



EPOS-DCAT-AP: an extension of the DCAT Application Profile for Research Infrastructures in the solid-Earth domain

Version 1.0



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1 INTRODUCTION

1.1 Context

This document contains the specification for EPOS-DCAT-AP, an extension of the DCAT application profile¹ for Research Infrastructures in the solid-Earth domain. It is developed in the framework of European Plate Observing System² (EPOS). EPOS-DCAT-AP has been conceived to represent shared Core Concepts agreed within the EPOS communities. It supports the process of collection and organisation of knowledge from the EPOS Thematic Core Services (TCS) in order to create a shared information space and enable semantic interoperability.

1.2 The EPOS-DCAT-AP specification

The EPOS-DCAT Application Profile defined in this document is based on DCAT Application Profile v1.1³.


The EPOS-DCAT extension respects the minimum conformance requirements as defined in section 6 of DCAT-AP v1.1 specification of and more specific rules as:

- Extensions must not widen but may only narrow down the usage notes as specified in DCAT-AP v1.1, so that all information provided according to the extension remains valid for DCAT-AP v1.1;
- Extensions may add classes that are not specified for DCAT-AP; however, an extension should not add classes that are similar to DCAT-AP classes;
- Extensions may add properties that are not specified for DCAT-AP; however, an extension should not add properties that are similar to DCAT-AP properties;
- Extensions may change the cardinalities for properties defined for DCAT-AP v1.1 respecting the following rules:
 - Mandatory properties in DCAT-AP v1.1 must be mandatory in the extension;
 - Recommended properties in DCAT-AP v1.1 may be declared optional or mandatory in the extension;

¹ DCAT Application profile for data portals in Europe (DCAT-AP)
<https://joinup.ec.europa.eu/solution/dcat-application-profile-data-portals-europe>

² European Plate Observing System
<https://www.epos-eu.org/>

³ DCAT-AP version 1.1
<https://joinup.ec.europa.eu/release/dcat-ap/1.1>

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- Optional properties in DCAT-AP v1.1 may be declared recommended or mandatory in the extension;
 - Recommended and optional properties in DCAT-AP v1.1 may be removed from the extension;
 - Extensions must include all the mandatory controlled vocabularies as listed in section 5 of the specification of DCAT-AP v1.1;
 - Extensions may add mandatory controlled vocabularies.

1.3 Structure of this document

This document consists of the following sections:

- Section 1 introduces this document;
- Section 2 provides the terminology used in the EPOS-DCAT-AP;
- Section 3 and 4 provide the EPOS-DCAT-AP specification.

The following UML class diagram (Figure 1) shows all classes and properties included in the DCAT Application Profile with additional classes (in orange) and their relationships in order to fulfil the EPOS requirements.

