GeoDCAT-AP: A geospatial extension for the DCAT application profile for data portals in Europe - Annexes

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Abbreviations used in this document

|  |  |
| --- | --- |
| ARE3NA | Reusable INSPIRE Reference Platform |
| CRS | Coordinate Reference System |
| CSW | Catalog Services for the Web |
| DCAT | Data Catalog Vocabulary |
| DCAT-AP | DCAT Application Profile for Data Portals in Europe |
| DCMI | Dublin Core Metadata Initiative |
| EARL | Evaluation and Report Language |
| EU | European Union |
| EuroVoc | Multilingual Thesaurus of the European Union |
| GEMET | GEneral Multilingual Environmental Thesaurus |
| GML | Geography Markup Language |
| GeoDCAT-AP | Geographical extension of DCAT-AP |
| IANA | Internet Assigned Numbers Authority |
| INSPIRE | Infrastructure for Spatial Information in the European Community |
| ISO | International Standardisation Organisation |
| JRC | European Commission - Joint Research Centre |
| MDR | Metadata Registry |
| NAL | Named Authority Lists |
| OGC | Open Geospatial Consortium |
| RDF | Resource Description Framework |
| RFC | Request for Comments |
| SPARQL | SPARQL Protocol and RDF Query |
| URI | Uniform Resource Identifier |
| W3C | World Wide Web Consortium |
| WG | Working Group |
| WKT | Well Known Text |
| XML | eXtensible Markup Language |
| XSLT | eXtensible Stylesheet Language Transformations |

# Content of this document

This document includes the annexes to the GeoDCAT-AP specification, an extension of the DCAT application profile for data portals in Europe (DCAT-AP) for describing geospatial datasets, dataset series, and services.

The annexes included in this document provide additional reference and support material for the GeoDCAT-AP specification. More precisely:

* Annex I provides a summary of the INSPIRE and ISO 19115:2003 elements covered by GeoDCAT-AP;
* Annex II provides detailed usage notes and examples for each of the metadata elements covered by GeoDCAT-AP;
* Annex III carries out a comparison of INSPIRE metadata with ISO 19115-1:2014.

1. Overview of metadata elements covered by GeoDCAT-AP

The following table provides an overview of the metadata elements in the INSPIRE metadata schema and in the core profile of ISO 19115, and the available mappings in DCAT-AP and GeoDCAT-AP. Columns titled with “obligation” specify whether the corresponding metadata elements are mandatory (M), conditional (C), and optional (O) (where “conditional” means “mandatory under given conditions”).

Note that the mappings covered by DCAT-AP correspond to those defined in GeoDCAT-AP core, whereas those covered only by GeoDCAT-AP correspond to those defined in the GeoDCAT-AP extended.

Table : Overview of covered metadata elements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| INSPIRE | Obligation | ISO 19115 Core | Obligation | DCAT-AP | GeoDCAT-AP |
| Metadata point of contact | M | Metadata point of contact | M |  | Yes |
| Metadata date | M | Metadata date stamp | M | Yes | Yes |
| Metadata language | M | Metadata language | C | Yes | Yes |
|  |  | Metadata character set | C |  | Yes |
|  |  | Metadata file identifier | O |  | Yes |
|  |  | Metadata standard name | O |  | Yes |
|  |  | Metadata standard version | O |  | Yes |
| Resource title | M | Dataset title | M | Yes | Yes |
| Temporal reference - Date of creation / publication / last revision | C | Dataset reference date | M | Partially (creation date not included) | Yes |
| Resource abstract | M | Abstract describing the dataset | M | Yes | Yes |
| Resource language | C | Dataset language | M | Yes | Yes |
| Topic category | M | Dataset topic category | M |  | Yes |
| Geographic bounding box | M | Geographic location of the dataset (by four coordinates or by geographic identifier) | C | Yes | Yes |
| Character encoding | C | Dataset character set | C |  | Yes |
| Temporal reference - Temporal extent | C | Additional extent information for the dataset (vertical and temporal) | O | Partially (temporal extent only) | Partially (temporal extent only) |
| Lineage | M | Lineage | O | Yes | Yes |
| Spatial representation type | M | Spatial representation type | O |  | Yes |
| Encoding | M | Distribution format | O | Yes | Yes |
| Spatial resolution | C | Spatial resolution of the dataset | O |  | Yes (but as free text) |
| Responsible organisation | M | Dataset responsible party | O | Partially (only 3 of the 11 responsible party roles are supported) | Yes |
| Resource locator | C | On-line resource | O | Yes | Yes |
| Coordinate reference system; Temporal reference system | M; C | Reference system | O |  | Yes |
| Conformity | M |  |  | Yes | Yes |
| Resource type | M |  |  | Partially (only datasets, series and discovery / catalogue services) | Yes |
| Spatial data service type | M |  |  |  | Yes |
| Keyword | M |  |  | Partially (only for datasets and dataset series) | Yes |
| Coupled resource | C |  |  |  | Yes |
| Unique resource identifier | M |  |  | Yes | Yes |
| Conditions for access and use | M |  |  | Yes | Yes |
| Limitations on public access | M |  |  | Yes | Yes |
| Maintenance information | O |  |  | Partially (only maintenance and update frequency) | Partially (only maintenance and update frequency) |
| Data quality – Logical consistency – Topological consistency | C |  |  |  | Partially (only conformance results) |
| Data quality – Logical consistency – Conceptual consistency | O |  |  |  | Partially (only conformance results) |
| Data quality – Logical consistency – Domain consistency | O |  |  |  | Partially (only conformance results) |

1. Detailed usage notes and examples

This annex contains further usage notes and examples on the mappings summarised in Section 5 of the GeoDCAT-AP specification.

* 1. Resource title - \*Dataset title

The content of the element ‘resource title’ can be represented in RDF as a plain literal.

The proposed binding is dct:title.

This binding may also include the specification of the language by using attribute @xml:lang [XML]. The language to be specified is the one indicated by element metadata language, mapped to the language identifiers defined by IETF BCP 47 [21].

|  |
| --- |
| Example |
| *# Resource metadata in GeoDCAT-AP*  [] dct:title "Forest / Non-Forest Map 2006"@en. |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata …  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  <gmd:citation>  <gmd:CI\_Citation>  <gmd:title>  <gco:CharacterString>  Forest / Non-Forest Map 2006  </gco:CharacterString>  </gmd:title>  </gmd:CI\_Citation>  </gmd:citation>  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

* 1. Resource abstract - \*Abstract describing the dataset

The content of the elements ‘resource abstract’ can be represented in RDF as a plain literal. The proposed binding is dct:description.

This binding may also include the specification of the language by using attribute @xml:lang [XML]. The language to be specified is the one indicated by element metadata language, mapped to the language identifiers defined by IETF BCP 47 [21].

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] dct:description "Pan-European Forest / Non Forest Map with target year 2006, Data Source: Landsat ETM+ and Corine Land Cover 2006, Classes: for-est, non-forest, clouds/snow, no data; Method: automatic classification performed with an in-house algorithm; spatial resolution: 25m. In addition, the forest map 2006 is extended to FTYPE2006 to include forest types (broadleaf, coniferous forest) that are mapped using MODIS composites."@en . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata …  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  <gmd:abstract>  <gco:CharacterString>  Pan-European Forest / Non Forest Map with target year 2006, Data Source: Landsat ETM+ and Corine Land Cover 2006, Classes: for-est, non-forest, clouds/snow, no data; Method: automatic classification performed with an in-house algorithm; spatial resolution: 25m. In addition, the forest map 2006 is extended to FTYPE2006 to include forest types (broadleaf, coniferous forest) that are mapped using MODIS composites.  </gco:CharacterString>  </gmd:abstract>  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

* 1. Resource type - \*not in ISO 19115 core

In DCAT [9], the notion of dataset is quite broad, and may include both the INSPIRE notions of **dataset** and **dataset series**. Moreover, currently no existing vocabulary provides suitable candidates for the INSPIRE notions of dataset series – the existing ones are very generic (e.g., dctype:Collection is defined as "An aggregation of resources" [DCTerms ]).

Based on this, in GeoDCAT-AP both INSPIRE datasets and dataset series are specified as instances of dcat:Dataset.

Moreover, in order to maintain the INSPIRE distinction between datasets and dataset series, following the work on aligning INSPIRE Metadata and the Dublin Core [10], in the extended profile of GeoDCAT-AP they will be denoted by using the resource type code list operated by the INSPIRE Registry [], and by using dct:type.

As far as the INSPIRE notion of **service** is concerned, DCAT and DCAT-AP foresee a single class, namely, dcat:Catalog, which only matches the notion of ‘discovery service’ in INSPIRE. Other services will be of type dctype:Service. Additionally, the spatial data service type can be specified by using dct:type with the corresponding code lists operated by the INSPIRE Registry.

For the reason explained above, the core profile of GeoDCAT-AP includes only the mappings for catalogue services (i.e., dcat:Catalog), whereas the mappings of other types of services are included in the extended profile of GeoDCAT-AP

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  ## Resource type for datasets  [] a dcat:Dataset;  dct:type <http://inspire.ec.europa.eu/codelist/ResourceType/dataset>  ## Resource type for series  [] a dcat:Dataset;  dct:type <http://inspire.ec.europa.eu/codelist/ResourceType/series>  ## Resource type for services (here, a view service)  [] a dctype:Service;  dct:type <http://inspire.ec.europa.eu/codelist/ResourceType/service> ,  <http://inspire.ec.europa.eu/codelist/SpatialDataServiceType/view> . |
| <!-- Resource metadata in ISO19139 -->  <!-- MD\_ScopeCode for a dataset in ISO19139 -->  <gmd:MD\_Metadata …  ...  <gmd:hierarchyLevel>  <gmd:MD\_ScopeCode  codeList=" http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/gmxCodelists.xml#MD\_ScopeCode" codeListValue="dataset">  dataset  </gmd:MD\_ScopeCode>  </gmd:hierarchyLevel>  ...  </gmd:MD\_Metadata>  <!-- MD\_ScopeCode for a data series in ISO19139 -->  <gmd:MD\_Metadata …  ...  <gmd:hierarchyLevel>  <gmd:MD\_ScopeCode  codeList=" http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/gmxCodelists.xml#MD\_ScopeCode" codeListValue="series">  series  </gmd:MD\_ScopeCode>  </gmd:hierarchyLevel>  ...  </gmd:MD\_Metadata>  <!-- MD\_ScopeCode for a service in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:hierarchyLevel>  <gmd:MD\_ScopeCode  codeList=" http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/gmxCodelists.xml#MD\_ScopeCode" codeListValue="service">  service  </gmd:MD\_ScopeCode>  </gmd:hierarchyLevel>  ...  <srv:SV\_ServiceIdentification>  ...  <srv:serviceType>  <gco:LocalName>view</gco:LocalName>  </srv:serviceType>  ...  </srv:SV\_ServiceIdentification>  ...  </gmd:MD\_Metadata> |

* 1. Resource locator - \*On-line resource

In INSPIRE, this element, quoting, “defines the link(s) to the resource and/or the link to additional information about the resource”.

