



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

**Version 1.0.1**



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### Note on this document (2016-08-02)

This version of the GeoDCAT-AP 1.0 has been amended with respect to the original one in order to correct a typo concerning the URIs of the code lists of the INSPIRE Registry. No other changes have been done on the original specification.

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## Abbreviations used in this document

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

## 1 INTRODUCTION

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

Its basic use case is to make spatial datasets, dataset series, and services searchable on general data portals, thereby making geospatial information better searchable across borders and sectors. This can be achieved by the exchange of descriptions of data sets among data portals. GeoDCAT-AP provides an RDF syntax binding for the union of metadata elements of the core profile of ISO 19115:2003 [ISO19115] and those defined in the framework of the INSPIRE Directive [INSPIRE-DIR].

**The GeoDCAT-AP specification does not replace the INSPIRE Metadata Regulation [INSPIRE-MD-REG] nor the INSPIRE Metadata technical guidelines [INSPIRE-MD-TG] based on ISO 19115 and ISO 19119.** Its purpose is to give owners of geospatial metadata the possibility to achieve more by providing the means of an *additional* implementation through harmonised RDF syntax bindings. Conversion rules to RDF syntax would allow Member States to maintain their collections of INSPIRE-relevant datasets following the INSPIRE Metadata technical guidelines based on ISO 19115 and ISO 19119 [ISO19119], while at the same time publishing these collections on DCAT-AP-conformant data portals. A conversion to RDF syntax allows additional metadata elements to be displayed on general-purposed data portals, provided that such data portals are capable of displaying additional metadata elements. Additionally, data portals may be capable of providing machine-to-machine interfaces where additional metadata could be provided.

### 1.1 Objectives

The objective of this work is to define an *RDF syntax* that can be used for the exchange of descriptions of *spatial* datasets, dataset series, and services among data portals. The RDF syntax should extend the DCAT Application Profile for data portals in Europe [DCAT-AP].

- To provide an RDF syntax binding for the *union* of the elements in the INSPIRE metadata schema and the core profile of ISO 19115:2003. The guiding design principle is to make the resulting RDF syntax as simple as possible; thereby maximally using existing RDF vocabularies – such as the Dublin Core and DCAT-AP –, and as much as possible avoiding minting new terms. The defined syntax binding must enable the conversion of metadata records *from* ISO 19115 / INSPIRE *to* a harmonised RDF representation. The ability to convert metadata records from RDF to ISO 19115 / INSPIRE is not a requirement.
- To formulate recommendations to the Working Group dealing with the revision of the DCAT-AP, to maximally align DCAT-AP and GeoDCAT-AP.

- To take into account and refer to alignment of relevant controlled vocabularies (e.g., the alignments between GEMET, INSPIRE themes, EuroVoc carried out by the Publications Office of the EU<sup>1</sup>).

Additionally, the following outcomes may be achieved, outside the context of this specification:

- To define new controlled vocabularies or define mappings between controlled vocabularies;
- To design executable transformation rules (i.e., an XSLT script [GEODCAT-XSLT]), as a reference implementation of the mappings defined in the GeoDCAT-AP specification.
- To define an RDF syntax binding for the elements in ISO 19115-1:2014.

## 1.2 Structure of this document

This document consists of the following sections:

- Section 1 introduces this document;
- Section 2 provides an overview of related work;
- Section 3 provides the use cases that motivate the creation of a GeoDCAT-AP specification;
- Section 4 provides a description of the methodology used in terms of alignment of criteria and requirement, metadata elements covered by GeoDCAT-AP, and a summary of the results;
- Section 5 provides the suggested RDF syntax bindings for metadata elements;
- Section 6 provides an overview of controlled vocabularies with relevant URI sets;

This specification is accompanied by a set of annexes, providing additional reference and support material. More precisely:

- Annex I provides a summary of the INSPIRE and ISO 19115 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.

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<sup>1</sup> <http://publications.europa.eu/mdr/eurovoc/>



## 2 RELATED STANDARDS AND WORK

This section contains an overview of related standards and work.

### 2.1 ISO 19115:2003, ISO 19139 and ISO 19115-1:2014

ISO 19115:2003 [ISO19115], a standard of the International Organization for Standardization (ISO), defines how to describe geographical information. ISO 19139 [ISO19139] defines the XML-based implementation for ISO 19115.

ISO 19115-1:2014 [ISO19115-1] has superseded ISO 19115:2003. At the date of publication of this document, the XML-based implementation of ISO 19115-1:2014 (namely, ISO 19115-3), was finalised but not yet officially released. Annex III contains an overview of the most important changes.

As documented in the INSPIRE Metadata Technical Guidelines [INSPIRE-MD-TG], the conformance of a metadata set to the core profile of ISO 19115 does not guarantee conformance to the INSPIRE metadata specifications, although there is a large correspondence.

### 2.2 OGC Catalog Service for the Web

Catalog Service for the Web (CSW) [CSW] is a standard of the Open Geospatial Consortium (OGC) for exposing a catalogue of geospatial records on the Web. It specifies *the interfaces, bindings, and a framework for defining application profiles required to publish and access digital catalogues of metadata for geospatial data, services, and related resource information.*

A profile of CSW is used in the INSPIRE Technical Guidance on Discovery Services [INSPIRE-DS-TG].

### 2.3 INSPIRE Metadata Regulation and INSPIRE Metadata Technical Guidelines

The INSPIRE Metadata Technical Guidelines [INSPIRE-MD-TG] include rules for the description of resources based on ISO 19115 (datasets and series) and ISO 19119 (services), and by using their XML-based implementation defined in ISO 19139.

INSPIRE<sup>2</sup> [INSPIRE-DIR] is a Directive of the European Parliament and of the Council aiming to establish a EU-wide spatial data infrastructure to give cross-border access to information that can be used to support EU environmental policies, as well as other policies or activities having an impact on the environment. The actual scope of this information corresponds to 34 environmental themes, covering also areas having cross-sector relevance – e.g., addresses, buildings, population distribution and demography.

In order to ensure cross-border interoperability of data infrastructures operated by EU Member States, INSPIRE sets out a framework based on common specifications for metadata, data, network services, data and service sharing, monitoring and reporting. Such specifications consist of a set of implementing rules (which take the form of Commission Regulations, i.e., they are legally binding in the EU Member States), along

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<sup>2</sup> European Commission – Joint Research Centre. INSPIRE Web site: <http://inspire.ec.europa.eu/>

with the corresponding technical guidelines, defined by a regulatory committee composed of representatives of both EU Member States and European Union bodies and institutions.

## 2.4 DCAT and DCAT-AP

The DCAT Application profile for data portals in Europe (DCAT-AP) [DCAT-AP] is a specification based on the W3C's Data Catalogue vocabulary (DCAT) [DCAT] for describing public sector datasets in Europe. Its basic use case is to enable cross-data portal search for data sets and make public sector data better searchable across borders and sectors. This can be achieved by the exchange of descriptions of datasets among data portals.

The application profile is a specification for metadata records to meet the specific application needs of data portals in Europe, while providing semantic interoperability with other applications on the basis of reuse of established controlled vocabularies (e.g. EuroVoc) and mappings to existing metadata vocabularies (e.g., Dublin Core, SDMX, INSPIRE metadata, etc.).

## 2.5 Alignment of INSPIRE metadata with Dublin Core

In 2008, JRC published a report [INSPIRE-DC] on the progress made in defining the proper way of expressing elements of INSPIRE metadata in conformance with ISO 15836 (Dublin Core).

## 2.6 Alignment of INSPIRE metadata with DCAT-AP

The GeoDCAT-AP specification builds upon prior work conducted by the European Commission's Joint Research Centre in 2014. This work consisted of an alignment exercise between INSPIRE metadata and DCAT-AP (version 1.0) in the framework of ISA Action 1.17 [INSPIRE-DCAT]. The results of this alignment exercise, referred to as INSPIRE+DCAT-AP, are divided in two parts:

- A Core version which defines alignments for the subset of INSPIRE metadata elements supported by DCAT-AP.
- An Extended version which defines alignments for all the INSPIRE metadata elements using DCAT-AP and other vocabularies whenever DCAT-AP is not relevant.

However, INSPIRE+DCAT-AP did not define alignments for the following elements:

- Some of the metadata elements in the core profile of ISO 19115 – i.e., those related to the metadata character set, metadata identifier and metadata standard. *The GeoDCAT-AP Extended profile– in this document – does provide an RDF syntax binding for these metadata elements.*
- The INSPIRE metadata elements recommended in the data specifications technical guidelines, summarised in Appendix B.2 to INSPIRE Metadata Technical Guidelines (version 1.3) [INSPIRE-MD-TG]. *The GeoDCAT-AP Extended profile– in this document –provides a partial syntax binding for data quality (limited to conformity) and maintenance information (limited to maintenance and update frequency).*

## 2.7 Alignment of EuroVoc – GEMET – INSPIRE themes

EuroVoc is a multilingual, multidisciplinary thesaurus covering the activities of the EU, and it is one of the controlled vocabularies recommended in DCAT-AP.

The Publications Office of the EU has defined and published alignments between EuroVoc and other vocabularies, including those typically used in geospatial metadata – in particular, AGROVOC, GEMET, the INSPIRE themes and the INSPIRE feature concept dictionary. It is worth noting that the use of the INSPIRE themes is a legal obligation in INSPIRE metadata.

