMailAddress>

    <gco:CharacterString>operator@organisation.org</gco:Chara
    cterString>
        </gmd:electronicMailAddress>
       </gmd:CI_Address>
      </gmd:address>
     </gmd:CI_Contact>
    </gmd:contactInfo>
    <gmd:role>
```



```
    <gmd:CI_RoleCode
    codeList="../ISO_19139_Schemas/resources/codeList.xml#CI_
    RoleCode"
    codeListValue="originator">originator</gmd:CI_RoleCode>
   </gmd:role>
  </gmd:CI_ResponsibleParty>
 </gmd:pointOfContact>
 <gmd:resourceConstraints>
  <gmd:MD_LegalConstraints>
   <gmd:accessConstraints>
    <gmd:MD_RestrictionCode
    codeList="./resources/codeList.xml#MD_RestrictionCode"
    codeListValue="license">license</gmd:MD_RestrictionCode>
   </gmd:accessConstraints>
  </gmd:MD_LegalConstraints>
 </gmd:resourceConstraints>
 <gmd:resourceConstraints>
  <gmd:MD_SecurityConstraints>
   <gmd:classification>
    <gmd:MD_ClassificationCode
    codeList="./resources/codeList.xml#MD_ClassificationCode"
    codeListValue="restricted">restricted</gmd:MD_Classificat
    ionCode>
   </gmd:classification>
  </gmd:MD_SecurityConstraints>
 </gmd:resourceConstraints>
 <gmd:resourceConstraints>
  <gmd:MD_Constraints>
   <gmd:useLimitation>
    <gco:CharacterString>remember to look at
    NOTAMS!</gco:CharacterString>
   </gmd:useLimitation>
  </gmd:MD_Constraints>
 </gmd:resourceConstraints>
 <gmd:language>
  <gmd:LanguageCode
   codeList="./resources/codeList.xml#LanguageCode"
   codeListValue="eng">eng</gmd:LanguageCode>
 </gmd:language>
 <gmd:topicCategory>

   <gmd:MD_TopicCategoryCode>transportation</gmd:MD_TopicCat
   egoryCode>
 </gmd:topicCategory>
 <gmd:extent>
  <gmd:EX_Extent>
   <gmd:geographicElement>
    <gmd:EX_GeographicBoundingBox>
     <gmd:westBoundLongitude>
      <gco:Decimal>3.93</gco:Decimal>
     </gmd:westBoundLongitude>
     <gmd:eastBoundLongitude>
      <gco:Decimal>7.57</gco:Decimal>
     </gmd:eastBoundLongitude>
     <gmd:southBoundLatitude>
      <gco:Decimal>52.10</gco:Decimal>
     </gmd:southBoundLatitude>
     <gmd:northBoundLatitude>
      <gco:Decimal>54.10</gco:Decimal>
     </gmd:northBoundLatitude>
    </gmd:EX_GeographicBoundingBox>
   </gmd:geographicElement>
   <gmd:temporalElement>
    <gmd:EX_TemporalExtent>
```

```
      <gmd:extent>
       <gml:TimePeriod gml:id="period1">
        <gml:beginPosition>2010-11-
     01T01:00:00</gml:beginPosition>
         <gml:endPosition>2010-12-
     24T23:59:59</gml:endPosition>
        </gml:TimePeriod>
       </gmd:extent>
      </gmd:EX_TemporalExtent>
     </gmd:temporalElement>
    </gmd:EX_Extent>
   </gmd:extent>
  </gmd:MD_DataIdentification>
 </gmd:identificationInfo>
 <gmd:dataQualityInfo>
  <gmd:DQ_DataQuality>
   <gmd:scope>
    <gmd:DQ_Scope>
     <gmd:level>
      <gmd:MD_ScopeCode
     codeListValue="../ISO_19139_Schemas/resources/codeList.xm
     l#MD_ScopeCode"
     codeList="dataset">dataset</gmd:MD_ScopeCode>
     </gmd:level>
    </gmd:DQ_Scope>
   </gmd:scope>
   <gmd:report>
    <gmd:DQ_QuantitativeAttributeAccuracy>
     <gmd:result>
      <gmd:DQ_QuantitativeResult>
       <gmd:valueUnit></gmd:valueUnit>
       <gmd:value>95</gmd:value>
      </gmd:DQ_QuantitativeResult>
     </gmd:result>
    </gmd:DQ_QuantitativeAttributeAccuracy>
   </gmd:report>
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     l#MD_ScopeCode"
     codeList="dataset">dataset</gmd:MD_ScopeCode>
     </gmd:level>
    </gmd:DQ_Scope>
   </gmd:scope>
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    <gmd:LI_Lineage>
     <gmd:processStep>
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       </gmd:description>
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       </gmd:dateTime>
       <gmd:processor>
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         <gmd:organisationName>
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```