For datasets, DCAT [9] foresees a property, namely, dcat:landingPage, having exactly the same purpose. By contrast, the only property foreseen in DCAT for linking a service to an online resource is foaf:homepage.

ISO 19115 offers however the ability to specify the “type” of resource locator by using a specific code list (CI\_OnlineFunctionCode), described in the following table:

|  |  |
| --- | --- |
| ISO 19115 – CI\_OnlineFunctionCode | Description |
| download | online instructions for transferring data from one storage device or system to another |
| information | online information about the resource |
| offlineAccess | online instructions for requesting the resource from the provider |
| order | online order process for obtaining the resource |
| search | online search interface for seeking out information about the resource |

Based on this, the proposed mappings of element “resource locator” are the following:

* foaf:homepage for services;
* for data sets and data set series, the mapping will vary depending on the function code (when available), based on the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| ISO 19115 – CI\_OnlineFunctionCode | Property | Domain | Range |
| (not provided) | dcat:landingPage | dcat:Dataset | foaf:Document |
| download | dcat:accessURL | dcat:Distribution | rdfs:Resource |
| Information | foaf:page | dcat:Dataset | foaf:Document |
| offlineAccess | dcat:accessURL | dcat:Distribution | rdfs:Resource |
| order | dcat:accessURL | dcat:Distribution | rdfs:Resource |
| search | foaf:page | dcat:Dataset | foaf:Document |

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  ## Resource locator for datasets and series  [] a dcat:Dataset;  foaf:page <http://forest.jrc.ec.europa.eu/forestmap-download>  ## Resource locator for services  [] a dcat:Catalog; foaf:homepage <http://geohub.jrc.ec.europa.eu/efas\_cc?service=WMS&request=GetCapabilities> . |
| <!-- Resource metadata in ISO19139 for datasets -->  <gmd:MD\_Metadata …  ...  <gmd:transferOptions>  <gmd:MD\_DigitalTransferOptions>  <gmd:onLine>  <gmd:CI\_OnlineResource>  <gmd:linkage>  <gmd:URL> http://forest.jrc.ec.europa.eu/forestmap-download </gmd:URL>  </gmd:linkage>  <gmd:name>  <gco:CharacterString> … </gco:CharacterString>  </gmd:name>  <gmd:description>  <gco:CharacterString> … </gco:CharacterString>  </gmd:description>  <gmd:function>  <CI\_OnLineFunctionCode codeListValue="information" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_OnLineFunctionCode" xmlns="http://www.isotc211.org/2005/gmd"/>  </gmd:function>  </gmd:CI\_OnlineResource>  </gmd:onLine>  </gmd:MD\_DigitalTransferOptions>  </gmd:transferOptions>  ...  </gmd:MD\_Metadata>  <!-- Resource locator in ISO19139 for services -->  <gmd:MD\_Metadata>  ...  <gmd:distributionInfo>  <gmd:MD\_Distribution>  ...  <gmd:transferOptions>  <gmd:MD\_DigitalTransferOptions>  <gmd:onLine>  <gmd:CI\_OnlineResource>  ...  <gmd:linkage>  <gmd:URL>http://geohub.jrc.ec.europa.eu/efas\_cc?service=WMS&request=GetCapabilities</gmd:URL>  </gmd:linkage>  <gmd:function>  <CI\_OnLineFunctionCode codeListValue="information" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_OnLineFunctionCode" xmlns="http://www.isotc211.org/2005/gmd"/>  </gmd:function>  ...  </gmd:CI\_OnlineResource>  </gmd:onLine>  </gmd:MD\_DigitalTransferOptions>  </gmd:transferOptions>  </gmd:MD\_Distribution>  </gmd:distributionInfo>  ...  </gmd:MD\_Metadata> |

* 1. Unique resource identifier - \*not in ISO 19115 core

In INSPIRE, this element is meant to uniquely identifying a resource (dataset, series or service), and it is mandatory for datasets and series.

Based on DCAT-AP [5], unique resource identifiers are mapped to dct:identifier (see the following example).

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] dct:identifier "12345"^^xsd:string . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  ...  <gmd:identifier>  <gmd:RS\_Identifier>  <gmd:code>  <gco:CharacterString>12345</gco:CharacterString>  </gmd:code>  ...  </gmd:RS\_Identifier>  </gmd:identifier>  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

If the unique resource identifier is specified with an HTTP URI, it can be used as the URI of the resource (see the following example).

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  <http://some.site/dataset/12345>  dct:identifier "http://some.site/dataset/12345"^^xsd:anyURI . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  ...  <gmd:identifier>  <gmd:RS\_Identifier>  <gmd:code>  <gco:CharacterString>  http://some.site/dataset/12345  </gco:CharacterString>  </gmd:code>  ...  </gmd:RS\_Identifier>  </gmd:identifier>  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |



* 1. Coupled resource - \*not in ISO 19115 core

This element is used to link a service to the target datasets or dataset series.

This relationship is modelled by using dct:hasPart.

NB: The notion of “coupled resource” does not apply to catalogue / discovery services. As per the DCAT-AP, the relationship between the catalogue and the available datasets is modelled by using dcat:dataset, which is a sub-property of dct:hasPart.

The target dataset or series should be preferably referred to by using its unique resource identifier (as in the following example).

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dctype:Service  dct:type <http://inspire.ec.europa.eu/codelist/ResourceType/service> ,  <http://inspire.ec.europa.eu/codelist/SpatialDataServiceType/view> ;  dct:hasPart [  dct:identifier "12345"^^xsd:string  ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <srv:SV\_ServiceIdentification>  ...  <srv:operatesOn>  <!-- Coupled resource identification (either embedded or by reference) -->  </srv:operatesOn>  </srv:SV\_ServiceIdentification>  ...  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata>  <!-- Coupled resource metadata (data identification section) -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  ...  <gmd:identifier>  <gmd:RS\_Identifier>  <gmd:code>  <gco:CharacterString>12345</gco:CharacterString>  </gmd:code>  ...  </gmd:RS\_Identifier>  </gmd:identifier>  </gmd:MD\_DataIdentification>  ...  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

* 1. Resource language and metadata language - \*Dataset language and Metadata language

In INSPIRE metadata, metadata and resource languages (which may be different) are specified by using the three-letter language codes defined in [ISO-639-2].

Based on DCAT and DCAT-AP, the proposal is to use for both elements is dct:language, and to specify the relevant language by using the language URI register operated by the EU Publications Office [MDR-LANG], available also in RDF format.

The following example assumes that the metadata language is Dutch, and the resource language is German.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  # Resource metadata  [] dct:language  <http://publications.europa.eu/resource/authority/language/DEU> ;  foaf:isPrimaryTopicOf  # Metadata on metadata  [ dct:language  <http://publications.europa.eu/resource/authority/language/NLD> ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <!-- Metadata on metadata: metadata language -->  <gmd:language>  <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-2/" codeListValue="dut"/>  </gmd:language>  ...  <!-- Resource language -->  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  ...  <gmd:language>  <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-2/" codeListValue="ger"/>  </gmd:language>  ...  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

The metadata language can be also used to specify the language of textual elements of resource metadata by using the @xml:lang attribute [22].

Since @xml:lang takes as value language identifiers defined by IETF-BCP-47 [21], a mapping from the actual value of the metadata language is needed.

* 1. Topic category, originating controlled vocabulary, and keyword value - \*Dataset topic category

In INSPIRE, these two elements have specific purposes. Quoting from the INSPIRE Metadata Regulation [3] ([§2.1](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e233-14-1) and [§3.1](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e233-14-1), respectively):

* The topic category is a high-level classification scheme to assist in the grouping and topic-based search of available spatial data resources.
* The keyword value is a commonly used word, formalised word or phrase used to describe the subject. While the topic category is too coarse for detailed queries, keywords help narrowing a full text search and they allow for structured keyword search.

Moreover, two types of keywords are allowed:

* free keywords;
* keywords taken from a controlled vocabulary.

Finally, topic categories apply only to datasets and dataset series.

***Topic category and keyword in datasets and dataset series***

As far as dataset metadata are concerned, in both DCAT and DCAT-AP, a distinction is made only between free keywords and keywords from controlled vocabularies, associated with a URI. For the former, dcat:keyword is used, whereas for the latter dcat:theme (which is a sub-property of dct:subject).Since the INSPIRE Registry operates URI registers for topic categories and INSPIRE spatial data themes, and in order to keep the distinction existing in INSPIRE between topic categories and keywords, the proposal is as follows:

* Topic category is mapped to dct:subject, and expressed by the corresponding URIs minted for the ISO code list in the INSPIRE Registry: <http://inspire.ec.europa.eu/metadata-codelist/TopicCategory>
* Keywords not associated with a controlled vocabulary will be mapped to dcat:keyword;
* Keywords whose controlled vocabulary is the one of the INSPIRE spatial data themes are mapped to dcat:theme and expressed by the corresponding URI in the INSPIRE Registry: <http://inspire.ec.europa.eu/theme>
* Keywords associated with other controlled vocabularies are mapped to dcat:theme.

Following DCAT-AP recommendations, keywords from controlled vocabularies should be preferably specified with dereferenceable HTTP URIs. In such a case, the information concerning the originating controlled vocabulary can be omitted.

When keywords cannot be specified with HTTP URIs, they should be modelled as (modelling the originating controlled vocabulary)

The representation of the information concerning the controlled vocabulary is illustrated in the following table.

Table : Mappings for metadata element ‘originating controlled vocabulary’

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Metadata Element | | | Proposed mapping | |
| Originating controlled vocabulary | Title | | *skos:ConceptScheme* | *dct:title* |
| Reference date | creation | *dct:created* |
| last revision | *dct:modified* |
| publication | *dct:issued* |

For conformance with DCAT-AP, GeoDCAT-AP records must also include keywords from the MDR Data Theme Named Authority List [].