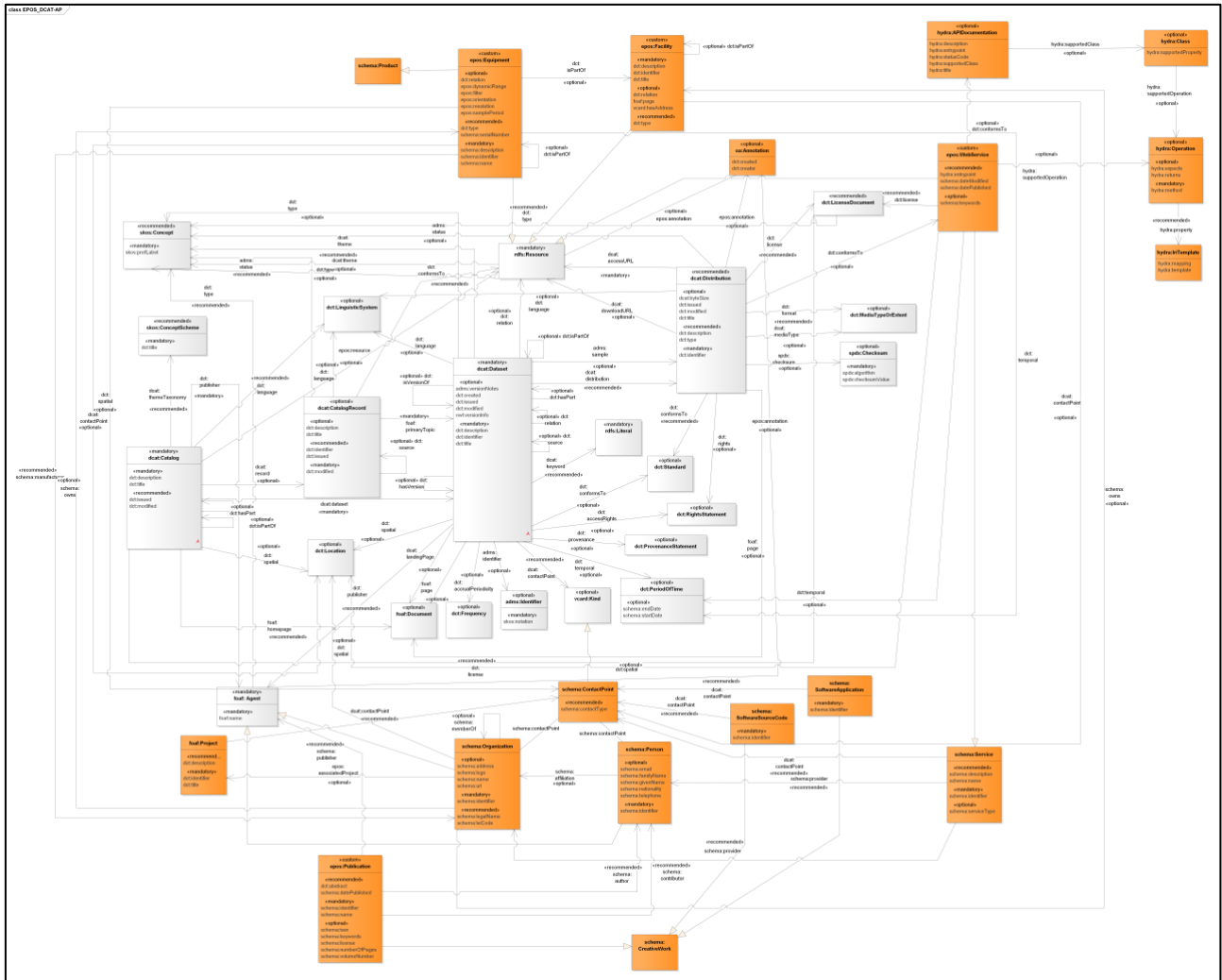


Figure 1 – EPOS-DCAT Application Profile UML Class Diagram.



The Application Profile reuses terms from various existing specifications. Classes and properties specified in the next sections have been taken from the following namespaces:

- adms: <http://www.w3.org/ns/adms#>
- dcat: <http://www.w3.org/ns/dcat#>
- dct: <http://purl.org/dc/terms/>
- epos: <https://www.epos-eu.org/epos-dcat-ap#>
- foaf: <http://xmlns.com/foaf/0.1/>
- gsp: <http://www.opengis.net/ont/geosparql#>
- http: <http://www.w3.org/2006/http#>
- hydra: <http://www.w3.org/ns/hydra/core#>
- locn: <http://www.w3.org/ns/locn#>
- owl: <http://www.w3.org/2002/07/owl#>
- rdfs: <http://www.w3.org/2000/01/rdf-schema#>
- schema: <http://schema.org/>
- skos: <http://www.w3.org/2004/02/skos/core#>
- spdx: <http://spdx.org/rdf/terms#>
- xsd: <http://www.w3.org/2001/XMLSchema#>
- vcard: <http://www.w3.org/2006/vcard/ns#>



3 EPOS-DCAT-AP classes

The following section describes the properties used in EPOS-DCAT Application Profile. It contains the specification for DCAT-AP v1.1 (blue tables) and indicates the extensions for EPOS-DCAT-AP separately under the relevant classes (orange tables).

3.1 Mandatory Classes for DCAT-AP

Class name	Usage note	URI	Reference
Agent	An entity that is associated with Catalogues and/or Datasets. If the Agent is an organisation, the use of the Organization Ontology is recommended.	foaf:Agent	http://xmlns.com/foaf/spec/#term_Agent
Catalogue	A catalogue or repository that hosts the Datasets being described.	dcat:Catalog	https://www.w3.org/TR/vocab-dcat-1/#class-catalog
Dataset	A conceptual entity that represents the information published.	dcat:Dataset	https://www.w3.org/TR/vocab-dcat-1/#class-dataset
Literal	A literal value such as a string or integer; Literals may be typed, e.g. as a date according to xsd:date. Literals that contain human-readable text have an optional language tag as defined by BCP 47.	rdfs:Literal	http://www.w3.org/TR/rdf-concepts/#section-Literals
Resource	Anything described by RDF.	rdfs:Resource	http://www.w3.org/TR/rdf-schema/#ch_resource

3.2 Recommended Classes for DCAT-AP

Class name	Usage note	URI	Reference
Category	A category or a theme used to describe assets in the catalogue.	skos:Concept	https://www.w3.org/TR/vocab-dcat-1/#class-concept
Category scheme	A concept collection (e.g. controlled vocabulary) in which the Category is defined.	skos:ConceptScheme	https://www.w3.org/TR/vocab-dcat-1/#class-concept-scheme
Distribution	A physical embodiment of the Dataset in a particular format.	dcat:Distribution	https://www.w3.org/TR/vocab-dcat-1/#class-distribution
Licence document	A legal document giving official permission to do something with a resource.	dct:LicenseDocument	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/2012-06-14/#terms-LicenseDocument