These alignments are available from the Metadata Registry of the EU Publications Office:

<http://publications.europa.eu/mdr/eurovoc/>

## 2.8 GeoDCAT-AP XSLT script and API

In the context of ISA Action 1.17 (ARE3NA – Reusable INSPIRE Reference Platform) an XSLT script [GEODCAT-XSLT] was created, that can be used to transform ISO 19139 metadata into Geo/DCAT-AP. This XSLT is maintained on the Commission's Git repository:

<https://webgate.ec.europa.eu/CITnet/stash/projects/ODCKAN/repos/iso-19139-to-dcat-ap/>

The XSLT is complemented with documentation summarising how the GeoDCAT-AP specification has been implemented. This documentation includes:

- A summary of the mappings, accompanied with detailed examples for some metadata elements.<sup>3</sup>
- Where the XSLT expects to find HTTP URIs, and how they are used.<sup>4</sup>

An experimental API has been also developed, as a proof-of-concept for the CSW-based implementation of GeoDCAT-AP. The API uses the GeoDCAT-AP XSLT to transform ISO 19139 records into Geo/DCAT-AP. It supports HTTP content negotiation and multiple RDF serialisation formats (namely, RDF/XML, Turtle, N3, N-Triples, JSON-LD, HTML+RDFa).

The source code of the API is available from the Commission's Git repository:

<https://webgate.ec.europa.eu/CITnet/stash/projects/ODCKAN/repos/iso-19139-to-dcat-ap/browse/api>

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<sup>3</sup> <https://webgate.ec.europa.eu/CITnet/stash/projects/ODCKAN/repos/iso-19139-to-dcat-ap/browse/documentation/Mappings.md>

<sup>4</sup> <https://webgate.ec.europa.eu/CITnet/stash/projects/ODCKAN/repos/iso-19139-to-dcat-ap/browse/documentation/HTTP-URIs.md>

### 3 MOTIVATION AND USE CASES

The basic use case that GeoDCAT-AP intends to enable is a cross-domain data portal search for datasets, as documented in the DCAT-AP specification [DCAT-AP]. GeoDCAT-AP will make it easier to share descriptions of spatial datasets between spatial data portals and general data portals, and thus help increase public and cross-sector access to such high value datasets. The datasets could include:

- **Datasets on the INSPIRE Geoportal.** The INSPIRE Geoportal aggregates metadata for over 100k datasets across Europe. It provides the means to search for spatial data sets and spatial data services, and subject to access restrictions, to view spatial data sets from the EU Member States within the framework of the INSPIRE Directive. The metadata stored on this portal is structured according to the INSPIRE Metadata Technical Guidelines [INSPIRE-MD-TG]. In order to maximise visibility and re-use, spatial datasets could also be listed on general-purpose Open Data Portals, such as the European Union Open Data Portal (EU ODP)<sup>5</sup> and the European Data Portal (EDP)<sup>6</sup>.
- **Datasets on national SDIs.** GeoDCAT-AP would facilitate the integration of SDIs operated by EU Member States with any data catalogue able to consume DCAT-AP-compliant metadata.
- **General geospatial datasets.** The geospatial community shares a common background and makes consistent use of consolidated standards and technologies. In particular, as far as metadata are concerned, it is widespread to use standards like ISO 19115 / 19139, for the representation and encoding of metadata, and OGC's CSW (Catalog Service for the Web) for accessing and querying metadata records. These standards are also those currently recommended in INSPIRE.

An additional RDF syntax for INSPIRE and ISO 19115 metadata elements is beneficial, especially when other data portals support the DCAT-AP metadata elements only.

Conversion rules to RDF syntax would allow Member States to maintain their collections of INSPIRE-relevant datasets following the INSPIRE Metadata Technical Guidelines based on ISO 19115 and ISO 19119, while at the same time publishing these collections on DCAT-AP-conformant data portals. A conversion to RDF syntax – using for example the GeoDCAT-AP XSLT script [GEODCAT-XSLT] – allows additional metadata elements to be displayed on general-purposed data portals, provided that such data portals are capable of displaying of additional metadata elements. Furthermore, data portals frequently are complemented by a triple store, making that the full set of GeoDCAT-AP metadata can be queried through a SPARQL endpoint.

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<sup>5</sup> <https://open-data.europa.eu/>

<sup>6</sup> <http://www.europeandataportal.eu/>

## 4 METHODOLOGY AND SUMMARY OF RESULTS

Methodologically, the development of GeoDCAT-AP implied three main interrelated tasks:

1. Definition of alignment criteria and requirements.
2. Identification of the metadata elements to be covered by GeoDCAT-AP.
3. Definition of alignments for the metadata elements to be covered by GeoDCAT-AP.

These tasks and their results are described in the following sections.

### 4.1 Alignment criteria and requirements

The objective of the GeoDCAT-AP is twofold:

1. Provide a DCAT-AP-conformant representation of geospatial metadata.
2. Provide an as much as possible comprehensive RDF-based representation of geospatial metadata, based on widely used vocabularies (as DCAT-AP), trying, at the same time, to avoid semantic loss and to promote cross-domain re-use.

These two goals, having a different scope and applying to different use cases (see Section 3), are reflected in the two profiles of GeoDCAT-AP, core and extended, described in Section 5.

Note that point (1) implies that:

- GeoDCAT-AP must include, at least, all the mandatory DCAT-AP elements.
- Vocabularies different from DCAT-AP can be used only for those geospatial metadata elements not supported in DCAT-AP.

Another key criterion was to base as much as possible the defined alignments on existing practices, in particular those contributed by the GeoDCAT-AP WG. The objective was to build upon experiences having already addressed issues in scope of GeoDCAT-AP, and to avoid a negative impact on existing implementations.

Finally, as already mentioned in Section 1.1, whenever no suitable candidates were available in existing vocabularies to represent geospatial metadata elements, the possibility of defining new terms was not excluded. However, this option needed to be carefully assessed, and discarded whenever it might have led to a specification that was conflicting with standards under preparation. For example, this was the case of the work carried out by the W3C Data on the Web Best Practices Working Group and the joint W3C/OG Spatial Data on the Web Working Group.

As it will be explained in Section 4.3, no new terms have been defined in the current version of GeoDCAT-AP.

### 4.2 Metadata elements to be covered by GeoDCAT-AP

The general criterion used for this task was that GeoDCAT-AP would ideally cover *all* the metadata elements of the core profile of ISO 19115 and those defined in INSPIRE, with the requirement that only *optional* elements *might* be excluded.

Based on this, the current version of GeoDCAT-AP covers the following set of metadata elements:

- All the metadata elements in the core profile of ISO 19115.
- All the metadata elements defined in INSPIRE, with the exclusion of those not common to all the INSPIRE spatial data themes.

More precisely, the supported INSPIRE metadata elements include:

- The set of metadata elements defined in the INSPIRE Metadata Regulation [INSPIRE-MD-REG].
- The set of metadata elements defined in the INSPIRE Data and Services Regulation (Article 13: "Metadata required for Interoperability") [INSPIRE-D&S-REG]. These elements are also listed in Appendix B.1 to the INSPIRE Metadata Technical Guidelines (version 1.3) [INSPIRE-MD-TG].
- The set of metadata elements recommended as common to all the INSPIRE spatial data themes in the INSPIRE Data Specifications Technical Guidelines, and listed in the first table included in Appendix B.2 to version 1.3 of the INSPIRE Metadata Technical Guidelines (version 1.3) [INSPIRE-MD-TG]. These elements are the following ones:
  - Conceptual and domain consistency (Data quality – Logical consistency).
  - Maintenance information.

The full list of metadata elements covered by the current version of GeoDCAT-AP is available in Annex I to this document.

The metadata elements not supported in the current version of GeoDCAT-AP are those recommended only for *specific* INSPIRE spatial data themes in the INSPIRE Data Specifications Technical Guidelines, and listed in the second, third and fourth table included in Appendix B.2 to the INSPIRE Metadata Technical Guidelines (version 1.3) [INSPIRE-MD-TG].

These elements have been excluded in the current version of GeoDCAT-AP for the following reasons:

- The priority was to support all those elements relevant to any dataset.
- These elements are all optional.

Support to these metadata elements might be provided in future versions of GeoDCAT-AP.

### **4.3 Alignments defined in GeoDCAT-AP**

The alignments defined in the current version of GeoDCAT-AP are the result of an iterative revision process, following the criteria illustrated in the previous sections and the review of the GeoDCAT-AP WG.

The work started with the review of the suite of specifications concerning the INSPIRE profile of DCAT-AP (INSPIRE+DCAT-AP) [INSPIRE-DCAT], and of the preliminary proposals concerning the metadata elements not covered by INSPIRE+DCAT-AP.

In two specific cases, feedback has been asked to relevant standardisation bodies, in order to validate the proposal made in GeoDCAT-AP. In particular, this concerned feedback provided by the W3C Provenance Working Group on the use of the W3C PROV ontology to model responsible party roles and conformance results (data quality).

Finally, the GeoDCAT-AP WG has worked in close coordination with the DCAT-AP WG, in order to ensure mutual compliance of the proposed solutions.

The results of this work, reflected in the current version of GeoDCAT-AP, can be summarised as follows:

- Compliance with DCAT-AP is ensured: The geospatial metadata elements covered by GeoDCAT-AP include all those that in DCAT-AP are mandatory, plus a subset of those that are recommended and optional.
- GeoDCAT-AP offers alignments for all the metadata elements illustrated in Section 4.2, by using existing vocabularies, and without defining new terms.

The majority of the alignments defined in GeoDCAT-AP provide a complete representation of the corresponding geospatial metadata elements, but some metadata elements have open issues:

- Partial mappings: For some metadata elements, only a partial mapping is available. This concerns data quality and maintenance information, for which only the mandatory components have been mapped (for more details, see Annex II, Sections II.14 and II.27, respectively). This decision was taken because existing vocabularies did not offer the ability to represent all the components of these metadata elements.
- Provisional mappings: For some metadata elements, no suitable candidate has been found to model them also partially. This concerns the following elements:
  - spatial resolution (see Annex II, Section II.13);
  - data quality and conformity (Annex II, Section II.14);
  - (coordinate and temporal) reference systems (Annex II, Section II.23).