In order to ensure consistency, the relevant MDR Data Theme keywords should be selected based on mappings with the controlled vocabularies used in INSPIRE / ISO 19115 metadata.

At the date of publication of this specification, work is under-way to define a set of harmonised mappings between the relevant vocabularies. The status of this work, and links to a machine readable representation of the mappings, is documented on the dedicated page on Joinup [], available at:

[link to be added]

Table 4: Non-normative mapping of INSPIRE themes and the Data Themes NAL

|  |  |  |
| --- | --- | --- |
| Data themes NAL  Authority code | Data themes NAL  label | INSPIRE themes |
| AGRI | Agriculture, fisheries, forestry and food | Agricultural and aquaculture facilities |
| ECON | Economy, finance and industry | Cadastral parcels, Building, Mineral resources, Production and industrial facilities, |
| EDUC | Education, culture, sport and tourism | - |
| ENER | Energy | Energy resources |
| ENVI | Environment | Protected sites, Hydrography, Area management/restriction/regulation zones & reporting, Atmospheric conditions, Bio-geographical regions, Environmental monitoring facilities, Habitats and biotopes, Land cover, Meteorological geographical features, Natural risk zones, Oceanographic geographical features, Sea regions, Soil, Species distribution, |
| GOVE | Government and public sector | Addresses, Administrative Units, Geographical Names, Utility and governmental services |
| HEAL | Health | Human health and safety |
| INTR | International issues |  |
| JUST | Justice, legal system and public safety |  |
| REGI | Regions and cities |  |
| SOCI | Population and social conditions | Population distribution and demography, Statistical units |
| TECH | Science and technology | Coordinate reference systems, Geographical grid systems, Elevation, Geology, Orthoimagery, Land use |
| TRAN | Transport | Transport networks |

***Keyword in services***

As far as service metadata are concerned, keywords can classify either a service or the datasets / series operated by the service itself. For the latter, INSPIRE Metadata Regulation requires using at least one of the keywords from the ISO 19119 code list of spatial data service categories.

Both DCAT and DCAT-AP do not foresee any specific property for keywords classifying either a service or the datasets / series operated by a service. Moreover, dcat:theme and dcat:keyword cannot be used for services, since their domain is restricted to dcat:Dataset.

In order to keep the distinction between these two types of keywords, the proposed solution is as follows:

* Keywords from the ISO 19119 codelist of spatial data service categories are mapped to dct:type, and expressed by the corresponding URI in the INSPIRE Registry.
* Keywords not associated with a controlled vocabulary will be mapped to dc:subject, and represented as un-typed literals;
* Keywords whose controlled vocabulary is the one of the INSPIRE spatial data themes are mapped to dct:subject, and expressed by the corresponding URI in the INSPIRE Registry.
* Keywords associated with other controlled vocabularies are mapped to dct:subject and expressed as a skos:Concept associated with a skos:ConceptScheme, and annotated with the textual content and reference date(s) in the relevant INSPIRE metadata elements. Both skos:Concept and skos:ConceptScheme will be blank nodes (i.e., no URIs will be used to denote them).

In the last case, controlled vocabularies are represented as explained in the previous section.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  ## Datasets and series  [] a dcat:Dataset ;  ### Free keywords  dcat:keyword "CHM"@en, "RDSI"@en ;  ### Keywords from controlled vocabularies  dcat:theme  ### Data themes Name Authority List (Environment)  <http://publications.europa.eu/resource/authority/data-theme/ENVI> ,  ### INSPIRE theme URI (land coverage)  <http://inspire.ec.europa.eu/theme/lc> ,  ### Other controlled vocabulary [ a skos:Concept ;  skos:prefLabel "coniferous forest"@en ;  skos:inScheme [ a skos:ConceptScheme ;  rdfs:label "GEMET - Concepts, version 2.4"@en ;  dct:issued "2010-01-13"^^xsd:date ] ] ;  ### Topic categories  dct:subject <http://inspire.ec.europa.eu/codelist/TopicCategory/geoscientificInformation> .  ## Services  [] a dcat:Catalog ;  ### Free keywords  dc:subject "hydrography"@en ;  ### Keyword from ISO 19119 codelist of spatial data service categories  dct:type <http://inspire.ec.europa.eu/codelist/SpatialDataServiceCategory/humanGeographicViewer/> ;  ### Keywords from controlled vocabularies  dct:subject <http://inspire.ec.europa.eu/theme/hy> ,  [ a skos:Concept ;  skos:prefLabel "Floods"@en ;  skos:inScheme [ a skos:ConceptScheme ;  rdfs:label "GEOSS - Societal Benefit Areas, version 1.0"@en ;  dct:issued "2010-08-25"^^xsd:date ] ] . |
| <!-- Resource metadata in ISO19139 -->  <!-- Datasets and series -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  <!-- free keywords -->  <gmd:descriptiveKeywords>  <gmd:keyword>  <gco:CharacterString>CHM</gco:CharacterString>  </gmd:keyword>  <gmd:keyword>  <gco:CharacterString>RDSI</gco:CharacterString>  </gmd:keyword>  </gmd:descriptiveKeywords>  <!-- Keywords from controlled vocabularies -->  <gmd:descriptiveKeywords>  <gmd:keyword>  <gco:CharacterString>coniferous forest</gco:CharacterString>  </gmd:keyword>  <gmd:thesaurusName>  <gmd:CI\_Citation>  <gmd:title>  <gco:CharacterString>GEMET - Concepts, version 2.4</gco:CharacterString>  </gmd:title>  <gmd:date>  <gmd:CI\_Date>  <gmd:date>  <gco:Date>2010-01-13</gco:Date>  </gmd:date>  <gmd:dateType>  <gmd:CI\_DateTypeCode  codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_DateTypeCode"  codeListValue="publication">publication</gmd:CI\_DateTypeCode>  </gmd:dateType>  </gmd:CI\_Date>  </gmd:date>  </gmd:CI\_Citation>  </gmd:thesaurusName>  </gmd:descriptiveKeywords>    <!-- Topic category -->  <gmd:topicCategory>  <gmd:MD\_TopicCategoryCode>http://inspire.ec.europa.eu/codelist/TopicCategory/geoscientificInformation</gmd:MD\_TopicCategoryCode>  </gmd:topicCategory>  ...  </gmd:MD\_DataIdentification>  ...  </gmd:identificationInfo>  </gmd:MD\_Metadata>  <!-- Keywords for services -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <srv:SV\_ServiceIdentification>  <!-- free keywords -->  <gmd:descriptiveKeywords>  <gmd:keyword>  <gco:CharacterString>hydrography</gco:CharacterString>  </gmd:keyword>  </gmd:descriptiveKeywords>  <!-- Keyword from ISO 19119 codelist of spatial data service categories -->  <gmd:descriptiveKeywords>  <gmd:keyword>  <gco:CharacterString>humanGeographicViewer</gco:CharacterString>  </gmd:keyword>  <gmd:thesaurusName>  <gmd:CI\_Citation>  <gmd:title>  <gco:CharacterString>ISO 19119 codelist of spatial data service categories</gco:CharacterString>  </gmd:title>  <gmd:date>  <gmd:CI\_Date>  <gmd:date>  <gco:Date>2007-06-01</gco:Date>  </gmd:date>  <gmd:dateType>  <gmd:CI\_DateTypeCode  codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_DateTypeCode"  codeListValue="publication">publication</gmd:CI\_DateTypeCode>  </gmd:dateType>  </gmd:CI\_Date>  </gmd:date>  </gmd:CI\_Citation>  </gmd:thesaurusName>  </gmd:descriptiveKeywords>  <!-- Keywords from controlled vocabularies -->  <gmd:descriptiveKeywords>  <gmd:keyword>  <gco:CharacterString>Floods</gco:CharacterString>  </gmd:keyword>  <gmd:thesaurusName>  <gmd:CI\_Citation>  <gmd:title>  <gco:CharacterString>GEOSS - Societal Benefit Areas, version 1.0</gco:CharacterString>  </gmd:title>  <gmd:date>  <gmd:CI\_Date>  <gmd:date>  <gco:Date>2010-08-25</gco:Date>  </gmd:date>  <gmd:dateType>  <gmd:CI\_DateTypeCode  codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_DateTypeCode"  codeListValue="publication">publication</gmd:CI\_DateTypeCode>  </gmd:dateType>  </gmd:CI\_Date>  </gmd:date>  </gmd:CI\_Citation>  </gmd:thesaurusName>  </gmd:descriptiveKeywords>  ...  </srv:SV\_ServiceIdentification>  ...  </gmd:identificationInfo>  </gmd:MD\_Metadata> |

* 1. Spatial data service type - \*not in ISO 19115 core

See Section II.3 on resource type.

* 1. Geographic bounding box - \*Geographic location of the dataset (by 4 coordinates or by geographic identifier)

In the core profile of ISO 19115, spatial coverage can be specified either with a bounding box (a geometry) or a geographic identifier. INSPIRE is more restrictive, in that it requires to use a bounding box

Based on that, GeoDCAT-AP models spatial coverage as follows:

* **Bounding box**: When the area corresponding to the spatial coverage is denoted by a geometry, as in INSPIRE, DCAT-AP recommends the use of the Core Location Vocabulary [23], where this is done by using property locn:geometry, having as range a geometry[[1]](#footnote-2) specified as
  + a URI - e.g., by using the geo URI scheme (IET RFC-5870) [24], or a geohash URI [25] [26];
  + a syntax encoding scheme - e.g., geohashes [25] [26], WKT [ISO-19125], GML [27], KML [28], GeoJSON [29]; or
  + a semantic representation - using vocabularies like W3C Lat/long [30] or schema.org [31].

It is worth noting that currently there is no agreement on a preferred format to be used in RDF for the representation of geometries. Geometries can be provided in any, and possibly multiple, encodings, but at least one of the following must be made available: WKT or GML. An additional requirement concerns the coordinate reference system (CRS) used, which may vary on a country or territory basis. The CRS must be specified in the GML or WKT encoding as required by GeoSPARQL. Geometries shall be interpreted using the axis order defined in the spatial reference system used. For example, for WGS84 the axis order is longitude / latitude. Summarising:

* + Geometries can be provided in multiple encodings, but at least one of the following must be made available: GML and WKT.
  + For GML and WKT, the CRS must be specified as defined in GeoSPARQL [32].
* **Geographic identifier**: ISO19115 core also allows specifying the geographic location using a geographic identifier. For this, it is recommended to use an HTTP URI from the NAL continents [], NAL countries [18], NAL places [19], or geonames [20], as proposed in the DCAT-AP specification. If an HTTP URI is not available, the geographical identifier must be expressed with skos:prefLabel, and the reference to the originating controlled vocabulary (if any) must be specified with skos:inScheme. The controlled vocabulary will be described by a name (dct:title) and a last modified data (dct:modified).