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          <gmd:contactInfo>
           <gmd:CI_Contact>
            <gmd:address>
             <gmd:CI_Address>
              <gmd:electronicMailAddress>

      <gco:CharacterString>bob@survey4u.be</gco:CharacterString
      >
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             </gmd:CI_Address>
            </gmd:address>
           </gmd:CI_Contact>
          </gmd:contactInfo>
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         </gmd:CI_ResponsibleParty>
        </gmd:processor>
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     </gmd:LI_Lineage>
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  </gmd:dataQualityInfo>
</gmd:MD_Metadata>
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Annex B: ISO 19115 UML

The following diagrams illustrate the UML from ISO 19115.

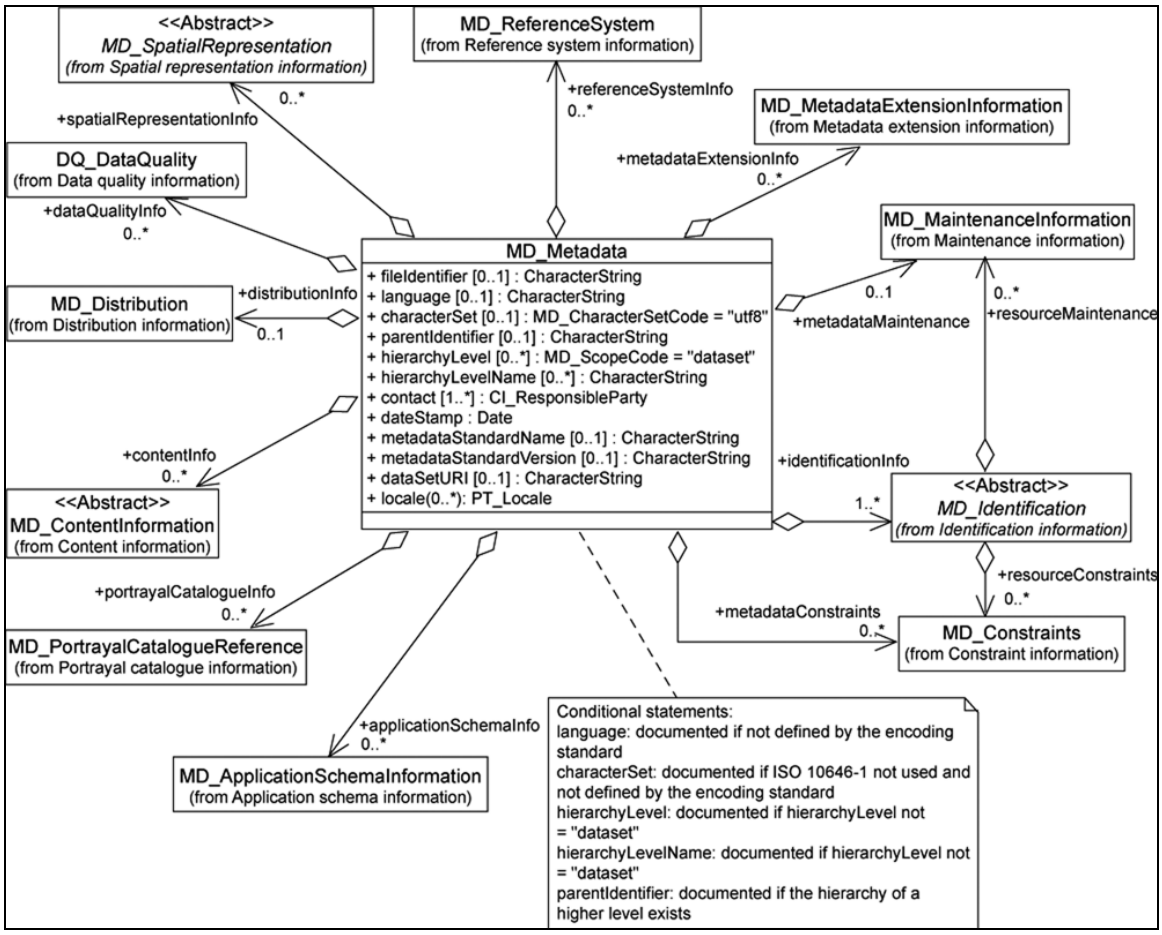

Figure 1 - Metadata entity set information

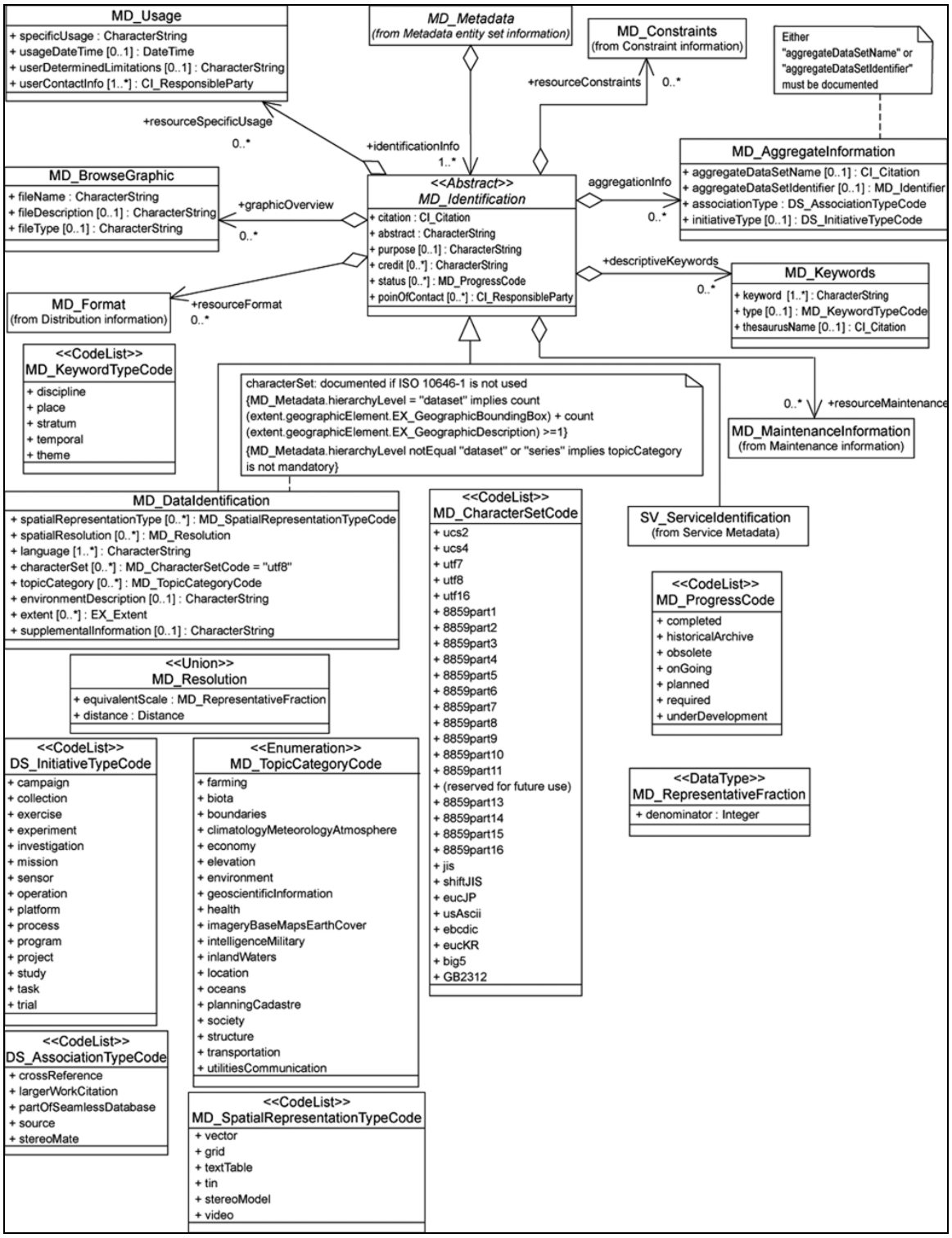

Figure 2 - Identification information

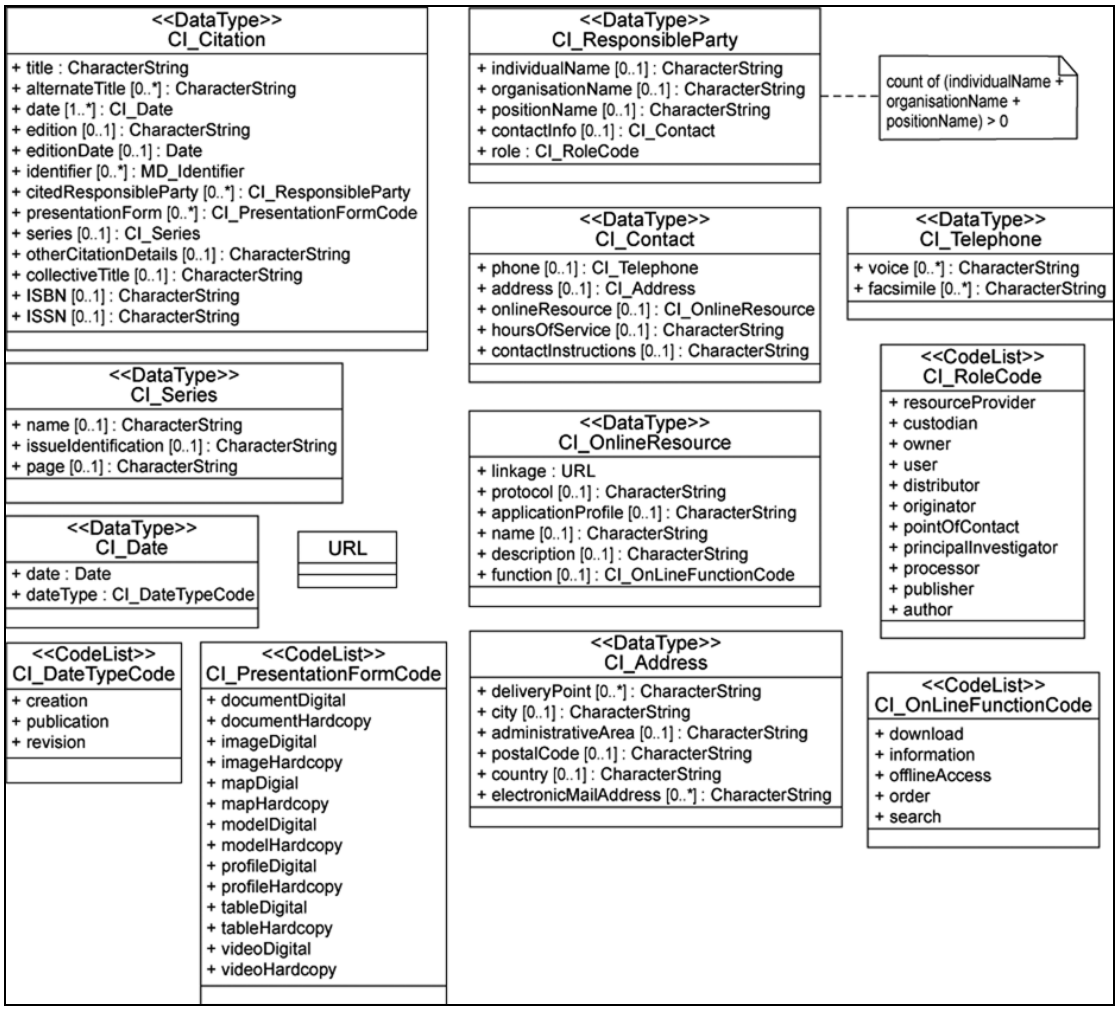