The alignments for these elements defined in the current version of GeoDCAT-AP must then be considered as unstable, and are meant to be replaced by appropriate terms defined in standard vocabularies (whether and when available). Notably, both the W3C Data on the Web Best Practices WG and the joint W3C/OGC Spatial Data on the Web Working Group planned to standardise the representation of data granularity (which includes spatial resolution), data quality and conformity, and reference systems.

The details of the alignments defined in GeoDCAT-AP are illustrated in the following section.

## 5 RDF SYNTAX BINDINGS FOR INSPIRE AND ISO 19115 METADATA ELEMENTS

The following sections provide the list of the bindings defined in GeoDCAT-AP for the RDF representation of INSPIRE metadata and the core profile of ISO 19115:2003.

For detailed usage notes and examples of each of the metadata elements covered by GeoDCAT-AP, we refer the reader to Annex II (the relevant section is specified in the “comments” column of the mapping table).

### 5.1 Used namespaces

Table 1 gives an overview of the namespaces (and prefixes) used in the remainder of this document.

**Table 1: Namespace prefixes**

Prefix	Namespace	RDF Vocabulary
adms	<a href="http://www.w3.org/ns/adms#">http://www.w3.org/ns/adms#</a>	Asset Description Metadata Schema
cnt	<a href="http://www.w3.org/2011/content#">http://www.w3.org/2011/content#</a>	Representing Content in RDF 1.0
dc	<a href="http://purl.org/dc/elements/1.1/">http://purl.org/dc/elements/1.1/</a>	Dublin Core Metadata Element Set, Version 1.1
dcat	<a href="http://www.w3.org/ns/dcat#">http://www.w3.org/ns/dcat#</a>	Data Catalog Vocabulary
dct	<a href="http://purl.org/dc/terms/">http://purl.org/dc/terms/</a>	DCMI Metadata Terms
dctype	<a href="http://purl.org/dc/dcmitype/">http://purl.org/dc/dcmitype/</a>	DCMI Type Vocabulary
foaf	<a href="http://xmlns.com/foaf/0.1/">http://xmlns.com/foaf/0.1/</a>	FOAF Vocabulary
gsp	<a href="http://www.opengis.net/ont/geosparql#">http://www.opengis.net/ont/geosparql#</a>	OGC GeoSPARQL
locn	<a href="http://www.w3.org/ns/locn#">http://www.w3.org/ns/locn#</a>	ISA Programme Core Location Vocabulary
owl	<a href="http://www.w3.org/2002/07/owl#">http://www.w3.org/2002/07/owl#</a>	OWL Web Ontology Language



Prefix	Namespace	RDF Vocabulary
prov	<a href="http://www.w3.org/ns/prov#">http://www.w3.org/ns/prov#</a>	PROV-O: The PROV Ontology
rdf	<a href="http://www.w3.org/1999/02/22-rdf-syntax-ns#">http://www.w3.org/1999/02/22-rdf-syntax-ns#</a>	Resource Description Framework (RDF): Concepts and Abstract Syntax
rdfs	<a href="http://www.w3.org/2000/01/rdf-schema#">http://www.w3.org/2000/01/rdf-schema#</a>	RDF Vocabulary Description Language 1.0: RDF Schema
schema	<a href="http://schema.org/">http://schema.org/</a>	schema.org
skos	<a href="http://www.w3.org/2004/02/skos/core#">http://www.w3.org/2004/02/skos/core#</a>	SKOS Simple Knowledge Organization System - Reference
vcard	<a href="http://www.w3.org/2006/vcard/ns#">http://www.w3.org/2006/vcard/ns#</a>	vCard Ontology
xsd	<a href="http://www.w3.org/2001/XMLSchema#">http://www.w3.org/2001/XMLSchema#</a>	XML Schema Part 2: Datatypes Second Edition

## 5.2 Overview of bindings for GeoDCAT-AP Core

Table 2 provides an overview of **GeoDCAT-AP Core**. This includes bindings for metadata elements of the INSPIRE metadata and metadata elements in the core profile of ISO 19115:2003 core *for which DCAT-AP provides an RDF syntax binding*. Those metadata elements for which DCAT-AP does not provide a binding are part of the GeoDCAT-AP Extended profile described in Section 5.3.

GeoDCAT-AP Core is meant to enable the harvesting and re-use of spatial metadata records through DCAT-AP-conformant applications and services, including data portals and APIs. The alignments for INSPIRE and ISO 19115:2003 metadata elements that are not included in GeoDCAT-AP Core are defined in GeoDCAT-AP Extended, see Section 5.3.

In addition to this, GeoDCAT-AP Core does not provide alignments from metadata records concerning services, with the only exception of catalogue or discovery services, which are the only one supported in DCAT-AP.

In Table 2 the starred elements (\*) are used to indicate the corresponding metadata element in the core profile of ISO 19115:2003. For each element, it is indicated whether the element is mandatory (M), optional (O), conditional (C), or recommended (R) in either specification.

**Table 2: Element bindings for GeoDCAT-AP Core**

INSPIRE metadata *ISO19115:2003 Core Profile	DCAT-AP Property	Domain	Range	Comments
<b>Resource title</b> (M) *Dataset title (M)	dct:title (M)	- (dcat:Dataset (M), dcat:Catalog (M))	rdf:PlainLiteral	See Annex II, Section II.1
<b>Resource abstract</b> (M) *Abstract describing the dataset (M)	dct:description (M)	- (dcat:Dataset (M), dcat:Catalog (M))	rdf:PlainLiteral	See Annex II, Section II.2
<b>Resource type</b> (M) *not in ISO19115 core	rdf:type (M) (see also binding for GeoDCAT-AP Extended)	- (dcat:Dataset (M), dcat:Catalog (M))	rdfs:Class (values dcat:Dataset dcat:Catalog)	See Annex II, Section II.3. DCAT-AP does not distinguish between datasets and dataset series. dcat:Catalog can be used for catalogue / discovery services.

INSPIRE metadata *ISO19115:2003 Core Profile	DCAT-AP Property	Domain	Range	Comments
<b>Resource locator</b> (C) *On-line resource (O)				See Annex II, Section II.4. The proposed encoding depends whether the resource is a service or a dataset or data series. Also, the value of the function code (CI_OnlineFunctionCode) must be taken into account.
For services	foaf:homepage	- (dcat:Catalog (M))	foaf:Document	See Annex II, Section II.4.
For dataset and data series (function code not provided)	dcat:landingPage (O)	dcat:Dataset (M)	foaf:Document	See Annex II, Section II.4.
For dataset and data series ('download' function code)	dcat:accessURL (M)	dcat:Distribution (R)	rdfs:Resource	See Annex II, Section II.4.
For dataset and data series ('information' function code)	foaf:page (not in DCAT-AP!)	- (dcat:Dataset (M))	foaf:Document	See Annex II, Section II.4.
For dataset and data series ('offlineAccess' function code)	dcat:accessURL (M)	dcat:Distribution (R)	rdfs:Resource	See Annex II, Section II.4.
For dataset and data series ('order' function code)	dcat:accessURL (M)	dcat:Distribution (R)	rdfs:Resource	See Annex II, Section II.4.
For dataset and data series ('search' function code)	foaf:page	- (dcat:Dataset)	foaf:Document	See Annex II, Section II.4.
<b>Unique resource identifier</b> (M) *not in ISO19115 core	dct:identifier (O)	- (dcat:Dataset (M))	rdfs:Literal	See Annex II, Section II.5. In RDF, this could also be represented as the URI of the dataset.

INSPIRE metadata *ISO19115:2003 Core Profile	DCAT-AP Property	Domain	Range	Comments
<b>Resource language</b> (C) *Dataset language (M)	dct:language (O for dcat:Dataset and R for dcat:Catalog)	- (dcat:Dataset (M), dcat:Catalog (M))	dct:LinguisticSystem	See Annex II, Section II.7.
<b>Spatial data service type</b> (M) *not in ISO19115 core	rdf:type	-	rdfs:Class (values dcat:Catalog)	See Annex II, Section II.3. DCAT-AP foresees only one type of services - i.e., data catalogues.
<b>Keyword value</b> (M) *not in ISO19115 core	dcat:keyword (R) dcat:theme (R) (see also binding for GeoDCAT-AP Extended)	dcat:Dataset (M)	rdfs:Literal	See Annex II, Section II.8. For datasets and data series, dcat:keyword is used for free keywords; dcat:theme for controlled vocabularies. 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. See controlled vocabulary for theme in Section 6.  For services a syntax binding is provided in GeoDCAT-AP Extended only.
<b>Geographic bounding box</b> (M) *Geographic location of the dataset (by four coordinates or by geographic identifier) (C)	dct:spatial (O)	- (dcat:Dataset (M), dcat:Catalog (M))	dct:Location	See Annex II, Section II.10 on the preferred format to be used in RDF for the representation of geometries.
<b>Temporal extent</b> (C) *Additional extent information for the dataset (vertical and temporal) (O)	dct:temporal (O)	- (dcat:Dataset (M))	dct:PeriodOfTime	See Annex II, Section II.11.
<b>Date of publication</b> (C) *Dataset reference date (M) – publication	dct:issued (R for dcat:Catalog and O for dcat:Dataset)	- (dcat:Dataset (M), dcat:Catalog (M))	xsd:date	See Annex II, Section II.11.
<b>Date of last revision</b> (C) *Dataset reference date (M) – revision	dct:modified (R for dcat:Catalog and O for dcat:Dataset)	- (dcat:Dataset (M), dcat:Catalog (M))	xsd:date	See Annex II, Section II.11.