As far as geographic identifiers are concerned, following DCAT-AP, GeoDCAT-AP does not prevent the use other vocabularies in addition to the recommended ones. The vocabularies identified by the GeoDCAT-AP WG are listed in Section 6 of the GeoDCAT-AP specification.

The following example shows how to specify the spatial coverage.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP using a geographic bounding box. This example uses multiple encodings, namely, the  # recommended ones (WKT and GML), plus GeoJSON. To denote the datatype of the GeoJSON literal, the URL of the corresponding  # IANA media type.  [] dct:spatial [ a dct:Location ;  locn:geometry "POLYGON((-10.58 70.09,34.59 70.09,34.59 34.56,-10.58 34.56,  -10.58 70.09))"^^gsp:wktLiteral ;  locn:geometry "<gml:Envelope srsName=\"http://www.opengis.net/def/crs/OGC/1.3/CRS84\">  <gml:lowerCorner>34.56 -10.58</gml:lowerCorner>  <gml:upperCorner>70.09 34.59</gml:upperCorner>  </gml:Envelope>"^^gsp:gmlLiteral ] ;  locn:geometry "{\"type\":\"Polygon\",\"crs\":{\"type\":\"name\",\"properties\":{\"name\":\"urn:ogc:def:crs:OGC:1.3:CRS84\"}},  \"coordinates\":[[[-10.58,70.09],[34.59,70.09],[34.59,34.56],[-10.58,34.56],[-10.58,70.09]]]  }"^^<https://www.iana.org/assignments/media-types/application/vnd.geo+json> ].  # Resource metadata in GeoDCAT-AP using a geographic identifier  #If a URI is used for the geographic identifier (recommended)  []  dct:spatial <http://publications.europa.eu/resource/authority/country/NLD>.  #If no URI is used for the geographic identifier  []  dct:spatial [  skos:preflabel "Netherlands"@en;  skos:prefLabel "Nederland"@nl;  skos:inScheme [  dct:title "Countries Authority Table"@en;  dct:modified "2009-01-01"^^xsd:date  ]  ]. |
| <!-- Resource metadata in ISO19139 using a geographic bounding box -->  <gmd:MD\_Metadata>  ...  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  <gmd:extent>  <gmd:EX\_Extent>  <gmd:geographicElement>  <gmd:EX\_GeographicBoundingBox>  <gmd:extentTypeCode>  <gco:Boolean>true</gco:Boolean>  </gmd:extentTypeCode>  <gmd:westBoundLongitude>  <gco:Decimal>-9.227701</gco:Decimal>  </gmd:westBoundLongitude>  <gmd:eastBoundLongitude>  <gco:Decimal>2.687637</gco:Decimal>  </gmd:eastBoundLongitude>  <gmd:southBoundLatitude>  <gco:Decimal>49.83726</gco:Decimal>  </gmd:southBoundLatitude>  <gmd:northBoundLatitude>  <gco:Decimal>60.850441</gco:Decimal>  </gmd:northBoundLatitude>  </gmd:EX\_GeographicBoundingBox>  </gmd:geographicElement>  </gmd:EX\_Extent>  </gmd:extent>  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

* 1. Temporal reference and metadata date –\*Additional extent information for the dataset (vertical and temporal) and \*Metadata date stamp

Temporal reference is a composite element consisting of the following possible child elements:

* temporal extent (temporal coverage);
* date of publication, last revision, and/or creation.

Based on DCAT(-AP) [9] [5], temporal extent is mapped to dct:temporal, having as range dct:PeriodOfTime. The time instant or interval is specified by using properties schema:startDate and schema:endDate, respectively.

By contrast, date of publication, last revision, and creation are mapped, respectively, to dct:issued, dct:modified, and dct:created.

DCAT(-AP) [9] [5] do not foresee a property equivalent to the INSPIRE metadata element metadata date. In INSPIRE, this element is defined as follows ([Part B, §10.2](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e576-14-1))):

The date which specifies when the metadata record was created or updated.

Due to this ambiguity, the proposed mapping for this element is dct:modified.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  ## Creation, publication and last revision dates  [] dct:created "2010-03-01"^^xsd:date ;  dct:issued "2010-10-05"^^xsd:date ;  dct:modified "2011-09-01"^^xsd:date ;  ## Temporal extent  dct:temporal [ a dct:PeriodOfTime ;  schema:endDate "2006-12-31"^^xsd:date ;  schema:startDate "2006-01-01"^^xsd:date ] ;  foaf:isPrimaryTopicOf  # Metadata on metadata  ## Metadata date    [ dct:modified "2012-08-13"^^xsd:date ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <!-- metadata date -->  <gmd:dateStamp>  <gco:Date>2012-08-13</gco:Date>  </gmd:dateStamp>  ...  <!—temporal extent -->  <gmd:extent>  <gmd:EX\_Extent>  <gmd:temporalElement>  <gmd:EX\_TemporalExtent>  <gmd:extent>  <gml:TimePeriod gml:id="w5633aaa">  <gml:beginPosition>2006-01-01</gml:beginPosition>  <gml:endPosition>2006-12-31</gml:endPosition>  </gml:TimePeriod>  </gmd:extent>  </gmd:EX\_TemporalExtent>  </gmd:temporalElement>  </gmd:EX\_Extent>  </gmd:extent>  ...  <!— Publication date (creation and last modification dates encoded similarly) -->  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  <gmd:citation>  <gmd:CI\_Citation>  ...  <gmd:date>  <gmd:CI\_Date>  <gmd:date>  <gco:Date>2010-03-01</gco:Date>  </gmd:date>  <gmd:dateType>  <gmd:CI\_DateTypeCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/  Codelist/ML\_gmxCodelists.xml#CI\_DateTypeCode" codeListValue="publication">publication</gmd:CI\_DateTypeCode></gmd:dateType>  </gmd:CI\_Date>  </gmd:date>  ...  </gmd:CI\_Citation>  </gmd:citation>  ...  </gmd:MD\_DataIdentification>  ...  </gmd:identificationInfo>  </gmd:MD\_Metadata> |

* 1. Lineage - \*Lineage

In DCAT(-AP) [7] [5], no equivalent term is foreseen.

In the work on the alignment of INSPIRE metadata and the Dublin Core [10], the proposed mapping is dc:description. However, an equivalent property, namely, dct:description, is used in DCAT and DCAT-AP for what in INSPIRE corresponds to the resource abstract element.

For these reasons, the proposed candidate is dct:provenance. Since the range of dct:provenance is not a literal, but class dct:ProvenanceStatement, the free-text content of element “lineage” can be expressed by using rdfs:label, as illustrated in the DCMI user guide on publishing metadata [33].

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dct:provenance [ a dct:ProvenanceStatement ;  rdfs:label "Forest Map 2006 is derived from the IMAGE2006 (SPOT/LISS scenes) and CORINE2006 landcover dataset. In  addition, MODIS composites are used for the Forest type classification."@en ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:dataQualityInfo>  <gmd:DQ\_DataQuality>  <gmd:lineage>  <gmd:LI\_Lineage>  <gmd:statement>  <gco:CharacterString> Forest Map 2006 is derived from the IMAGE2006 (SPOT/LISS scenes) and CORINE2006 landcover dataset. In addition, MODIS composites are used for the Forest type classification.  </gco:CharacterString>  </gmd:statement>  </gmd:LI\_Lineage>  </gmd:lineage>  </gmd:DQ\_DataQuality>  </gmd:dataQualityInfo>  ...  </gmd:MD\_Metadata> |

* 1. Spatial resolution – Spatial resolution of the dataset

In DCAT(-AP) [7] [5], no equivalent term is foreseen.

There are currently no candidates in existing vocabularies to represent such metadata elements. It is proposed to encode spatial resolution in a human-readable form only, using the property rdfs:comment.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  # Spatial resolution as equivalent scale  [] a dcat:Dataset ;  rdfs:comment "Spatial resolution (equivalent scale): 1:10000"@en .  # Spatial resolution as distance  [] a dcat:Dataset ;  rdfs:comment "Spatial resolution (distance): 5 km"@en . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Resolution>  <gmd:equivalentScale>  <gmd:MD\_RepresentativeFraction>  <gmd:denominator>  <gco:Integer>10000</gco:Integer>  </gmd:denominator>  </gmd:MD\_RepresentativeFraction>  </gmd:equivalentScale>  </gmd:MD\_Resolution> |

* 1. Conformity and data quality - \*not in ISO 19115 core

The GeoDCAT-AP specification only provides a syntax binding for conformity and not for data quality in general. In ISO 19115 conformance and quality information is encoded as a quality report containing the result of a test (an evaluation) of a given quality measure according to an evaluation method with a quantitative result (a metric) or a conformance result (pass or fail) as most important outcome. For encoding conformance, GeoDCAT-AP proposes to use dct:conformsTo and the W3C Provenance Ontology (PROV-O) [34] as explained in the following paragraphs. For encoding other aspects of data quality, GeoDCAT-AP does not provide a syntax binding as there is a risk that the (future) work of other standards bodies on data quality may make the proposed syntax binding for GeoDCAT-AP outdated. For example, the W3C Data on the Web Best Practices WG is working on a Data Quality standard. To limit the impact, it may be better to only provide a partial mapping for Data Quality / Conformance.

DCAT-AP [5] provides a single candidate, dct:conformsTo, which however can be used to map only a conformity of degree ‘conformant’. This is suitable for GeoDCAT-AP Core.

Considering how conformity must be expressed in GeoDCAT-AP Extended (see the INSPIRE Metadata Regulation, Part B, [§7](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e415-14-1)), possible candidates are the W3C Evaluation and Report Language (EARL) [35] and the W3C Provenance Ontology (PROV-O) [34]. The latter candidate was chosen since it would enable wider re-use with respect to the EARL vocabulary, which is more specific, and its use is limited. PROV-O allows encoding conformity as a test activity (prov:Activity) that generated a result encoded with property ‘prov:generated’, corresponding to the degree of conformity, for which the INSPIRE Registry maintains a URI set, see Section 6 of the GeoDCAT-AP specification. The specification against which the conformance is asserted is encoded via a qualified association (prov:QualifiedAssociation) with a test plan (a prov:Plan) in turn derived from a standard (dct:Standard, also prov:Entity). These associations are made via a chain of properties: ‘prov:qualifiedAssociation’, ‘prov:hadPlan’, and ‘prov:wasDerivedFrom’.