Figure 3 - Citation and responsible party information

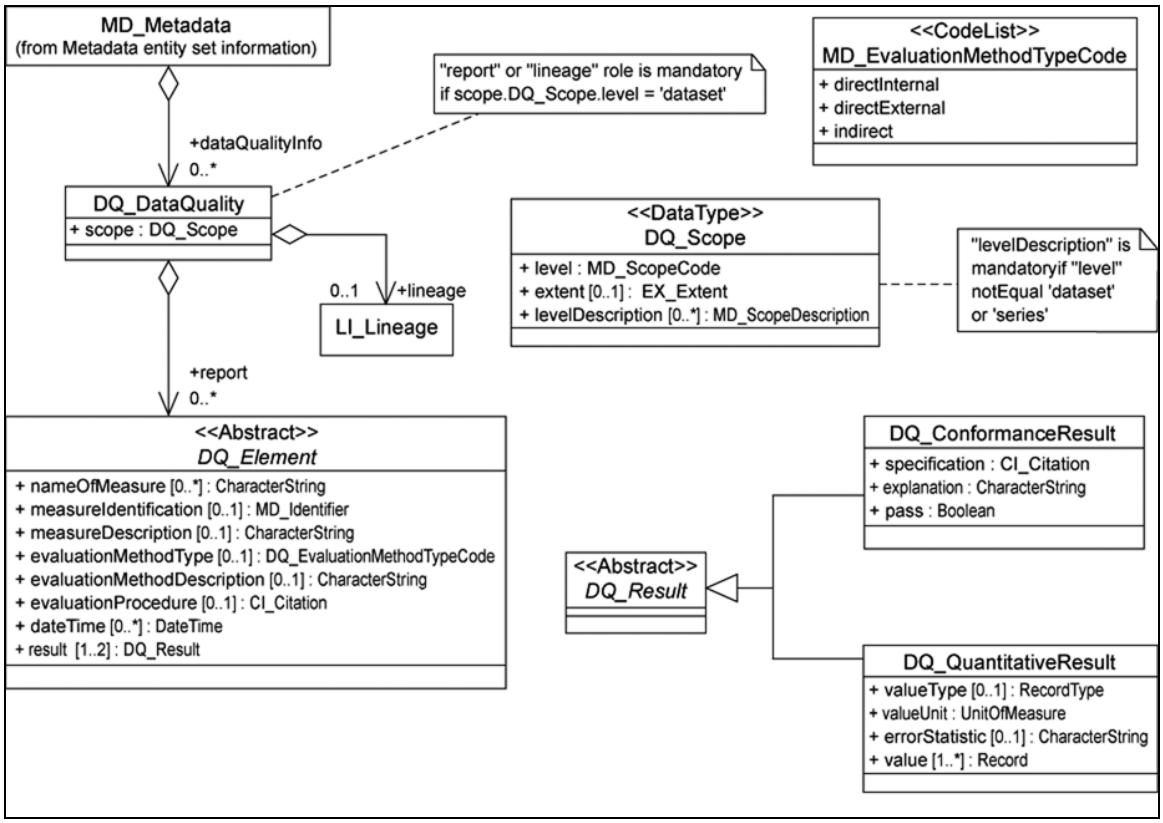

Figure 4 - Data quality information

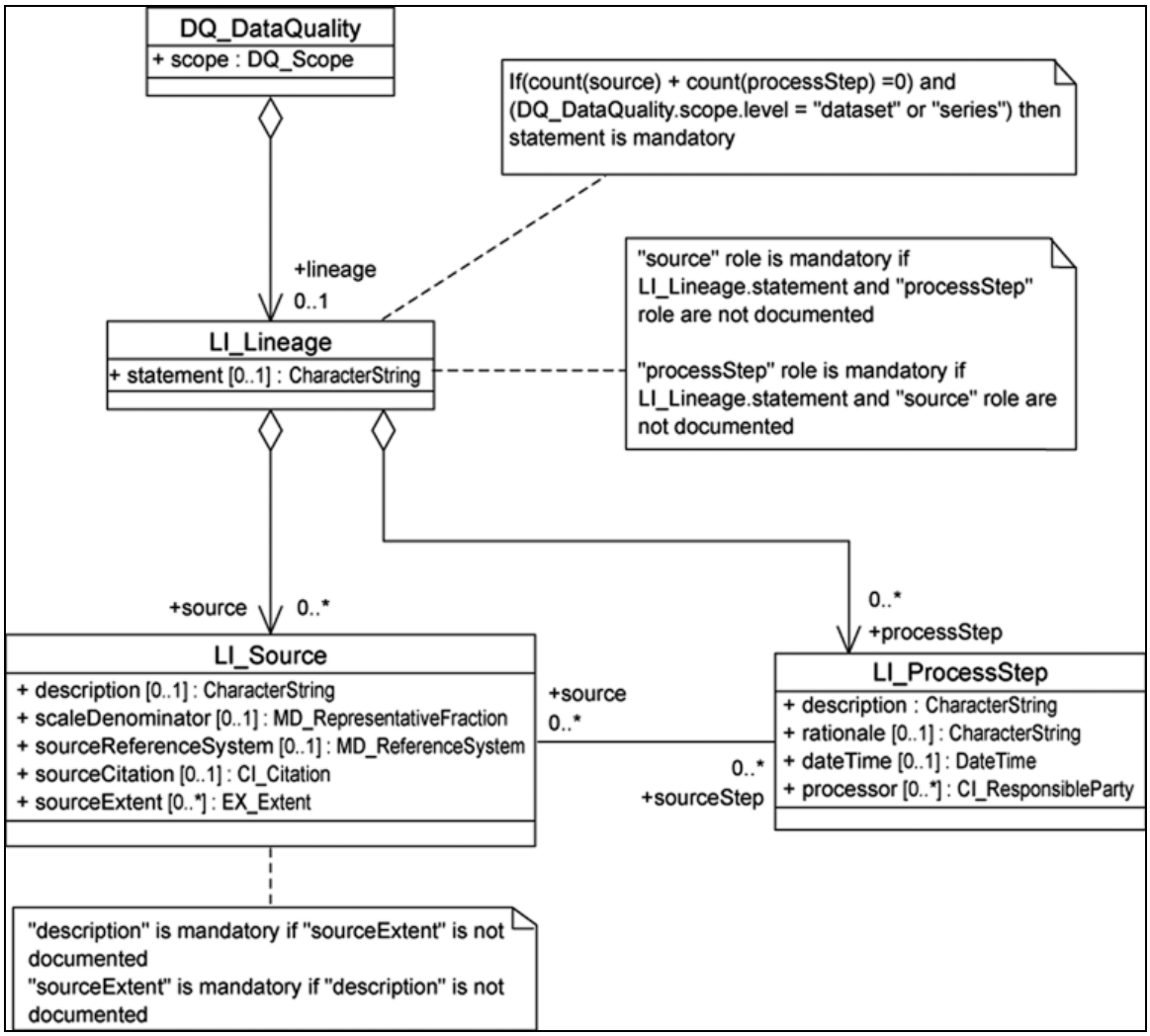

Figure 5 - Lineage information