INSPIRE metadata *ISO19115:2003 Core Profile	DCAT-AP Property	Domain	Range	Comments
<b>Lineage</b> (M) *Lineage (O)	dct:provenance	- - (dcat:Dataset (M), dcat:Catalog (M))	dct:ProvenanceStatement	See Annex II, Section II.12.
<b>Conformity</b> (M) *not in ISO19115 core	dct:conformsTo (O) (see also binding for GeoDCAT-AP Extended)	- (dcat:Dataset (M))	dct:Standard	See Annex II, Section II.14. dct:conformsTo can model only one of the cases foreseen in INSPIRE. i.e., when the degree of conformity is "conformant".
<b>Conformity Specification</b> (M) *not in ISO19115 core	dct:title dct:issued, dct:modified, dct:created (see also binding for GeoDCAT-AP Extended)	rdfs:Resource	rdf:PlainLiteral xsd:date	See Annex II, Section II.14.
<b>Conditions for access and use</b> (M) *not in ISO19115 core	dct:license (O)	- (dcat:Distribution (R))	dct:LicenseDocument	See Annex II, Section II.15.
<b>Limitations on public access</b> (C) *not in ISO19115 core	dct:accessRights (O)	- (dcat:Distribution (R))	dct:RightsStatement	See Annex II, Section II.15.
<b>Responsible party</b> (M) *Dataset responsible party (O)	dct:publisher (R), dcat:contactPoint (R)	- (dcat:Dataset (M))	dct:Agent vcard:Kind	See Annex II, Section II.16. DCAT-AP foresees only 2 of the 11 responsible party roles supported in INSPIRE. GeoDCAT-AP Extended suggests the use of the W3C PROV ontology to model information concerning provenance not covered in DCAT-AP.
<b>Encoding</b> (M) *Distribution format (O)	dct:format (R), dcat:mediaType (O)	dcat:Distribution (R)	dc:MediaTypeOrExtent	See Annex II, Section II.25. See controlled vocabularies for encoding in Section 6.
<b>Maintenance information</b> (R) *not in ISO19115 core	dct:accrualPeriodicity (O)	dctype:Collection (dcat:Dataset) (M)	dct:Frequency	See Annex II, Section II.27.

INSPIRE metadata *ISO19115:2003 Core Profile	DCAT-AP Property	Domain	Range	Comments
-Metadata standard	dct:conformsTo (R)	- (dcat:CatalogRecord (O))	dct:Standard	See Annex II, Section II.18. This element, not existing in ISO 19115, is just meant to provide the context for the specification of the metadata standard name and version.
*Metadata standard name (O)	dct:title	- (dct:Standard (O))	rdf:PlainLiteral	See Annex II, Section II.18.
*Metadata standard version (O)	owl:versionInfo	- (dct:Standard (O))	rdfs:Literal	See Annex II, Section II.18. This can be part of the information specified for metadata standard name.
<b>Metadata date</b> (M) *Metadata date stamp (M)	dct:modified (M)	- (dcat:CatalogRecord (O))	xsd:date	See Annex II, Section II.11.
<b>Metadata language</b> (M) *Metadata language (C)	dct:language (O)	- (dcat:CatalogRecord (O))	dct:LinguisticSystem	See Annex II, Section II.7.

### 5.3 Overview of bindings for GeoDCAT-AP Extended

This section provides an overview of the RDF syntax bindings in GeoDCAT-AP Extended. This GeoDCAT-AP profile covers elements defined in INSPIRE and the core profile of ISO 19115:2003, for which DCAT-AP does not provide a syntax binding. GeoDCAT-AP Extended is a *superset* of GeoDCAT-AP Core.

Table 3 contains the suggested RDF syntax binding for INSPIRE metadata. In the table below, the starred elements (\*) are used to indicate the corresponding metadata element in the core profile of ISO 19115:2003. For each metadata element, it is indicated whether the element is mandatory (M), optional (O), conditional (C), or recommended (R) in either specification.

Please note that some metadata elements have an RDF syntax binding in both the GeoDCAT-AP Core and Extended profile. These elements fall in one of these categories:

1. **Partial coverage by a DCAT-AP binding:** This concerns conformity (only degree of conformity conformant is supported) and responsible organisation (only responsible party roles publisher and point of contact are supported).
2. **Subsumption by a GeoDCAT-AP RDF binding:** ISO metadata elements available in GeoDCAT-AP Core, but for which only a many-to-one mapping is supported in DCAT-AP. This concerns resource types, since the DCAT notion of dataset models both the ISO/INSPIRE notions of data set and data series; the DCAT notion of data catalogue models only one of the types of spatial data services.

In order to preserve the original semantics, the extended profile of GeoDCAT-AP defines additional mappings to those included in GeoDCAT-AP Core. The two sets of alignments are not mutually exclusive, and can coexist without creating conflicts.

**Table 3: Element bindings for GeoDCAT-AP Extended**

INSPIRE metadata *ISO19115:2003 Core Profile	Property	Domain	Range	Comments
<b>Resource type</b> (M) *not in ISO19115	dct:type	- (dcat:Dataset (M), dcat:Catalog (M))	rdfs:Class (skos:Concept)	See Annex II, Section II.3 and the controlled vocabulary for resource type in Section 6. DCAT-AP foresees the use of dct:type on dct:Dataset only.

INSPIRE metadata *ISO19115:2003 Core Profile	Property	Domain	Range	Comments
<b>Topic category</b> (M) *Dataset topic category (M)	dct:subject	- (dcat:Dataset (M))	- (skos:Concept)	See Annex II, Section II.8 and the controlled vocabulary for topic category in Section 6.
<b>Spatial data service type</b> (M) *not in ISO19115	dct:type	- (dcat:Dataset (M), dcat:Catalog (M), dctype:Service)	rdfs:Class (skos:Concept)	See Annex II, Section II.3. See controlled vocabulary for spatial data service type in Section 6.
<b>Keyword value</b> (M) *not in ISO19115 core	dc:subject dct:subject dct:type	- (dcat:Catalog (M))	- (rdfs:Literal) - (rdfs:Resource) rdfs:Class (skos:Concept)	See Annex II, Section II.8.2.
<b>Originating controlled vocabulary</b> (C) *not in ISO19115 core	skos:inScheme	skos:Concept	skos:ConceptScheme	See Annex II, Section II.8.
<b>Date of creation</b> (C) *Dataset reference date (M) - creation	dct:created	- (dcat:Dataset (M), dcat:Catalog (M))	xsd:date	See Annex II, Section II.11.
<b>Spatial resolution</b> (C) *Spatial resolution of the dataset (O)	rdfs:comment	-	rdfs:Literal	See Annex II, Section II.13. Spatial resolution is encoded in a human-readable form only.
<b>Conformity</b> (M) *not in ISO19115 core	prov:wasUsedBy	prov:Entity (dcat:DataSet (M))	prov:Activity	See Annex II, Section II.14.
<b>Conformity Specification</b> (M) *not in ISO19115 core	prov:wasDerivedFrom	prov:Entity	prov:Entity	See Annex II, Section II.14.
<b>Conformity degree</b> (M) *not in ISO19115 core	prov:generated	prov:Activity	prov:Entity	See Annex II, Section II.14 and the controlled vocabulary for conformity degree in Section 6.



INSPIRE metadata *ISO19115:2003 Core Profile	Property	Domain	Range	Comments
<b>Topological Consistency (C)</b> *not in ISO19115 core	-	-	-	See Annex II, Section II.14. No syntax binding is provided for data quality, other than data conformity.
<b>Data Quality – Logical Consistency – Conceptual Consistency, Domain Consistency – (R)</b> *not in ISO19115 core	-	-	-	See Annex II, Section II.14. No syntax binding is provided for data quality, other than conformity.
<b>Responsible party (M)</b> *Dataset responsible party (O)	dct:creator	- (dcat:Dataset (M))	dct:Agent	See Annex II, Section II.16.
	prov:qualifiedAttribution	prov:Entity (dcat:Dataset (M))	prov:Attribution	
<b>Responsible party role (M)</b>	dct:type	- (prov:Attribution)	rdfs:Class	See Annex II, Section II.16 and controlled vocabulary for responsible party role in Section 6.
*Metadata file identifier (O)	dct:identifier	- (dcat:CatalogRecord (O))	rdfs:Literal	See Annex II, Section II.17. In RDF, this could also be represented as the URI of the metadata / catalogue record.
<b>Metadata point of contact (M)</b> *Metadata point of contact (M)	prov:qualifiedAttribution	- (dcat:CatalogRecord (O))	prov:Attribution	See Annex II, Section II.16.
	dcat:contactPoint	- (dcat:CatalogRecord (O))	vcard:Kind	See Annex II, Section II.16.
*Metadata character set (C)	cnt:characterEncoding	cnt:Content (dcat:CatalogRecord (O))	rdfs:Literal	See Annex II, Section II.24.
<b>Coordinate Reference System (M)</b> *Reference System (O)	dct:conformsTo	- (dcat:Dataset (M))	dct:Standard	See Annex II, Section II.23.

INSPIRE metadata *ISO19115:2003 Core Profile	Property	Domain	Range	Comments
<b>Temporal Reference System</b> (C) *Reference System (O)	dct:conformsTo	- (dcat:Dataset (M))	dct:Standard	See Annex II, Section II.23.
<b>Character Encoding</b> (C) *Dataset character set (C)	cnt:characterEncoding	cnt:Content (dcat:Distribution (R))	rdfs:Literal	See Annex II, Section II.24.
<b>Spatial representation type</b> – (M) *Spatial representation type (O)	adms:representationTechnique	dcat:Distribution (R)	skos:Concept	See Annex II, Section II.26.

## 6 CONTROLLED VOCABULARIES

This section lists the controlled vocabularies that must be used according to the GeoDCAT-AP Core Profile and the GeoDCAT-AP Extended Profile.