Table : Mappings for metadata element 'conformity'

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Metadata element | | | | *Proposed mapping* | | |
| Conformity | Specification (M) | Title | | prov:wasUsedBy  (range  *prov:Activity)* | *prov:qualifiedAssociation (range prov:Assocation) >*  *prov:hadPlan (range prov:Plan) >*  *prov:wasDerivedFrom (range: prov:Entity, dct:Standard)* | *dct:title* |
| Reference date | creation | *dct:created* |
| last revision | *dct:modified* |
| publication | *dct:issued* |
| Degree (M) | | | *prov:generated* | |

In order to grant interoperability with DCAT-AP, when conformity is of degree “conformant”, the proposal is to use both PROV-O and dct:conformsTo for GeoDCAT-AP Extended.

|  |
| --- |
| Example |
| *# Resource metadata in GeoDCAT-AP*  prov:wasUsedBy [  a prov:Activity;  *# Conformity degree*  prov:generated [  dct:type <http://inspire.ec.europa.eu/codelist/DegreeOfConformity/conformant> ;  dct:description “See the referenced specification”@en  prov:qualifiedAssociation [  prov:hadPlan [  a prov:Plan;  prov:wasDerivedFrom [  *# Specification*  a prov:Entity, dct:Standard;  dct:title "COMMISSION REGULATION (EC) No 976/2009 of 19 October 2009 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards the Network Services"@en  dct:issued "2009-10-20"^^xsd:date  ]  ];  ];  ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:result>  <gmd:DQ\_ConformanceResult>  <gmd:specification>  <gmd:CI\_Citation>  <gmd:title>  <gco:CharacterString>COMMISSION REGULATION (EC) No 976/2009 of 19 October 2009 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards the Network Services</gco:CharacterString>  </gmd:title>  <gmd:date>  <gmd:CI\_Date>  <gmd:date>  <gco:Date>2009-10-20</gco:Date>  </gmd:date>  <gmd:dateType>  <gmd:CI\_DateTypeCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_DateTypeCode" codeListValue="publication">publication</gmd:CI\_DateTypeCode>  </gmd:dateType>  </gmd:CI\_Date>  </gmd:date>  </gmd:CI\_Citation>  </gmd:specification>  <gmd:explanation>  <gco:CharacterString> </gco:CharacterString>  </gmd:explanation>  <gmd:pass><gco:Boolean>true</gco:Boolean></gmd:pass>  </gmd:DQ\_ConformanceResult>  </gmd:result> |

* 1. Conditions for access and use and limitations on public access – Use limitation and access / other constraints

In DCAT(-AP) [9] [5], licensing information is specified on (a) data catalogues (services) and on (b) the distribution(s) of a dataset, and not on the dataset itself. The principle is that different dataset distributions may be associated with different licensing terms. Moreover, DCAT-AP recommends the use of dct:accessRights for specifying access conditions.

Based on this, GeoDCAT-AP models use and access limitations by using, respectively, dct:license and dct:accessRights.

Since the range of these properties is not a literal, but, respectively, classes dct:LicenseDocument and dct:RightsStatement, the free-text content of the corresponding ISO 19115 / INSPIRE metadata elements can be expressed by using rdfs:label, as illustrated in [33]. It is a recommended good practice to mint URIs for licence documents and right statements.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] dcat:distribution [ a dcat:Distribution ;  dct:license [ a dct:LicenseDocument ;  rdfs:label "Reuse is authorised according to the European Commission legal notice at  http://ec.europa.eu/geninfo/legal\_notices\_en.htm"@en ] ;  dct:accessRights [ a dct:RightsStatement ;  rdfs:label "no limitation"@en ] ] .  # Resource metadata in GeoDCAT-AP (using URI for the licence)  [] dcat:distribution [ a dcat:Distribution ;  dct:license <http://ec.europa.eu/geninfo/legal\_notices\_en.htm> ;  dct:accessRights [ a dct:RightsStatement ;  rdfs:label "no limitation"@en ] ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:MD\_LegalConstraints>  <gmd:useLimitation>  <gco:CharacterString>Reuse is authorised according to the European Commission legal notice at  http://ec.europa.eu/geninfo/legal\_notices\_en.htm.</gco:CharacterString>  </gmd:useLimitation>  <gmd:accessConstraints>  <gmd:MD\_RestrictionCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#MD\_RestrictionCode" codeListValue="otherRestrictions"/>  </gmd:accessConstraints>  <gmd:otherConstraints>  <gco:CharacterString>No limitation</gco:CharacterString>  </gmd:otherConstraints>  </gmd:MD\_LegalConstraints>  </gmd:MD\_Metadata>  <!-- Resource metadata in ISO19139: using a licence URI -->  <gmd:MD\_Metadata>  ...  <gmd:MD\_LegalConstraints>  <gmd:useLimitation>  <gmx:Anchor xlink:href=" http://ec.europa.eu/geninfo/legal\_notices\_en.htm"</gmx:Anchor >  </gmd:useLimitation>  <gmd:accessConstraints>  <gmd:MD\_RestrictionCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#MD\_RestrictionCode" codeListValue="otherRestrictions"/>  </gmd:accessConstraints>  <gmd:otherConstraints>  <gco:CharacterString>No limitation</gco:CharacterString>  </gmd:otherConstraints>  </gmd:MD\_LegalConstraints>  </gmd:MD\_Metadata> |

* 1. Responsible party and metadata point of contact - \*Dataset responsible party and \*Metadata point of contact

DCAT(-AP) [9] [5] foresee properties to denote the publisher and the contact point for a dataset.

By contrast, ISO 19139 [7] and the INSPIRE Metadata Regulation foresee 11 possible relationships between a resource (a dataset, a dataset series, a service) and an agent (organisation), plus one for metadata. For some of them, suitable candidates exist from widely used vocabularies (in particular, [DCTerms ]). However, for some of them no suitable candidate is available in the existing vocabularies (in particular, for roles “user” and “processor”).

A possible solution is to support many-to-1 mappings whenever possible. For instance, roles “publisher” and “provider” could be both mapped to dct:publisher. However, besides losing the original semantics, this would result in creating ambiguities (e.g., two dct:publisher’s) that would not help interoperability with [DCAT-AP]. Therefore, it would be preferable to support 1-to-1 mappings only.

In the extended profile of GeoDCAT-AP, the W3C PROV ontology [34] is used to specify the relationship between the resource and the responsible organisation. The W3C vCard ontology [36] can then be used to specify the contact information concerning the responsible party. Finally, the responsible party role can be specified by using dct:type, and using the relevant code list values from the INSPIRE Registry. These mappings are illustrated in the following table.

Table : Mappings for metadata element ‘responsible party’

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Metadata element | | | Proposed mapping | | |
| Responsible party | Responsible party | Organisation name | *prov:Attribution* | *vcard:Kind* | *vcard:organization-name* |
| Contact email address | *vcard:hasEmail* |
| Responsible party role | | *dct:type* | |

This option has the advantage of preserving the semantics in the original metadata, and of preventing information loss. However, it does not rely on RDF properties used in DCAT-AP.

For these reason, the proposed solution is as follows:

* Represent responsible organisations by using the PROV ontology.
* If suitable candidates exist from widely used vocabularies, use them to represent the corresponding responsible parties and their roles, based on an agreed definition of 1-to-1 mappings.

The following table lists the proposed mappings for responsible party roles, taking into account only widely used vocabularies.

Table Responsible party roles

|  |  |  |  |
| --- | --- | --- | --- |
| ISO 19139 Code [7] -  Responsible party role | INSPIRE Metadata Regulation [3] | Description | Proposed RDF mapping  (where not available prov:qualifiedAttribution can be used) |
| Metadata point of contact | [**Part B §10.1**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e557-14-1) | This is the description of the organisation responsible for the creation and maintenance of the metadata. | dcat:contactPoint |
| Resource provider | [**Part B §6.1**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2082-14-1) | Party that supplies the resource. | N/A |
| Custodian | [**Part B §6.2**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2092-14-1) | Party that accepts accountability and responsibility for the data and ensures appropriate care and maintenance of the resource. | N/A |
| Owner | [**Part B §6.3**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2102-14-1) | Party that owns the resource. | dct:rightsHolder |
| User | [**Part B §6.4**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2112-14-1) | Party who uses the resource. | N/A |
| Distributor | [**Part B §6.5**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2122-14-1) | Party who distributes the resource | N/A |
| Originator | [**Part B §6.6**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2132-14-1) | Party who created the resource. | dct:creator |
| Point of contact | [**Part B §6.7**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2142-14-1) | Party who can be contacted for acquiring knowledge about or acquisition of the resource. | dcat:contactPoint |
| Principal investigator | [**Part B §6.8**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2152-14-1) | Key party responsible for gathering information and conducting research | N/A |
| Processor | [**Part B §6.9**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2162-14-1) | Party who has processed the data in a manner such that the resource has been modified. | N/A |
| Publisher | [**Part B §6.10**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2172-14-1) | Party who published the resource | dct:publisher |
| Author | [**Part B §6.11**](http://eur-lex.europa.eu/eli/reg/com/2008/1205#d1e2183-14-1) | Party who authored the resource. | N/A |