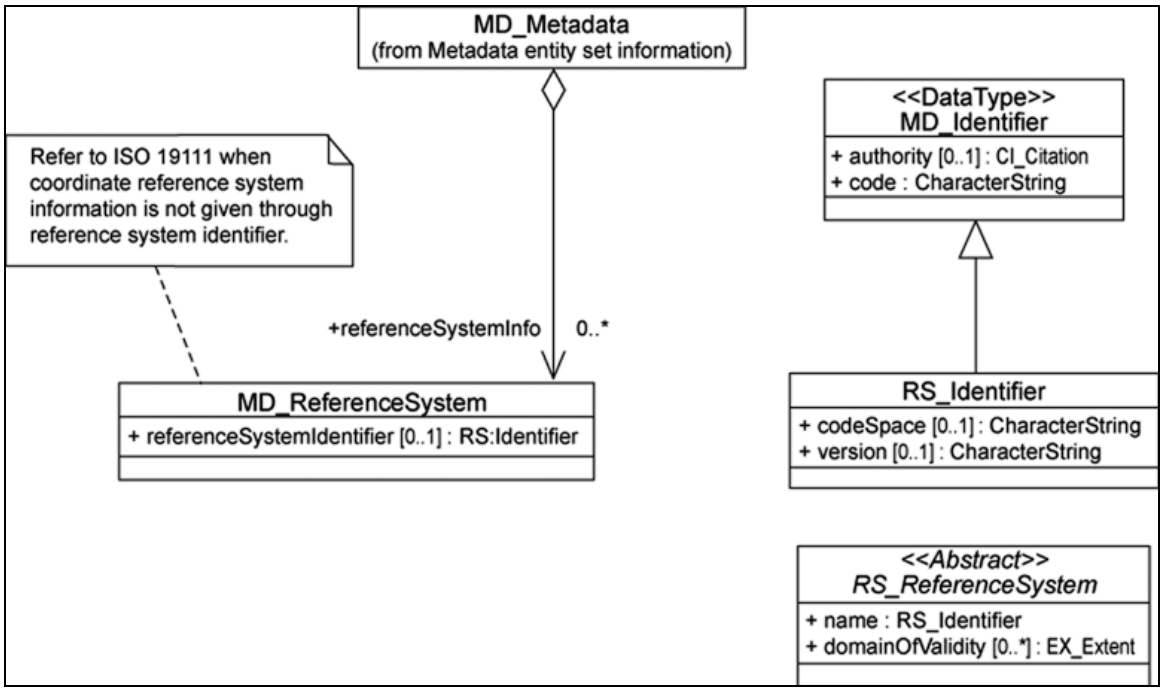

Figure 6 - Reference system information

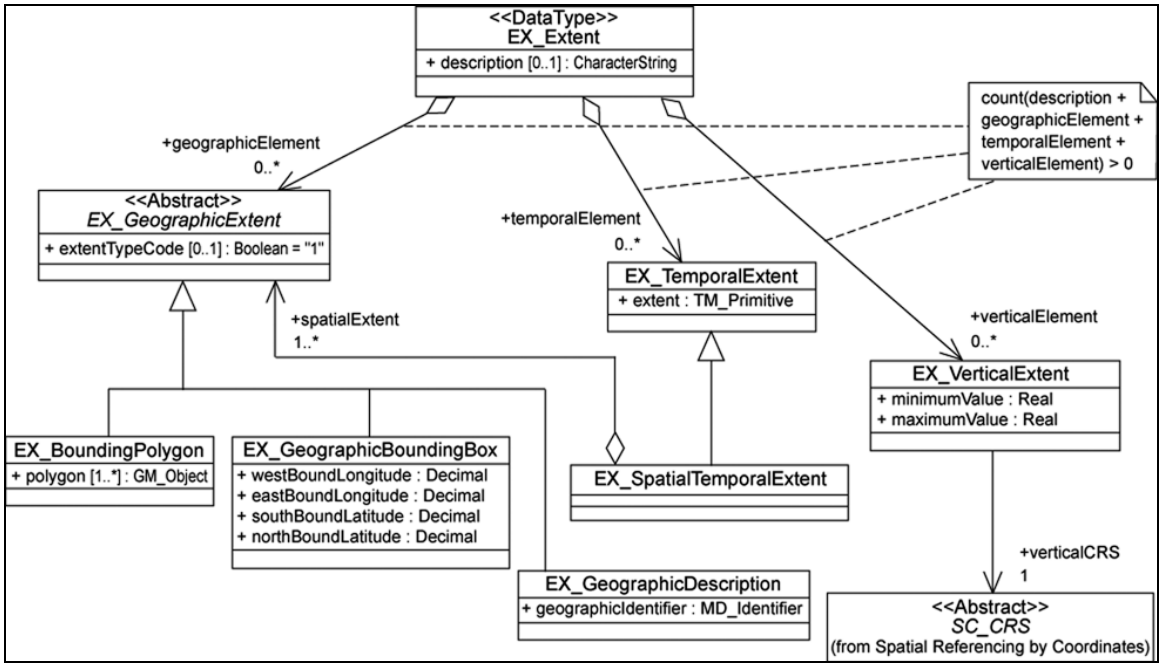

Figure 7 - Extent information

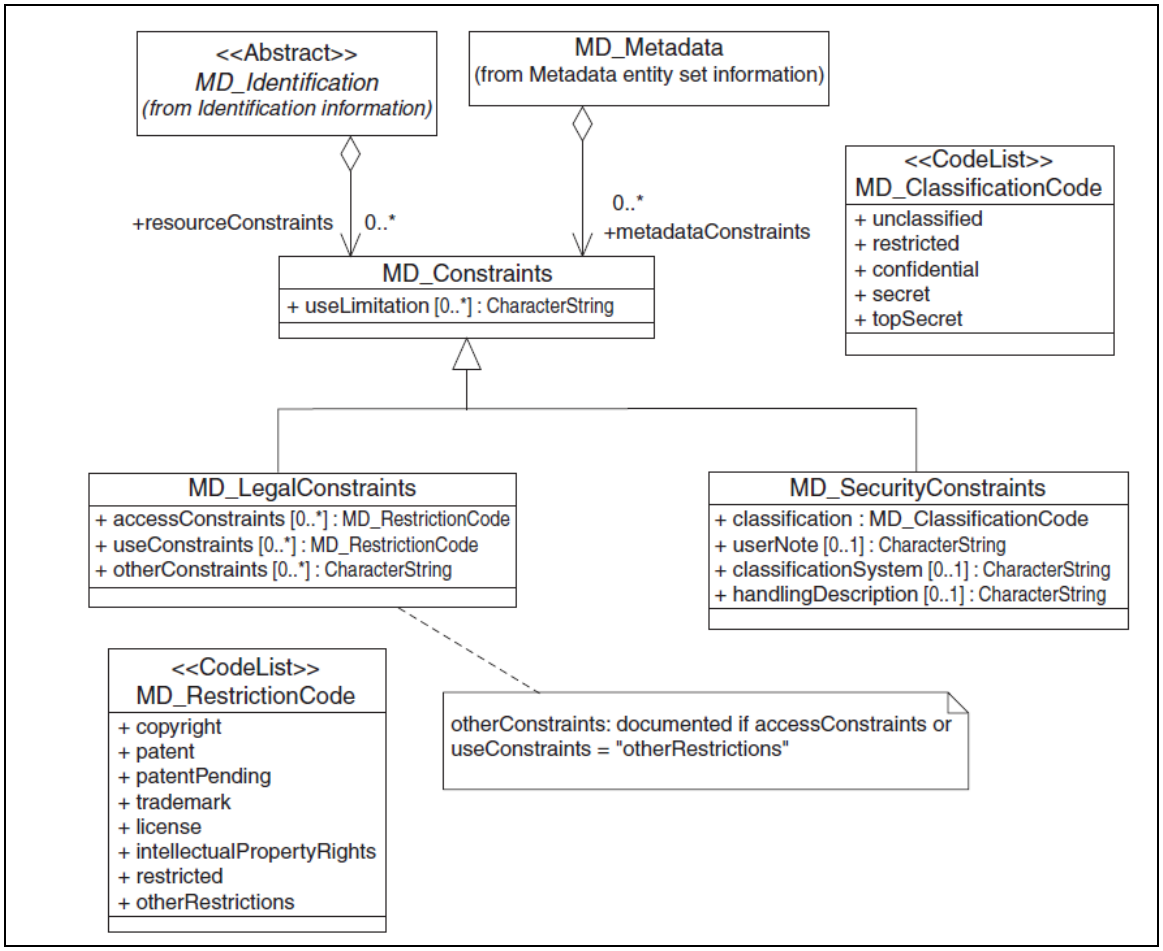

Figure 8 - Constraint information