**Table 4: Controlled vocabularies to be used**

Element(s) in INSPIRE Metadata Regulation *ISO19115:2003 Core Profile	Property	Controlled Vocabulary	Comment
<b>Resource language</b> <b>Metadata language</b> (ISO 639-2)	dct:language	Language Named Authority List [MDR-LANG] operated by the Metadata Registry of the Publications Office of the EU <a href="http://publications.europa.eu/resource/authority/language">http://publications.europa.eu/resource/authority/language</a>	
<b>Resource type</b>	dct:type	Register operated by the INSPIRE Registry for resource types defined in ISO 19115 <a href="http://inspire.ec.europa.eu/metadata-codelist/ResourceType">http://inspire.ec.europa.eu/metadata-codelist/ResourceType</a>	GeoDCAT-AP Extended profile only.
<b>Spatial data service type</b>	dct:type	Register operated by the INSPIRE Registry for service types <a href="http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceType">http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceType</a>	GeoDCAT-AP Extended profile only.
<b>Topic category</b>	dct:subject	Register operated by the INSPIRE Registry for topic categories defined in ISO 19115 <a href="http://inspire.ec.europa.eu/metadata-codelist/TopicCategory">http://inspire.ec.europa.eu/metadata-codelist/TopicCategory</a>	GeoDCAT-AP Extended profile only.
<b>Keyword denoting one of the INSPIRE spatial data themes</b>	dcat:theme	INSPIRE spatial data theme register operated by the INSPIRE Registry <a href="http://inspire.ec.europa.eu/theme">http://inspire.ec.europa.eu/theme</a>	
<b>MDR Data Themes</b>	dcat:theme	Data Theme Named Authority List [MDR-THEMES] operated by the Metadata Registry of the Publications Office of the EU <a href="http://publications.europa.eu/resource/authority/data-theme">http://publications.europa.eu/resource/authority/data-theme</a>	Required for compliance with DCAT-AP. See Annex II, Section II.8 for more details.

Element(s) in INSPIRE Metadata Regulation *ISO19115:2003 Core Profile	Property	Controlled Vocabulary	Comment
<b>Keyword denoting one of the spatial data service categories</b>	dct:type	Register operated by the INSPIRE Registry for spatial data service categories defined in ISO 19119 <a href="http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceCategory">http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceCategory</a>	GeoDCAT-AP Extended profile only.
<b>Conformity degree</b>	dct:type	Register operated by the INSPIRE Registry for degrees of conformity <a href="http://inspire.ec.europa.eu/metadata-codelist/DegreeOfConformity">http://inspire.ec.europa.eu/metadata-codelist/DegreeOfConformity</a>	GeoDCAT-AP Extended profile only.
<b>Responsible party role</b>	dct:type	Register operated by the INSPIRE Registry for responsible party roles <a href="http://inspire.ec.europa.eu/metadata-codelist/ResponsiblePartyRole">http://inspire.ec.europa.eu/metadata-codelist/ResponsiblePartyRole</a>	GeoDCAT-AP Extended profile only.
<b>Encoding</b>	dct:format	File type Named Authority List [MDR-FT] operated by the Metadata Registry of the Publications Office of the EU <a href="http://publications.europa.eu/resource/authority/file-type">http://publications.europa.eu/resource/authority/file-type</a>	
		For formats not (yet) included into [MDR-FT], the media type register for datasets in INSPIRE download services is to be used [INSPIRE-MT]. <a href="http://inspire.ec.europa.eu/media-types">http://inspire.ec.europa.eu/media-types</a>	GeoDCAT-AP Extended profile only
<b>Character encoding - *Character sets</b>	cnt:characterEncoding	Register of Character Sets operated by IANA [IANA-CS]. <a href="http://www.iana.org/assignments/character-sets/">http://www.iana.org/assignments/character-sets/</a>	See mapping table in Annex II, Section II.24. GeoDCAT-AP Extended profile only.
<b>Coordinate reference system</b>	dct:conformsTo	Register of coordinate reference systems included in the European Petroleum Survey Group (EPSG) Geodetic Parameter Dataset. <a href="http://www.opengis.net/def/crs/EPSG/">http://www.opengis.net/def/crs/EPSG/</a> <a href="http://www.epsg-registry.org/">http://www.epsg-registry.org/</a>	GeoDCAT-AP Extended profile only.

Element(s) in INSPIRE Metadata Regulation *ISO19115:2003 Core Profile	Property	Controlled Vocabulary	Comment
<b>Spatial representation types</b>	adms:representationTechnique	The ISO 19115 code list of spatial representation types might be in the future available as a URI register from the INSPIRE Registry.	See mapping table in Annex II, Section II.26.  GeoDCAT-AP Extended profile only.
<b>Maintenance frequency</b>	dct:accrualPeriodicity	MDR Frequency Named Authority List [MDR-FREQ]. <a href="http://publications.europa.eu/resource/authority/frequency">http://publications.europa.eu/resource/authority/frequency</a>	See mapping table in Annex II, Section II.27.
		For the frequency codes not covered by the MDR Frequency code list, GeoDCAT-AP will use the code list of ISO maintenance frequency codes operated by the INSPIRE Registry.	GeoDCAT-AP Extended profile only
<b>Geographic identifier</b>	dct:spatial	The continents, countries and places Named Authority Lists operated by the Metadata Registry of the Publications Office of the EU [MDR-CONT, MDR-COUNTRIES, MDR-PLACES]. <a href="http://publications.europa.eu/mdr/authority/continent/">http://publications.europa.eu/mdr/authority/continent/</a> <a href="http://publications.europa.eu/mdr/authority/place/">http://publications.europa.eu/mdr/authority/place/</a> <a href="http://publications.europa.eu/mdr/authority/country/">http://publications.europa.eu/mdr/authority/country/</a> The geonames URI sets [GEONAMES]. <a href="http://www.geonames.org/">http://www.geonames.org/</a>	The MDR Name Authority Lists must be used for continents, countries and places that are in those lists; if a particular location is not in one of the mentioned Named Authority Lists, Geonames URIs must be used.

Other controlled vocabularies can be used *in addition* to those mentioned above. For example, the working group has identified the following vocabularies:

- **Geographic identifiers:**
  - **For marine regions:**
    - Marine Regions <http://www.marineregions.org/>

- SeaVoX salt and fresh water body gazetteer - [https://www.bodc.ac.uk/data/codes\\_and\\_formats/seavox/](https://www.bodc.ac.uk/data/codes_and_formats/seavox/)
- **General:**
  - DBpedia for Geographic Placenames- <http://dbpedia.org/about>
  - National gazetteer vocabularies where feasible
  - SeaVoX salt and fresh water body gazetteer for 'marine geonames' - [https://www.bodc.ac.uk/data/codes\\_and\\_formats/seavox/](https://www.bodc.ac.uk/data/codes_and_formats/seavox/)
- **Keywords (with controlled vocabularies):**
  - **For discipline:** suggested vocabularies are
    - GEneral Multilingual Environmental Thesaurus (GEMET) - <https://www.eionet.europa.eu/gemet/>
  - **General:**
    - GEOSS Societal Benefit Areas - [https://en.wikipedia.org/wiki/Societal\\_Benefit\\_Areas](https://en.wikipedia.org/wiki/Societal_Benefit_Areas)
    - GEneral Multilingual Environmental Thesaurus (GEMET)- <https://www.eionet.europa.eu/gemet/>
    - British Oceanographic Data centre - <http://www.bodc.ac.uk/>

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<b>Chrysi Tsinaraki</b>	European Commission - Joint Research Centre	JRC Data Catalogue	EU
<b>David Read</b>	Data.gov.uk	data.gov.uk	UK
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<b>Eliane Roos</b>	Institut géographique national (IGN)	geoportail.gouv.fr	FR
<b>Franks Knibbe</b>	Geodan		NL
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<b>James Passmore</b>	British Geological Survey		UK
<b>Jan Hjelmager</b>	Danish Geodata Agency		DK
<b>Jon Blower</b>	University of Reading	MELODIES EU project	UK
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Name	Organisation	Data portal / project	Country
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<b>Lorena Hernandez Quiroz</b>	European Commission - Joint Research Centre	INSPIRE Geoportal	EU
<b>Lorenzino Vaccari</b>	European Commission - Joint Research Centre	JRC Data Catalogue	EU
<b>Maik Riechert</b>	University of Reading	MELODIES EU project	UK
<b>Makx Dekkers</b>	AMI Consult	SEMIC project	NL
<b>Martin Seiler</b>	National Spatial Data Infrastructure	<a href="http://www.geoportal.de">www.geoportal.de</a>	DE
<b>Matthias Palmér</b>	MetaSolutions AB		SE
<b>Michael Lutz</b>	European Commission - Joint Research Centre	INSPIRE Geoportal	EU
<b>Michael Östling</b>	MetaGIS		SE
<b>Paul Smits</b>	European Commission - Joint Research Centre	INSPIRE Geoportal	EU
<b>Paul van Genuchten</b>	GEOCAT	GeoNetwork	NL
<b>Pedro Gonçalves</b>	Terradue		IT
<b>Piergiorgio Cipriano</b>	Sinergis		IT
<b>Pierluigi Cara</b>	Italian Civil Protection – Open data Group		IT
<b>Pieter Colpaert</b>	iMinds / Ghent University / Open Knowledge Belgium		BE
<b>Simon Cox</b>	CSIRO		AU
<b>Simon Dutkowski</b>	Fraunhofer FOKUS	<a href="http://www.govdata.de">www.govdata.de</a> , European Data Portal	DE
<b>Stephan Kafka</b>	Help Service Remote Sensing, Ltd.	Czech national INSPIRE Geoportal	CZ
<b>Stijn Goedertier</b>	PwC EU Services	SEMIC project	EU
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## Annex I 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 5: 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

INSPIRE	Obligation	ISO 19115 Core	Obligation	DCAT-AP	GeoDCAT-AP
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



INSPIRE	Obligation	ISO 19115 Core	Obligation	DCAT-AP	GeoDCAT-AP
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)

## Annex II 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.

### II.1 Resource title - \*Dataset title

The content of the element 'resource title' can be represented in RDF as a plain literal, and by using property `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 [BCP47].