In the following example, the same organisation is both the data custodian and the metadata point of contact.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] dcat:contactPoint [ a vcard:Organization ;  foaf:mbox <mailto:bag@kadaster.nl> ;  foaf:name "Kadaster"@nl ] ;  prov:qualifiedAttribution  [ a prov:Attribution ;  dct:type <http://inspire.ec.europa.eu/codelist/ResponsiblePartyRole/custodian> ;  prov:agent [ a vcard:Kind ;  vcard:hasEmail <mailto:bag@kadaster.nl> ;  vcard:organization-name "Kadaster"@nl ] ] ;  foaf:isPrimaryTopicOf  # Metadata on metadata in GeoDCAT-AP  [ dcat:contactPoint [ a vcard:Kind ;  vcard:hasEmail <mailto:bag@kadaster.nl> ;  vcard:organization-name "Kadaster"@nl ] ;  prov:qualifiedAttribution [ a prov:Attribution ;  dct:type <http://inspire.ec.europa.eu/codelist/ResponsiblePartyRole/pointOfContact> ;  prov:agent [ a vcard:Kind ;  vcard:hasEmail <mailto:bag@kadaster.nl> ;  vcard:hasURL <http://www.kadaster.nl/bag> ;  vcard:organization-name "Kadaster"@nl ] ] ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:pointOfContact>  <gmd:CI\_ResponsibleParty>  <gmd:organisationName>  <gco:CharacterString>Kadaster</gco:CharacterString>  </gmd:organisationName>  <gmd:contactInfo>  <gmd:CI\_Contact>  <gmd:address>  <gmd:CI\_Address>  <gmd:electronicMailAddress>  <gco:CharacterString>bag@kadaster.nl</gco:CharacterString>  </gmd:electronicMailAddress>  </gmd:CI\_Address>  </gmd:address>  <gmd:onlineResource>  <gmd:CI\_OnlineResource>  <gmd:linkage>  <gmd:URL>http://www.kadaster.nl/bag</gmd:URL>  </gmd:linkage>  </gmd:CI\_OnlineResource>  </gmd:onlineResource>  </gmd:CI\_Contact>  </gmd:contactInfo>  <gmd:role>  <gmd:CI\_RoleCode codeListValue="custodian" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_RoleCode"/>  </gmd:role>  </gmd:CI\_ResponsibleParty>  </gmd:pointOfContact>  ...  </gmd:MD\_Metadata>  <!-- Metadata on metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:contact>  <gmd:CI\_ResponsibleParty>  <gmd:organisationName>  <gco:CharacterString>Kadaster</gco:CharacterString>  </gmd:organisationName>  <gmd:contactInfo>  ...  </gmd:contactInfo>  <gmd:role>  <gmd:CI\_RoleCode codeListValue="pointofContact" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#CI\_RoleCode"/>  </gmd:role>  </gmd:CI\_ResponsibleParty>  </gmd:contact>  ...  </gmd:MD\_Metadata> |

* 1. \*Metadata file identifier

This element identifies a metadata record.

Metadata file identifiers are mapped to dct:identifier.

|  |
| --- |
| Example |
| # Metadata on metadata in GeoDCAT-AP  [] a dcat:CatalogRecord ;  dct:identifier "947e5a55-e548-11e1-9105-0017085a97ab"^^xsd:string ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  <!-- Metadata on metadata -->  ...  <gmd:fileIdentifier>  <gco:CharacterString>  947e5a55-e548-11e1-9105-0017085a97ab  </gco:CharacterString>  </gmd:fileIdentifier>  ...  </gmd:MD\_Metadata> |

If the metadata file identifier is an HTTP URI, it can also be used as the URIs of the catalogue record (see the following example).

|  |
| --- |
| Example |
| # Metadata on metadata in GeoDCAT-AP  <http://some.site/some/path/947e5a55-e548-11e1-9105-0017085a97ab>  a dcat:CatalogRecord ;  dct:identifier "http://some.site/some/path/947e5a55-e548-11e1-9105-0017085a97ab"^^xsd:anyURI ]. |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  <!-- Metadata on metadata -->  ...  <gmd:fileIdentifier>  <gco:CharacterString>  http://some.site/some/path/947e5a55-e548-11e1-9105-0017085a97ab  </gco:CharacterString>  </gmd:fileIdentifier>  ...  </gmd:MD\_Metadata> |

* 1. \*Metadata standard name, \*Metadata standard version

Similar as the encoding of conformity (see Section II.14), it is proposed to use dct:conformsTo to encode information about the metadata standard name and metadata standard version.

The metadata on metadata is encoded as a dcat:CatalogRecord.

Table : Metadata standard name and metadata standard version

|  |  |  |  |
| --- | --- | --- | --- |
| Metadata element | | *Proposed mapping* | |
| Metadata standard | Metadata standard name | *dct:conformsTo* | *dct:title* |
| Metadata standard version | *owl:versionInfo* |

The following example shows a GeoDCAT-AP metadata record obtained from one conformant with ISO 19115.

|  |
| --- |
| Example |
| # Metadata on metadata in GeoDCAT-AP  [] a dcat:CatalogRecord ;  dct:conformsTo [  # Standard name and version of the GeoDCAT-AP record  dct:title "GeoDCAT-AP Extended profile"@en ;  owl:versionInfo "1.0".  ] . |
| <!-- Resource metadata in ISO19139 for datasets -->  <gmd:MD\_Metadata>  ...  <gmd:metadataStandardName>  <gco:CharacterString>ISO 19115</gco:CharacterString>  </gmd:metadataStandardName>  <gmd:metadataStandardVersion>  <gco:CharacterString>Nederlands metadata profiel op ISO 19115 voor geografie 1.3</gco:CharacterString>  </gmd:metadataStandardVersion>  </gmd:MD\_Metadata> |

To represent the standard name and version of the source ISO record, the GeoDCAT-AP metadata record must be extended as in the following example.

|  |
| --- |
| Example |
| # Metadata on metadata in GeoDCAT-AP  [] a dcat:CatalogRecord ;  dct:conformsTo [  # Standard name and version of the GeoDCAT-AP record  dct:title "GeoDCAT-AP Extended profile"@en ;  owl:versionInfo "1.0".  ] ;  dct:source [  # Standard name and version of the source ISO 19115 record  a dcat:CatalogRecord ;  dct:conformsTo [  dct:title "ISO 19115"@en ;  owl:versionInfo "Nederlands metadata profiel op ISO 19115 voor geografie 1.3".  ] . |
| <!-- Resource metadata in ISO19139 for datasets -->  <gmd:MD\_Metadata>  ...  <gmd:metadataStandardName>  <gco:CharacterString>ISO 19115</gco:CharacterString>  </gmd:metadataStandardName>  <gmd:metadataStandardVersion>  <gco:CharacterString>Nederlands metadata profiel op ISO 19115 voor geografie 1.3</gco:CharacterString>  </gmd:metadataStandardVersion>  </gmd:MD\_Metadata> |

* 1. \*Metadata characterset

See Section II.24.

* 1. Metadata point of contact - \*Metadata point of contact

See Section II.16.

* 1. Metadata date - \*Metadata date stamp

See Section II.11.

* 1. Metadata language - \*Metadata language

See Section II.7.

* 1. Coordinate reference systems and Temporal reference systems – \*Reference System

In DCAT(-AP) [7] [5], no equivalent term is foreseen. This is also the case for the NeoGeo [37], GeoSPARQL [32], and Core Location Vocabulary [23].

Based on this, these elements are provisionally mapped to property dct:conformsTo. Moreover, in order to indicate that the object of dct:conformsTo denotes a reference system, an additional statement with predicate dct:type is added, with a code list value defining the notion of (spatial / temporal) reference system, taken from the glossary operated by the INSPIRE Registry.

More precisely, the following URIs should be used to denote, respectively, spatial and temporal reference systems:

* <http://inspire.ec.europa.eu/glossary/SpatialReferenceSystem>
* <http://inspire.ec.europa.eu/glossary/TemporalReferenceSystem>

The reference system identifier should be preferably represented with an HTTP URI. In particular, spatial reference systems should be specified by using the corresponding URIs from the “EPSG coordinate reference systems” register operated by the Open Geospatial Consortium.

In this register, the URI prefix for coordinate reference systems is the following one:

<http://www.opengis.net/def/crs/EPSG/0/>

followed by the number identifying the coordinate reference system in the EPSG register. For instance, the following URI

<http://www.opengis.net/def/crs/EPSG/0/4258>

identifies coordinate reference system EPSG 4258, corresponding to ETRS89 (European Terrestrial Referent System 1989).

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dct:conformsTo <<http://www.opengis.net/def/crs/EPSG/0/4258>> .  <<http://www.opengis.net/def/crs/EPSG/0/4258>>  dct:type <<http://inspire.ec.europa.eu/glossary/SpatialReferenceSystem>> . |
| <!-- Resource metadata in ISO19139 -->  <gmd:referenceSystemInfo>  <gmd:MD\_ReferenceSystem>  <gmd:referenceSystemIdentifier>  <gmd:RS\_Identifier>  <gmd:code>  <gco:CharacterString>  http://www.opengis.net/def/crs/EPSG/0/4258  </gco:CharacterString>  </gmd:code>  ...  </gmd:RS\_Identifier>  </gmd:referenceSystemIdentifier>  </gmd:MD\_ReferenceSystem>  </gmd:referenceSystemInfo> |

If not represented with an HTTP URI, the reference system identifier must be mapped to dct:identifier, as in the following example.



|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dct:conformsTo [  dct:identifer "EPSG:4258"^^xsd:string ;  dct:type <http://inspire.ec.europa.eu/glossary/SpatialReferenceSystem>  ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:referenceSystemInfo>  <gmd:MD\_ReferenceSystem>  <gmd:referenceSystemIdentifier>  <gmd:RS\_Identifier>  <gmd:code>  <gco:CharacterString>EPSG:4258</gco:CharacterString>  </gmd:code>  ...  </gmd:RS\_Identifier>  </gmd:referenceSystemIdentifier>  </gmd:MD\_ReferenceSystem>  </gmd:referenceSystemInfo> |

* 1. Character encoding - \*Dataset character set and \*Metadata character set

In DCAT and DCAT-AP, the specification of the character encoding of a dataset and the character encoding of a metadata record is not explicitly foreseen.

According to RFC 4288 [38], the character set can be part of the media type specification, but only for type “text”. By contrast, in INSPIRE the charset can be specified also for other media types.

The W3C Content vocabulary [39] provides a possibly suitable candidate, namely, property cnt:characterEncoding, taking as value the character set names in the IANA register [16]. The proposal is to use this property.

Character encoding in ISO 19115 metadata is specified with a code list that can be mapped to the corresponding codes in the IANA Character Sets register[[2]](#footnote-5), as shown in the following table (entries with 1-to-many mappings are in italic).

|  |  |  |
| --- | --- | --- |
| ISO 19115 - MD\_CharacterSetCode | Description | IANA |
| ucs2 | 16-bit fixed size Universal Character Set, based on ISO/IEC 10646 | ISO-10646-UCS-2 |
| ucs4 | 32-bit fixed size Universal Character Set, based on ISO/IEC 10646 | ISO-10646-UCS-4 |
| utf7 | 7-bit variable size UCS Transfer Format, based on ISO/IEC 10646 | UTF-7 |
| utf8 | 8-bit variable size UCS Transfer Format, based on ISO/IEC 10646 | UTF-8 |
| utf16 | 16-bit variable size UCS Transfer Format, based on ISO/IEC 10646 | UTF-16 |
| 8859part1 | ISO/IEC 8859-1, Information technology - 8-bit single byte coded graphic character sets - Part 1 : Latin alphabet No.1 | ISO-8859-1 |
| 8859part2 | ISO/IEC 8859-2, Information technology - 8-bit single byte coded graphic character sets - Part 2 : Latin alphabet No.2 | ISO-8859-2 |
| 8859part3 | ISO/IEC 8859-3, Information technology - 8-bit single byte coded graphic character sets - Part 3 : Latin alphabet No.3 | ISO-8859-3 |
| 8859part4 | ISO/IEC 8859-4, Information technology - 8-bit single byte coded graphic character sets - Part 4 : Latin alphabet No.4 | ISO-8859-4 |
| 8859part5 | ISO/IEC 8859-5, Information technology - 8-bit single byte coded graphic character sets - Part 5 : Latin/Cyrillic alphabet | ISO-8859-5 |
| 8859part6 | ISO/IEC 8859-6, Information technology - 8-bit single byte coded graphic character sets - Part 6 : Latin/Arabic alphabet | ISO-8859-6 |
| 8859part7 | ISO/IEC 8859-7, Information technology - 8-bit single byte coded graphic character sets - Part 7 : Latin/Greek alphabet | ISO-8859-7 |
| 8859part8 | ISO/IEC 8859-8, Information technology - 8-bit single byte coded graphic character sets - Part 8 : Latin/Hebrew alphabet | ISO-8859-8 |
| 8859part9 | ISO/IEC 8859-9, Information technology - 8-bit single byte coded graphic character sets - Part 9 : Latin alphabet No.5 | ISO-8859-9 |
| 8859part10 | ISO/IEC 8859-10, Information technology - 8-bit single byte coded graphic character sets - Part 10 : Latin alphabet No.6 | ISO-8859-10 |
| 8859part11 | ISO/IEC 8859-11, Information technology - 8-bit single byte coded graphic character sets - Part 11 : Latin/Thai alphabet | ISO-8859-11 |
| 8859part13 | ISO/IEC 8859-13, Information technology - 8-bit single byte coded graphic character sets - Part 13 : Latin alphabet No.7 | ISO-8859-13 |
| 8859part14 | ISO/IEC 8859-14, Information technology - 8-bit single byte coded graphic character sets - Part 14 : Latin alphabet No.8 (Celtic) | ISO-8859-14 |
| 8859part15 | ISO/IEC 8859-15, Information technology - 8-bit single byte coded graphic character sets - Part 15 : Latin alphabet No.9 | ISO-8859-15 |
| 8859part16 | ISO/IEC 8859-16, Information technology - 8-bit single byte coded graphic character sets - Part 16 : Latin alphabet No.10 | ISO-8859-16 |
| *jis* | *japanese code set used for electronic transmission* | *JIS\_Encoding* |
| shiftJIS | japanese code set used on MS-DOS machines | Shift\_JIS |
| eucJP | japanese code set used on UNIX based machines | EUC-JP |
| usAscii | United States ASCII code set (ISO 646 US) | US-ASCII |
| *ebcdic* | *IBM mainframe code set* | *IBM037* |
| eucKR | Korean code set | EUC-KR |
| big5 | traditional Chinese code set used in Taiwan, Hong Kong of China and other areas | Big5 |
| GB2312 | simplified Chinese code set | GB2312 |

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dcat:distribution [ a dcat:Distribution ;  cnt:characterEncoding "UTF-8"^^xsd:string ] .  # Metadata on metadata in GeoDCAT-AP  [] a dcat:CatalogRecord ;  cnt:characterEncoding "UTF-8"^^xsd:string. |
| <gmd:MD\_Metadata>  ...  <!-- Metadata on metadata: metadata character set -->  <gmd:characterSet>  <MD\_CharacterSetCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/codelist/ML\_gmxCodelists.xml#MD\_CharacterSetCode" codeListValue="utf8"> UTF-8 </MD\_CharacterSetCode>  </gmd:characterSet>  ...  <!-- Resource metadata: dataset character set -->  <gmd:identificationInfo>  <gmd:MD\_DataIdentification>  ...  <gmd:characterSet>  <gmd:MD\_CharacterSetCode codeListValue="utf8" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/codelist/ML\_gmxCodelists.xml#MD\_CharacterSetCode"/>  </gmd:characterSet>  ...  </gmd:MD\_DataIdentification>  </gmd:identificationInfo>  ...  </gmd:MD\_Metadata> |

* 1. Encoding - \*Distribution format

In both DCAT and DCAT-AP, this information is specified for the distribution(s) of a dataset, and not for the dataset itself.

Two properties are foreseen:

* dcat:mediaType: to be used when the format corresponds to one of the media types registered by IANA [40]
* dct:format: to be used in all the other cases

The same approach can be proposed for ISO 19115 / INSPIRE metadata.

In both cases, DCAT-AP recommends the use of the URI file type register [15], operated by the Metadata Registry of the Publications Office of the EU, to specify formats/media types. However, this register does not include many of the formats/media types typically used for INSPIRE data – as, e.g., GML, shapefiles and raster files – which are available through the INSPIRE media type register [14].

The proposal is then to use the file type register of the Publications Office, if it includes the relevant format/media type, and the INSPIRE Media Types otherwise.

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dcat:distribution [ a dcat:Distribution ;  dcat:mediaType <http://publications.europa.eu/resource/authority/file-type/TIFF> ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_Metadata>  ...  <gmd:distributionInfo>  <gmd:MD\_Distribution>  <gmd:distributionFormat>  <gmd:MD\_Format>  <gmd:name>  <gco:CharacterString>GeoTIFF</gco:CharacterString>  </gmd:name>  <gmd:version>  <gco:CharacterString>1.0</gco:CharacterString>  </gmd:version>  </gmd:MD\_Format>  </gmd:distributionFormat>  ...  </gmd:MD\_Distribution>  </gmd:distributionInfo>  ...  </gmd:MD\_Metadata> |

* 1. Spatial representation type – \*Spatial representation type

In DCAT(-AP) [7] [5], no equivalent term is foreseen.

In ISO 19115, element “Spatial representation type” is meant mainly to describe the “method used to represent geographic information in the dataset”, by using a code list (see the table below).

The ADMS vocabulary includes a property, namely, adms:representationTechnique that could be used for this purpose. It is worth noting that, in the ADMS specification, adms:representationTechnique decribes a distribution, and not the dataset. Moreover, the ISO 19115 code list of spatial representation types might be in the future available as a URI register from the INSPIRE Registry.

Based on this, GeoDCAT-AP models this information by using adms:representationTechnique, with the spatial representation type URIs that will be operated by the INSPIRE Registry.

This mapping is supported only in the extended profile of GeoDCAT-AP.

|  |  |
| --- | --- |
| ISO 19115 - MD\_SpatialRepresenationTypeCode | Description |
| vector | vector data is used to represent geographic data |
| grid | grid data is used to represent geographic data |
| textTable | textual or tabular data is used to represent geographic data |
| tin | triangulated irregular network |
| stereoModel | three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images |
| video | scene from a video recording |

| Example |
| --- |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dcat:distribution [ a dcat:Distribution  adms:represenationTechnique <http://inspire.ec.europa.eu/metadata-codelist/SpatialRepresentationTypeCode/vector>  ] . |
| <!-- Resource metadata in ISO19139 -->  <gmd:spatialRepresentationType>  <gmd:MD\_SpatialRepresentationTypeCode codeListValue="vector" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/gmxCodelists.xml#MD\_SpatialRepresentationTypeCode">vector</gmd:MD\_SpatialRepresentationTypeCode>  </gmd:spatialRepresentationType> |

* 1. Maintenance information - \*not in ISO 19115 core

In ISO 19115, element “Maintenance information” is meant mainly to describe how frequently a resource is updated.

DCAT and DCAT-AP, the update frequency is expressed through dct:accrualPeriodicity, with the frequency codes defined in the Dublin Core Collection Description Frequency Vocabulary[[3]](#footnote-6) [17], which can be partially mapped to the ones used in ISO 19115, as shown in the following table (the missing alignments are in bold). A similar mapping was added for the MDR Frequency Named Authority List [41].

The ISO 19115 code list of maintenance frequency codes might be in the future available as a URI register from the INSPIRE Registry.

Based on this, maintenance frequency is modelled in GeoDCAT-AP by using dct:accrualPeriodicity with the MDR Frequency Named Authority List [41].

For the frequency codes not covered by the MDR Frequency code list, the approach will be as follows:

* In the core profile of GeoDCAT-AP these codes will be ignored:
* The extended profile of GeoDCAT-AP will use the code list of ISO maintenance frequency codes operated by the INSPIRE Registry.

|  |  |  |
| --- | --- | --- |
| ISO 19115 - MD\_MaintenanceFrequencyCode | Dublin Core Collection Description Frequency Vocabulary [17] | MDR Frequency Named Authority List [41] |
| continual | continuous | UPDATE\_CONT / CONT |
| daily | daily | DAILY |
| weekly | weekly | WEEKLY |
| fortnightly | biweekly | BIWEEKLY |
| monthly | monthly | MONTHLY |
| quarterly | quarterly | QUARTERLY |
| biannually | semiannual | ANNUAL\_2 |
| annually | annual | ANNUAL |
| asNeeded | - | - |
| Irregular | irregular | IRREG |
| notPlanned | - | - |
| unknown | - | UNKNOWN |
| - | triennial | TRIENNIAL |
| - | biennial | BIENNIAL |
| - | threeTimesAYear | ANNUAL\_3 |
| - | bimonthly | BIMONTHLY |
| - | semimonthly | MONTHLY\_2 |
| - | threeTimesAMonth | MONTHLY\_3 |
| - | semiweekly | WEEKLY\_2 |
| - | threeTimesAWeek | WEEKLY\_3 |
| - | - | OTHER |

|  |
| --- |
| Example |
| # Resource metadata in GeoDCAT-AP  [] a dcat:Dataset ;  dct:accrualPeriodicity <http://publications.europa.eu/resource/authority/frequency/DAILY > . |
| <!-- Resource metadata in ISO19139 -->  <gmd:MD\_MaintenanceInformation>  <gmd:maintenanceAndUpdateFrequency gco:nilReason="missing">  <gmd:MD\_MaintenanceFrequencyCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO\_19139\_Schemas/resources/Codelist/ML\_gmxCodelists.xml#MD\_MaintenanceFrequencyCode" codeListValue="daily">daily</gmd:MD\_MaintenanceFrequencyCode>  </gmd:maintenanceAndUpdateFrequency>  </gmd:MD\_MaintenanceInformation> |

1. Comparison between INSPIRE and ISO 19115-1:2014

In ISO Standard 19115-1:2014 the concept of ‘Core metadata’ was removed; it was translated into a normative annex (Annex F) “Discovery metadata for geographic resources”. In the Annex F metadata elements for the discovery are listed in 2 tables:

• the metadata elements to be used for discovery of geographic datasets and series are identified in F.1;

• the metadata elements to be used for discovery of service resources are identified inF.2.