Example
<pre># Resource metadata in GeoDCAT-AP  [] dct:title "Forest / Non-Forest Map 2006"@en.  &lt;!-- Resource metadata in ISO19139 --&gt;  &lt;gmd:MD_Metadata ... ...   &lt;gmd:identificationInfo&gt;     &lt;gmd:MD_DataIdentification&gt;       &lt;gmd:citation&gt;         &lt;gmd:CI_Citation&gt;           &lt;gmd:title&gt;             &lt;gco:CharacterString&gt;               Forest / Non-Forest Map 2006             &lt;/gco:CharacterString&gt;           &lt;/gmd:title&gt;         &lt;/gmd:CI_Citation&gt;       &lt;/gmd:citation&gt;     &lt;/gmd:MD_DataIdentification&gt;   &lt;/gmd:identificationInfo&gt;   ... &lt;/gmd:MD_Metadata&gt;</pre>

### II.2 Resource abstract - \*Abstract describing the dataset

The content of the elements 'resource abstract' can be represented in RDF as a plain literal, and by using property `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 [BCP47].

Example
<pre># Resource metadata in GeoDCAT-AP</pre>

## Example

```
[] 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>
```

### II.3 Resource type - \*not in ISO 19115 core

In [DCAT], 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 Dublin Core [INSPIRE-DC], 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. More precisely, the following URIs should be used to denote, respectively, dataset and series:

- <http://inspire.ec.europa.eu/metadata-codelist/ResourceType/dataset>
- <http://inspire.ec.europa.eu/metadata-codelist/ResourceType/series>

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. More precisely, the following URI should be used to denote services:

- <http://inspire.ec.europa.eu/metadata-codelist/ResourceType/service>

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 supported only 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/metadata-codelist/ResourceType/dataset>

## Resource type for series

[] a dcat:Dataset;
   dct:type <http://inspire.ec.europa.eu/metadata-codelist/ResourceType/series>

## Resource type for services (here, a view service)

[] a dctype:Service;
   dct:type <http://inspire.ec.europa.eu/metadata-codelist/ResourceType/service> ,
           <http://inspire.ec.europa.eu/metadata-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>
```

### Example

```

<!-- 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>

```

## II.4 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] 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 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_Sc
hemas/resources/codelist/ML_gmxCodelists.xml#CI_OnlineFunctionCode"
xmlns="http://www.isotc211.org/2005/gmd"/>
        </gmd:function>
      </gmd:CI_OnlineResource>
    </gmd:onLine>
  </gmd:MD_DigitalTransferOptions>

```

## Example

```

</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=GetCapabili
ties</gmd:URL>
              </gmd:linkage>
              <gmd:function>
                <CI_OnlineFunctionCode codeListValue="information"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Sc
hemas/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>

```

## II.5 Unique resource identifier - \*not in ISO 19115 core

In INSPIRE, this element is meant to uniquely identify a resource (dataset, series or service), and it is mandatory for datasets and series. It is specified by (a) a *mandatory* character string code and by (b) an *optional* character string namespace.

Based on DCAT-AP, unique resource identifiers are mapped to dct:identifier (see the following example). The actual value is obtained by the concatenation of the values of the namespace (if specified) and of the code in the original metadata record.

## Example

```

# Resource metadata in GeoDCAT-AP

[]  dct:identifier "12345"^^xsd:string .

<!-- Resource metadata in ISO19139 -->

```

## Example

```

<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>12345</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmd:identifier>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>

```

If the unique resource identifier is specified with or can be encoded as 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/resource/12345>
  dct:identifier "http://some.site/resource/12345"^^xsd:anyURI .

<!-- Resource metadata in ISO19139 -->

<!--Unique resource identifier specified only with code -->

<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>
              http://some.site/dataset/12345
            </gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmd:identifier>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>

<!-- Unique resource identifier specified with code and namespace -->

```



## Example

```

<gmd:MD_Metadata>
  ...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      ...
      <gmd:identifier>
        <gmd:RS_Identifier>
          <gmd:code>
            <gco:CharacterString>
              12345
            </gco:CharacterString>
          </gmd:code>
          <gmd:codeSpace>
            <gco:CharacterString>
              http://some.site/dataset/
            </gco:CharacterString>
          </gmd:codeSpace>
        </gmd:RS_Identifier>
      </gmd:identifier>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>

```

## II.6 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`. This mapping is supported only in the extended profile of GeoDCAT-AP.

NB: The notion of “coupled resource” does not apply to catalogue / discovery services. As per the DCAT-AP, in GeoDCAT-AP (core and extended profiles) 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/metadata-codelist/ResourceType/service> ,
  <http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceType/view> ;
  dct:hasPart [
    dct:identifier "12345"^^xsd:string
  ] .

<!-- Resource metadata in ISO19139 -->

```

## Example

```

<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:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>12345</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmd:identifier>
    </gmd:MD_DataIdentification>
    ...
  </gmd:identificationInfo>
  ...
</gmd:MD_Metadata>

```

## II.7 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 [ISO639-2].

Based on DCAT-AP, both elements are specified with property `dct:language`, with the URI of the relevant language available from the relevant register operated by the EU Publications Office [MDR-LANG].

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

## Example

```
# Resource metadata in GeoDCAT-AP
```

## Example

```

# 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 [XML].

Since @xml:lang takes as value language identifiers defined by IETF BCP 47 [BCP47], a mapping from the actual value of the metadata language is needed.

## II.8 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 [INSPIRE-MD-REG] (§2.1 and §3.1, 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.

### **II.8.1 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 mapping 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 – reference register:
  - <http://inspire.ec.europa.eu/metadata-codelist/TopicCategory>
- Keywords not associated with a controlled vocabulary will be mapped to `dcat:keyword`;
- INSPIRE spatial data themes are mapped to `dcat:theme` and expressed by the corresponding URI in the INSPIRE Registry – reference register:
  - <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 a `skos:Concept` associated with a `skos:ConceptScheme` (modelling the originating controlled vocabulary), and annotated with the textual content and reference date(s) in the relevant INSPIRE metadata elements.

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

**Table 6: Mappings for metadata element 'originating controlled vocabulary'**

Metadata Element		Proposed mapping		
<b>Originating controlled vocabulary</b>	Title	<i>skos:ConceptScheme</i>	<i>dct:title</i>	
	Reference date		creation	<i>dct:created</i>
			last revision	<i>dct:modified</i>
			publication	<i>dct:issued</i>

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

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:

<https://joinup.ec.europa.eu/node/148245/>

### II.8.2 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 codelists of spatial data service type and categories are mapped to *dct:type*, and expressed by the corresponding URI in the INSPIRE Registry – reference registers:
  - <http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceType>
  - <http://inspire.ec.europa.eu/metadata-codelist/SpatialDataServiceCategory>
- Keywords not associated with a controlled vocabulary will be mapped to *dc:subject*, and represented as un-typed literals;
- INSPIRE spatial data themes are mapped to *dct:subject*, and expressed by the corresponding URI in the INSPIRE Registry – reference register:

- <http://inspire.ec.europa.eu/theme>
- Keywords associated with other controlled vocabularies are mapped to dct:subject. If not denoted by an HTTP URI, they should be 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.

#### 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/metadata-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/metadata-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 ] ] .
```

## Example

```

<!-- 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_Sc
hemas/resources/codelist/ML_gmxCodetlists.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/metadata-
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 -->

```

## Example

```

<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_Sc
hemas/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_Sc
hemas/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>

```



## Example

```

...
</srv:SV_ServiceIdentification>
...
</gmd:identificationInfo>
</gmd:MD_Metadata>

```

## II.9 Spatial data service type - \*not in ISO 19115 core

See Section II.3 on resource type.

## II.10 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 [LOCN], where this is done by using property `locn:geometry`, having as range a geometry<sup>7</sup> specified as
  - a URI - e.g., by using the geo URI scheme (IET RFC-5870) [RFC5870], or a geohash URI [GEOHASH, GEOHASH-36];
  - a syntax encoding scheme - e.g., geohashes [GEOHASH, GEOHASH-36], WKT [ISO19125-1], GML [GML], KML [KML], GeoJSON [GEOJSON]; or
  - a semantic representation - using vocabularies like W3C Lat/long [LAT-LONG] or schema.org [SCHEMA].

It is worth noting that currently there is no agreement on a preferred format to be used in RDF for the representation of geometries. In GeoDCAT-AP, 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 [GEOSPARQL]. Geometries shall be interpreted using the axis order defined in the spatial reference system used. For example, for CRS84 the axis order is longitude / latitude, whereas for WGS84 the axis order is latitude / longitude. Summarising:

- Geometries can be provided in multiple encodings, but at least one of the following must be made available: GML and WKT.

<sup>7</sup> Please note that the Core Location Vocabulary does not restrict `locn:geometry` to bounding box geometries only.

- For GML and WKT, the CRS must be specified as defined in GeoSPARQL [GEOSPARQL].
- **Geographic identifier:** ISO 19115 core also allows specifying the geographic location using a geographic identifier. Following DCAT-AP, for this, it is recommended to use an HTTP URI from one of the following registers / gazetteers:
  - The Named Authority Lists operated by the Metadata Registry of the EU Publications office concerning continents [MDR-CONT], countries [MD-COUNTRIES], and places [MDR-PLACES].
  - If none of the above provides the relevant geographic identifiers, Geonames [GEONAMES] should be used.

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)

[]
```

## Example

```
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>
```

## II.11 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, 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` (both core and extended GeoDCAT-AP profiles), and `dct:created` (only for the extended profile of GeoDCAT-AP).

DCAT-AP does not foresee a property equivalent to the INSPIRE metadata element `metadata date`. In INSPIRE, this element is defined as follows ([Part B, §10.2](#)):

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>
</gmd:MD_Metadata>
```

## Example

```

</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_Sc
hemas/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>

```

## II.12 Lineage - \*Lineage

Following DCAT-AP, this element is mapped to property `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 [DCWIKI].

## 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>

```

## Example

```

<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>

```

## II.13 Spatial resolution – Spatial resolution of the dataset

In DCAT-AP, no equivalent term is foreseen.

There are currently no candidates in existing vocabularies to represent such metadata elements.

Based on this, GeoDCAT-AP defines a provisional mapping, representing spatial resolution in a human-readable form only, using 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>

```

## II.14 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 either 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) [PROV] 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 Vocabulary (DQV). To limit the impact, it was decided to only provide a partial mapping for Data Quality / Conformance.

DCAT-AP provides a single candidate, `dct:conformsTo`, which however can be used to map only a conformity of degree 'conformant'. This is suitable for the core profile of GeoDCAT-AP.

Considering how conformity must be expressed in extended profile of GeoDCAT-AP (see the INSPIRE Metadata Regulation, Part B, §7), possible candidates are the W3C Evaluation and Report Language (EARL) [EARL] and the W3C Provenance Ontology (PROV-O) [PROV]. The latter candidate was chosen by the GeoDCAT-AP Working Group, 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 7: Mappings for metadata element 'conformity'**

Metadata element				Proposed mapping		
Conformity	Specification (M)	Title		prov:wasUsedBy (range prov:Activity)	<i>prov:qualifiedAssociation (range prov:Association) &gt; prov:hadPlan (range prov:Plan) &gt; prov:wasDerivedFrom (range: prov:Entity, dct:Standard)</i>	<i>dct:title</i>
		Reference date	creation		<i>dct:created</i>	
			last revision		<i>dct:modified</i>	
			publication		<i>dct:issued</i>	
	Degree (M)				<i>prov:generated</i>	

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/metadata-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_Sc
              hemas/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:DQ_ConformanceResult>
</gmd:result>
```



## Example

```
<gmd:pass><gco:Boolean>true</gco:Boolean></gmd:pass>
</gmd:DQ_ConformanceResult>
</gmd:result>
```

The PROV-O-based approach might be revised in the future – but still supported for backward interoperability –, if future standard vocabularies will be able to address GeoDCAT-AP requirement.

## II.15 Conditions for access and use and limitations on public access – Use limitation and access / other constraints

In DCAT-AP, 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 [DCWIKI].

NB: 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
```

## Example

```

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_Sc
hemas/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_Sc
hemas/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>

```

## II.16 Responsible party and metadata point of contact - \*Dataset responsible party and \*Metadata point of contact

DCAT-AP supports properties to denote the publisher and the contact point for a dataset.

By contrast, ISO 19115 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, DCMI Metadata Terms [DCTERMS]). However, for some of them no suitable candidate is available in the existing vocabularies (in particular, for roles "user" and "processor").

In the extended profile of GeoDCAT-AP, the W3C PROV ontology [PROV] is used to specify the relationship between the resource and the responsible organisation. The W3C vCard ontology [VCARD] will then be used to specify the contact information concerning the responsible party. Finally, the responsible party role will be specified by using dct:type, and using the relevant code list values from the INSPIRE Registry – reference register:

<http://inspire.ec.europa.eu/metadata-codelist/ResponsiblePartyRole>

These mappings are illustrated in the following table.

**Table 8: Mappings for metadata element 'responsible party'**

Metadata element			Proposed mapping		
<b>Responsible party</b>	Responsible party	Organisation name	<i>prov:Attribution</i>	<i>vcard:Kind</i>	<i>vcard:organization-name</i>
		Contact email address			<i>vcard:hasEmail</i>
	Responsible party role			<i>dct:type</i>	

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 reasons, the GeoDCAT-AP overall approach is as follows:

- 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. Otherwise:
- Represent responsible organisations by using the PROV ontology.

As mentioned earlier, the latter option is supported only in the extended profile of GeoDCAT-AP.

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

**Table 9: Responsible party roles**

ISO 19115:2003	INSPIRE Metadata Regulation	Description	Proposed RDF mapping (where not available <i>prov:qualifiedAttribution</i> can be used)
<b>Resource provider</b>	<a href="#">Part B §6.1</a>	Party that supplies the resource.	N/A
<b>Custodian</b>	<a href="#">Part B §6.2</a>	Party that accepts accountability and responsibility for the data and ensures appropriate care and maintenance of the resource.	N/A
<b>Owner</b>	<a href="#">Part B §6.3</a>	Party that owns the resource.	<i>dct:rightsHolder</i>
<b>User</b>	<a href="#">Part B §6.4</a>	Party who uses the resource.	N/A
<b>Distributor</b>	<a href="#">Part B §6.5</a>	Party who distributes the resource	N/A

ISO 19115:2003	INSPIRE Metadata Regulation	Description	Proposed RDF mapping (where not available prov:qualifiedAttribution can be used)
<b>Originator</b>	<a href="#">Part B §6.6</a>	Party who created the resource.	N/A
<b>Point of contact</b>	<a href="#">Part B §6.7</a>	Party who can be contacted for acquiring knowledge about or acquisition of the resource.	dcat:contactPoint
<b>Principal investigator</b>	<a href="#">Part B §6.8</a>	Key party responsible for gathering information and conducting research	N/A
<b>Processor</b>	<a href="#">Part B §6.9</a>	Party who has processed the data in a manner such that the resource has been modified.	N/A
<b>Publisher</b>	<a href="#">Part B §6.10</a>	Party who published the resource	dct:publisher
<b>Author</b>	<a href="#">Part B §6.11</a>	Party who authored the resource.	dct:creator

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

Example
<pre># Resource metadata in GeoDCAT-AP  [] dcat:contactPoint [ a vcard:Organization ;   foaf:mbox &lt;mailto:bag@kadaster.nl&gt; ;   foaf:name "Kadaster"@nl ] ;   prov:qualifiedAttribution   [ a prov:Attribution ;     dct:type &lt;http://inspire.ec.europa.eu/metadata- codelist/ResponsiblePartyRole/custodian&gt; ;     prov:agent [ a vcard:Kind ;       vcard:hasEmail &lt;mailto:bag@kadaster.nl&gt; ;       vcard:organization-name "Kadaster"@nl ] ] ;    foaf:isPrimaryTopicOf  # Metadata on metadata in GeoDCAT-AP  [ dcat:contactPoint [ a vcard:Kind ;   vcard:hasEmail &lt;mailto:bag@kadaster.nl&gt; ;   vcard:organization-name "Kadaster"@nl ] ;   prov:qualifiedAttribution [ a prov:Attribution ;     dct:type &lt;http://inspire.ec.europa.eu/metadata- codelist/ResponsiblePartyRole/pointOfContact&gt; ;     prov:agent [ a vcard:Kind ;       vcard:hasEmail &lt;mailto:bag@kadaster.nl&gt; ;       vcard:hasURL &lt;http://www.kadaster.nl/bag&gt; ;       vcard:organization-name "Kadaster"@nl ] ] ] .  &lt;!-- Resource metadata in ISO19139 --&gt;</pre>

## Example

```

<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_Sc
hemas/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_Sc
hemas/resources/codelist/ML_gmxCodelists.xml#CI_RoleCode"/>
      </gmd:role>
    </gmd:CI_ResponsibleParty>
  </gmd:contact>
  ...
</gmd:MD_Metadata>

```

## II.17 \*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 or can be encoded as an HTTP URI, it can also be used as the URI 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 ] .
```

## II.18 \*Metadata standard name, \*Metadata standard version

Following DCAT-AP, GeoDCAT-AP uses 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 10: Metadata standard name and metadata standard version**

Metadata element		Proposed mapping	
Metadata standard	Metadata standard name	<i>dct:conformsTo</i>	<i>dct:title</i>
	Metadata standard version		<i>owl:versionInfo</i>

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

Example
<pre># 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". ] .  &lt;!-- Resource metadata in ISO19139 for datasets --&gt; &lt;gmd:MD_Metadata&gt; ...   &lt;gmd:metadataStandardName&gt;     &lt;gco:CharacterString&gt;ISO 19115&lt;/gco:CharacterString&gt;   &lt;/gmd:metadataStandardName&gt;   &lt;gmd:metadataStandardVersion&gt;     &lt;gco:CharacterString&gt;Nederlands metadata profiel op ISO 19115 voor geografie 1.3&lt;/gco:CharacterString&gt;   &lt;/gmd:metadataStandardVersion&gt; &lt;/gmd:MD_Metadata&gt;</pre>

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
<pre># 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 [</pre>

## Example

```
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>
```

## II.19 \*Metadata character set

See Section II.24.

## II.20 Metadata point of contact - \*Metadata point of contact

See Section II.16.

## II.21 Metadata date - \*Metadata date stamp

See Section II.11.

## II.22 Metadata language - \*Metadata language

See Section II.7.

## II.23 Coordinate reference systems and Temporal reference systems

### - \*Reference System

In DCAT-AP, no equivalent term is foreseen. This is also the case for the NeoGeo [NEOGEO], GeoSPARQL [GEOSPARQL], and the Core Location Vocabulary [LOCN].

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/EPSSG/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/EPSSG/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/EPSSG/0/4258> .

<http://www.opengis.net/def/crs/EPSSG/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/EPSSG/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 [
```

## Example

```
dct:identifier "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>
```

## II.24 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 [RFC4288], the character set can be part of the media type specification, but only for type "text". By contrast, in INSPIRE the character set can be specified also for other media types.

The W3C Content vocabulary [CNT] provides a possibly suitable candidate, namely, property `cnt:characterEncoding`, taking as value the character set names in the IANA register [IANA-CS]. GeoDCAT-AP uses 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<sup>8</sup>, as shown in the following table (entries with 1-to-many mappings are in italic).