* 1. Spatial dataset and spatial dataset series

The table below compares the core requirements of ISO 19115:2003 (see Table 3 in 6.5 of ISO 19115:2003), the requirements of INSPIRE for spatial dataset and spatial dataset series as defined in the Implementing Rules for metadata and the discovery metadata for geographic datasets and series (see Table F.1 in annex F of ISO 19115-1:2014). For those last metadata elements in the last field of the table the path is indicated. For each element, in brackets the obligation/max occurrence (3rd field).

Table : Metadata elements used for discovery of geographic datasets and series

| **ISO 19115 Core** | **INSPIRE Implementing Rules for Metadata** | **ISO 19115-1:2014 Discovery metadata for datasets and series (Table F.1)** | **ISO 19115-1:2014 Path** |
| --- | --- | --- | --- |
| Dataset title (M) | Part B 1.1 Resource Title | Resource title (M/1) | MD\_Metadata.identificationInfo>MD\_DataIdentification.citation>CI\_Citation.title |
| Dataset reference date (M) | Part B 5 Temporal Reference | Resource reference date (O/N) | MD\_Metadata.idenitificationInfo>MD\_DataIdentification.citation>CI\_Citation.date |
| Dataset responsible party (O) | Part B 9 Responsible organisation | Resource point of contact (O/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification.pointOf-Contact>CI\_Responsibility |
| Geographic location of the dataset (C) | Part B 4.1 Geographic Bounding Box | Geographic location (C/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification.extent>EX\_Extent.geographicElement>EX\_GeographicExtent>EX\_GeographicBoundingBox –or- EX\_GeographicDescription) |
| Dataset language (M) | Part B 1.7 Resource Language | Resource language (C/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification.defaultLocale>PT\_Locale |
| Dataset character set (C) | - | - |  |
| Dataset topic category (M) | Part B 2.1 Topic Category | Resource topic category (C/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification.topicCategory>MD\_TopicCategoryCode |
| Spatial resolution of the dataset (O) | Part B 6.2 Spatial Resolution | Spatial resolution (O/N) | MD\_Metadata.identificationInfo>MD\_Identification.spatialResolution>MD\_Resolution.equivalentScale MD\_Resolution.distance, MD\_Resolution.vertical, or MD\_Resolution.angularDistance, or  MD\_Resolution.levelOfDetail |
| Abstract describing the dataset (M) | Part B 1.2 Resource abstract | Resource abstract (M/1) | MD\_Metadata.identificationInfo>MD\_DataIdentification.abstract |
| Distribution format (O) | - | - |  |
| Additional extent information for the dataset (vertical and temporal) (O) | Part B 5.1 Temporal extent | Extent information for the dataset (additional) (O/N) | MD\_Metadata.identificationInfo>MD\_Identification.extent > EX\_Extent>EX\_TemporalExtent or EX\_VerticalExtent |
| Spatial representation type (O) | - | - |  |
| Reference system (O) | - | - |  |
| Lineage (O) | Part B 6.1 Lineage | Resource lineage (O/N) | MD\_Metadata>resourceLineage>LI\_Lineage.statement |
| On-line resource (O) | Part B 1.4 Resource Locator | Resource on-line Link (O/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification.citation>CI\_Citation.onlineResource>CI\_OnlineResource |
| Metadata file identifier (O) | - | Metadata reference information (O/1) | MD\_Metadata.metadataIdentifier |
| Metadata standard name (O) | - | - |  |
| Metadata standard version (O) | - | - |  |
| Metadata language (C) | Part B 10.3 Metadata Language | - | MD\_Metadata.defaultLocale>PT\_Locale.language |
| Metadata character set (C) | - | - |  |
| Metadata point of contact (M) | Part B 10.1 Metadata point of contact | Metadata point of contact (M/N) | MD\_Metadata.contact>CI\_Responsibility |
| Metadata date stamp (M) | Part B 10.2 Metadata Date | Metadata date stamp (M/N) | MD\_Metadata.dateInfo |
| - | Part B 1.3 Resource Type | Resource type (C/1) | MD\_Metadata.metadataScope>MD\_Scope.resourceScope |
|  | Part B 1.5 Unique Resource Identifier | Resource identifier (O/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification.citation>CI\_Citation.identifier>MD\_Identifier |
|  | Part B 3 Keyword | Keywords (O/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification>descriptiveKeywords>MD\_Keywords |
| - | Part B 7 Conformity | - | MD\_Metadata.dataQualityInfo>DQ\_DataQuality.report>DQ\_UsabilityElement.result>DQ\_ConformanceResult |
| - | Part B 8.1 Conditions for access and use | Constraints on resource access and use (O/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification>MD\_Constraints.useLimitations and/or MD\_LegalConstraints.useLimitations and/or MD\_SecurityConstraints.useLimitations |
| - | Part B 8.2 Limitations on public access | - | MD\_Metadata.identificationInfo>MD\_DataIdentification> MD\_LegalConstraints.accessConstraint and/or MD\_LegalConstraints.useConstraint and/or MD\_LegalConstraints.otherConstraint and/or MD\_SecurityConstraints.classification |

* 1. Services

The table below compares the core requirements of ISO 19115:2003 (see Table 3 in 6.5 of ISO 19115:2003), the requirements of INSPIRE for services as defined in the Implementing Rules for metadata and the discovery metadata for services (see Table F.2 in annex F of ISO 19115-1:2014). For those metadata elements in the last field of the table the path is indicated. For each element, in brackets the obligation/max occurrence (3rd field).

Table : Metadata elements used for discovery of service resources

| **ISO 19115 Core** | **INSPIRE** | **ISO 19115-1:2014 Discovery metadata for services (Table F.2)** | **Path ISO 19115-1:2014** |
| --- | --- | --- | --- |
| Dataset title (M) | Part B 1.1 Resource Title | Service title (M/1) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.citation>CI\_Citation.title |
| Dataset reference date (M) | Part B 5 Temporal Reference | Reference date (O/1) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.citation>CI\_Citation.date |
| Dataset responsible party (O) | Part B 9 Responsible organisation | Responsible party (O/N) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.pointOfContact>CI\_Responsibility |
| Geographic location of the dataset (C) | **-** | Geographic location (M/1) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.extent>EX\_Extent.geographicElement > EX\_GeographicExtent>EX\_GeographicBoundingBox–or- EX\_GeographicDescription |
| - | Part B 4.1 Geographic Bounding Box | - |  |
| Dataset language (M) | - | - |  |
| Dataset character set (C) | - | - |  |
| Dataset topic category (M) | - | Service topic category (O/N) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.topicCategory>MD\_TopicCategoryCode |
| Spatial resolution of the dataset (O) | Part B 6.2 Spatial Resolution | - |  |
| Abstract describing the dataset (M) | Part B 1.2 Resource abstract | Resource abstract (M/1) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.abstract |
| Distribution format (O) | - | - |  |
| Additional extent information for the dataset (O) | - | - |  |
| Spatial representation type (O) | - | - |  |
| Reference system (O) | - | - |  |
| Lineage (O) | - | - |  |
| On-line resource (O) | Part B 1.4 Resource Locator | On-line Link (O/N) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.citation>CI\_Citation.onlineResource>CI\_OnlineResource |
| Metadata file identifier (O) | - | Metadata reference information (O/1) | MD\_Metadata.metadataIdentifier |
| Metadata standard name (O) | - | - |  |
| Metadata standard version (O) | - | - |  |
| Metadata language (C) | Part B 10.3 Metadata Language | - | MD\_Metadata.defaultLocale>PT\_Locale.language |
| Metadata character set (C) | - | - |  |
| Metadata point of contact (M) | Part B 10.1 Metadata point of contact | Metadata point of contact (M/N) | MD\_Metadata.contact>CI\_Responsibility |
| Metadata date stamp (M) | Part B 10.2 Metadata Date | Metadata date stamp (M/N) | MD\_Metadata.dateInfo |
| - | Part B 1.3 Resource Type | Resource type (M/1) | MD\_Metadata.metadataScope>MD\_Scope.resourceScope |
| - | Part B 1.6 Coupled Resource | Coupled Resource (C/N) | MD\_Metadata>SV\_ServiceIdentification.coupledResource>SVCoupledResource |
| - | Part B 2.2 Spatial Data Service Type | - |  |
|  | Part B 3 Keyword | Keywords (O/N) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification>MD\_Keywords |
| - | Part B 7 Conformity | - | MD\_Metadata.dataQualityInfo>DQ\_DataQuality.report>DQ\_UsabilityElement.result>DQ\_ConformanceResult |
| - | Part B 8.1 Conditions for access and use | Constraints on access and use (O/N) | MD\_Metadata.identificationInfo>MD\_DataIdentification>MD\_Constraints.useLimitations and/or MD\_LegalConstraints.useLimitations and/or MD\_SecurityConstraints.useLimitations |
| - | Part B 8.2 Limitations on public access | - | MD\_Metadata.identificationInfo>MD\_DataIdentification> MD\_LegalConstraints.accessConstraint and/or MD\_LegalConstraints.useConstraint and/or MD\_LegalConstraints.otherConstraint and/or MD\_SecurityConstraints.classification |
| - | - | Coupled resource type (C/1) | MD\_Metadata>SV\_ServiceIdentification.couplingType>SV-CouplingType |
| - | - | Resource identifier (O/N) | MD\_Metadata.identificationInfo>SV\_ServiceIdentification.citation>CI\_Citation.identifier>MD\_Identifier |

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1. Please note that the Core Location Vocabulary does not restrict locn:geometry to bounding box geometries only. [↑](#footnote-ref-2)
2. <http://www.iana.org/assignments/character-sets/> [↑](#footnote-ref-5)
3. <http://dublincore.org/groups/collections/frequency/> [↑](#footnote-ref-6)