ISO 19115 - MD_CharacterSetCode	Description	IANA
<b>ucs2</b>	16-bit fixed size Universal Character Set, based on ISO/IEC 10646	ISO-10646-UCS-2
<b>ucs4</b>	32-bit fixed size Universal Character Set, based on ISO/IEC 10646	ISO-10646-UCS-4
<b>utf7</b>	7-bit variable size UCS Transfer Format, based on ISO/IEC 10646	UTF-7

<sup>8</sup> <http://www.iana.org/assignments/character-sets/>

ISO 19115 - MD_CharacterSetCode	Description	IANA
<b>utf8</b>	8-bit variable size UCS Transfer Format, based on ISO/IEC 10646	UTF-8
<b>utf16</b>	16-bit variable size UCS Transfer Format, based on ISO/IEC 10646	UTF-16
<b>8859part1</b>	ISO/IEC 8859-1, Information technology - 8-bit single byte coded graphic character sets - Part 1 : Latin alphabet No.1	ISO-8859-1
<b>8859part2</b>	ISO/IEC 8859-2, Information technology - 8-bit single byte coded graphic character sets - Part 2 : Latin alphabet No.2	ISO-8859-2
<b>8859part3</b>	ISO/IEC 8859-3, Information technology - 8-bit single byte coded graphic character sets - Part 3 : Latin alphabet No.3	ISO-8859-3
<b>8859part4</b>	ISO/IEC 8859-4, Information technology - 8-bit single byte coded graphic character sets - Part 4 : Latin alphabet No.4	ISO-8859-4
<b>8859part5</b>	ISO/IEC 8859-5, Information technology - 8-bit single byte coded graphic character sets - Part 5 : Latin/Cyrillic alphabet	ISO-8859-5
<b>8859part6</b>	ISO/IEC 8859-6, Information technology - 8-bit single byte coded graphic character sets - Part 6 : Latin/Arabic alphabet	ISO-8859-6
<b>8859part7</b>	ISO/IEC 8859-7, Information technology - 8-bit single byte coded graphic character sets - Part 7 : Latin/Greek alphabet	ISO-8859-7
<b>8859part8</b>	ISO/IEC 8859-8, Information technology - 8-bit single byte coded graphic character sets - Part 8 : Latin/Hebrew alphabet	ISO-8859-8
<b>8859part9</b>	ISO/IEC 8859-9, Information technology - 8-bit single byte coded graphic character sets - Part 9 : Latin alphabet No.5	ISO-8859-9
<b>8859part10</b>	ISO/IEC 8859-10, Information technology - 8-bit single byte coded graphic character sets - Part 10 : Latin alphabet No.6	ISO-8859-10
<b>8859part11</b>	ISO/IEC 8859-11, Information technology - 8-bit single byte coded graphic character sets - Part 11 : Latin/Thai alphabet	ISO-8859-11
<b>8859part13</b>	ISO/IEC 8859-13, Information technology - 8-bit single byte coded graphic character sets - Part 13 : Latin alphabet No.7	ISO-8859-13
<b>8859part14</b>	ISO/IEC 8859-14, Information technology - 8-bit single byte coded graphic character sets - Part 14 : Latin alphabet No.8 (Celtic)	ISO-8859-14
<b>8859part15</b>	ISO/IEC 8859-15, Information technology - 8-bit single byte coded graphic character sets - Part 15 : Latin alphabet No.9	ISO-8859-15

ISO 19115 - MD_CharacterSetCode	Description	IANA
<b>8859part16</b>	ISO/IEC 8859-16, Information technology - 8-bit single byte coded graphic character sets - Part 16 : Latin alphabet No.10	ISO-8859-16
<i>jis</i>	<i>japanese code set used for electronic transmission</i>	<i>JIS_Encoding</i>
<b>shiftJIS</b>	japanese code set used on MS-DOS machines	Shift_JIS
<b>eucJP</b>	japanese code set used on UNIX based machines	EUC-JP
<b>usAscii</b>	United States ASCII code set (ISO 646 US)	US-ASCII
<b>ebcdic</b>	<i>IBM mainframe code set</i>	<i>IBM037</i>
<b>eucKR</b>	Korean code set	EUC-KR
<b>big5</b>	traditional Chinese code set used in Taiwan, Hong Kong of China and other areas	Big5
<b>GB2312</b>	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_Sc
      hemas/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_Sc
          hemas/resources/codelist/ML_gmxCodelists.xml#MD_CharacterSetCode"/>
      </gmd:characterSet>
      ...
    </gmd:MD_DataIdentification>
  ...
</gmd:MD_Metadata>
```

## Example

```

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

```

## II.25 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 [IANA-MT].
- `dct:format`: to be used in all the other cases.

The same approach is used in GeoDCAT-AP for ISO 19115 / INSPIRE metadata.

In both cases, DCAT-AP recommends the use of the URI file type register [MDR-FT], 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 [INSPIRE-MT].

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 register 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>

```

## Example

```

</gmd:distributionFormat>
...
</gmd:MD_Distribution>
</gmd:distributionInfo>
...
</gmd:MD_Metadata>

```

## II.26 Spatial representation type – \*Spatial representation type

In DCAT-AP, 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` describes 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 property `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.

The spatial representation types defined in ISO 19115 are listed in the following table. It is important to note that, as stated in the INSPIRE Data Specifications, the only spatial representation types in scope of INSPIRE are the following ones: "vector", "grid", and "tin".

ISO 19115 - MD_SpatialRepresentationTypeCode	Description	In scope of INSPIRE?
vector	vector data is used to represent geographic data	Yes
grid	grid data is used to represent geographic data	Yes
textTable	textual or tabular data is used to represent geographic data	No
tin	triangulated irregular network	Yes
stereoModel	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images	No
video	scene from a video recording	No

## Example

```
# Resource metadata in GeoDCAT-AP

[] a dcat:Dataset ;
  dcat:distribution [ a dcat:Distribution
    adms:representationTechnique <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>
```

## II.27 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 [CLD-FREQ], 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 [MDR-FREQ].

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 [MDR-FREQ].

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 [CLD-FREQ]	MDR Frequency Named Authority List [MDR-FREQ]
continual	continuous	UPDATE_CONT / CONT
daily	daily	DAILY
weekly	weekly	WEEKLY
fortnightly	biweekly	BIWEEKLY
monthly	monthly	MONTHLY

ISO 19115 - MD_MaintenanceFrequencyCode	Dublin Core Collection Description Frequency Vocabulary [CLD-FREQ]	MDR Frequency Named Authority List [MDR-FREQ]
quarterly	quarterly	QUARTERLY
biannually	semiannual	ANNUAL_2
annually	annual	ANNUAL
<b>asNeeded</b>	-	-
Irregular	irregular	IRREG
<b>notPlanned</b>	-	-
<b>unknown</b>	-	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>
```



## Annex III COMPARISON BETWEEN INSPIRE AND ISO 19115-1:2014

In ISO 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 in F.2.

### III.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 11: 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.identificationInfo>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.pointOfContact>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.topic

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
			Category>MD_TopicCategoryCode
Spatial resolution of the dataset (O)	Part B 6.2 Spatial Resolution	Spatial resolution (O/N)	MD_Metadatas.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_Metadatas.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_Metadatas.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_Metadatas>resourceLineage>LI_Lineage.statement
On-line resource (O)	Part B 1.4 Resource Locator	Resource on-line Link (O/N)	MD_Metadatas.identificationInfo>MD_DataIdentification.citation>CI_Citation.onlineResource>CI_OnlineResource
Metadata file identifier (O)	-	Metadata reference information (O/1)	MD_Metadatas.metadataIdentifier
Metadata standard name (O)	-	-	
Metadata standard version (O)	-	-	
Metadata language (C)	Part B 10.3 Metadata Language	-	MD_Metadatas.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_Metadatas.contact>CI_Responsibility

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
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
-	Part B 8.2 Limitations on public access	Constraints on resource access and use (O/N)	MD_Metadata.identificationInfo > MD_DataIdentification > MD_LegalConstraints.accessConstraint and/or MD_LegalConstraints.otherConstraint and/or MD_SecurityConstraints.classification

### III.2 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 (3<sup>rd</sup> field).

**Table 12: 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

ISO 19115 Core	INSPIRE	ISO 19115-1:2014 Discovery metadata for services (Table F.2)	Path ISO 19115-1:2014
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)	-	-	

ISO 19115 Core	INSPIRE	ISO 19115-1:2014 Discovery metadata for services (Table F.2)	Path ISO 19115-1:2014
Metadata point of contact (M)	Part B 10.1 Metadata point of contact	Metadata point of contact (M/N)	MD_Metadata.contact>CI_Res ponsibility
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_ServiceIde ntification.coupledResource>S VCoupledResource
-	Part B 2.2 Spatial Data Service Type	-	
-	Part B 3 Keyword	Keywords (O/N)	MD_Metadata.identificationInf o>SV_ServiceIdentification>M D_Keywords
-	Part B 7 Conformity	-	MD_Metadata.dataQualityInfo >DQ_DataQuality.report>DQ_ UsabilityElement.result>DQ_C onformanceResult
-	Part B 8.1 Conditions for access and use	Constraints on access and use (O/N)	MD_Metadata.identificationInf o>MD_DataIdentification>MD _Constraints.useLimitations
-	Part B 8.2 Limitations on public access	Constraints on access and use (O/N)	MD_Metadata.identificationInf o>MD_DataIdentification> MD_LegalConstraints.accessC onstraint and/or MD_LegalConstraints.otherCo nstraint and/or MD_SecurityConstraints.classif ication
-	-	Coupled resource type (C/1)	MD_Metadata>SV_ServiceIde ntification.couplingType>SV- CouplingType

ISO 19115 Core	INSPIRE	ISO 19115-1:2014 Discovery metadata for services (Table F.2)	Path ISO 19115-1:2014
-	-	Resource identifier (O/N)	MD_Metadata.identificationInfo>SV_ServiceIdentification.citation>CI_Citation.identifier>MD_Identifier