3.3 Optional Classes for DCAT-AP

Class name	Usage note	URI	Reference
Catalogue Record	A description of a Dataset's entry in the Catalogue.	dcat:CatalogRecord	https://www.w3.org/TR/vocab-dcat-1/#class-catalog-record
Checksum	A value that allows the contents of a file to be authenticated. This class allows the results of a variety of checksum and cryptographic message digest algorithms to be represented.	spdx:Checksum	http://spdx.org/rdf/terms#Checksum
Document	A textual resource intended for human consumption that contains information, e.g. a web page about a Dataset.	foaf:Document	http://xmlns.com/foaf/spec/#term_Document
Frequency	A rate at which something recurs, e.g. the publication of a Dataset.	dct:Frequency	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/Frequency
Identifier	An identifier in a particular context, consisting of the string that is the identifier; an optional identifier for the identifier scheme; an optional identifier for the version of	adms:Identifier	https://www.w3.org/TR/vocab-adms/#identifier

	the identifier scheme; an optional identifier for the agency that manages the identifier scheme		
Kind	A description following the vCard specification, e.g. to provide telephone number and e-mail address for a contact point. Note that the class Kind is the parent class for the four explicit types of vCards (Individual, Organization, Location, Group).	vcards:Kind	https://www.w3.org/TR/2014/NOTE-vcards-rdf-20140522/#d4e1819
Linguistic system	A system of signs, symbols, sounds, gestures, or rules used in communication, e.g. a language	dct:LinguisticSystem	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/LinguisticSystem
Location	A spatial region or named place. It can be represented using a controlled vocabulary or with geographic coordinates. In the latter case, the use of the Core Location Vocabulary is recommended, following the approach described in the GeoDCAT-AP specification.	dct:Location	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/Location
Media type or extent	A media type or extent, e.g. the format of a computer file	dct:MediaTypeOrExtent	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/
Period of time	An interval of time that is named or defined by its start and end dates.	dct:PeriodOfTime	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/PeriodOfTime
Provenance Statement	A statement of any changes in ownership and custody of a resource since its creation that are significant for its authenticity, integrity, and interpretation	dct:ProvenanceStatement	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/ProvenanceStatement
Publisher type	A type of organisation that acts as a publisher	skos:Concept	https://www.w3.org/TR/vocab-adms/#dct:terms-type
Rights statement	A statement about the intellectual property rights (IPR) held in or over a resource, a legal document giving official permission to do something with a resource, or a statement about access rights.	dct:RightsStatement	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/RightsStatement
Standard	A standard or other specification to which a Dataset or Distribution conforms	dct:Standard	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#http://purl.org/dc/terms/Standard
Status	An indication of the maturity of a Distribution or the type of change of a Catalogue Record.	skos:Concept	https://www.w3.org/TR/vocab-adms/#status

3.4 Additional classes for EPOS-DCAT-AP

Class name	Usage note	URI	Subclass Of	Reference
Annotation	A statement providing explanatory information about a resource or agent.	oa:Annotation	none	
Address	Physical address of the item.	vcards:Address		https://www.w3.org/TR/vcards-rdf/#d4e1292
ApiDocumentation	A link to the API documentation	hydra:ApiDocumentation	hydra:Resource	http://api.verint.com/w3c/hydra - ApiDocumentation
Equipment	Device	epos:Equipment	schema:Product and rdfs:Resource	
Facility	This refers to facilities with resources and related services used by the scientific community to conduct top-level research in their respective fields, ranging from social sciences to astronomy, genomics to nanotechnologies. Examples include laboratories, special habitats, libraries, databases, biological archives, etc. A type of facility could be a research infrastructure a higher aggregated entity.	epos:Facility	rdfs:Resource	
IriTemplate	An IriTemplate consists of a template literal and a set of mappings.	hydra:IriTemplate	hydra:Resource	http://api.verint.com/w3c/hydra#IriTemplate

IriTemplateMapping	This maps a variable used in the template to a property and may optionally specify whether that variable is required or not. The syntax of the template literal is specified by its datatype and defaults to the [RFC6570] URI Template syntax, which can be explicitly indicated by hydra:Rfc6570Template.	hydra:IriTemplateMapping	hydra:Resource	http://api.verint.com/w3c/hydra#IriTemplateMapping
Operation	A description of a web service operation.	hydra:Operation	hydra:Resource	http://api.verint.com/w3c/hydra#Operation
PostalAddress	Physical address of the item.	schema:PostalAddress		https://schema.org/PostalAddress
Project	This refers to associated projects for an organization.	foaf:Project	none	http://xmlns.com/foaf/spec/#term_Project
Publication	a text publication is a resource relating to a dataset, data product or other.	epos:Publication	schema:CreativeWork	
QuantitativeValue	A point value or interval for product characteristics and other purposes.	schema:QuantitativeValue		https://schema.org/QuantitativeValue
Service	Describes an offer of an RI to the community. It could be free or ask for something in return (money, publication of the datasets, etc.).	schema:Service	schema:Intangible	https://schema.org/Service
SoftwareApplication	This represents software packages, applications and programs.	schema:SoftwareApplication	schema:CreativeWork	https://schema.org/SoftwareApplication
SoftwareSourceCode	Computer programming source code. Example: Full (compile ready) solutions, code snippet samples, scripts, templates.	schema:SoftwareSourceCode	schema:CreativeWork	https://schema.org/SoftwareSourceCode
WebService	Online interfaces (APIs) enabling a user or a machine to programmatically access the given resource.	epos:WebService	schema:Service and rdfs:Resource	

3.5 Equivalent classes for EPOS-DCAT-AP

Class name	URI	mapping property	DCAT-AP class	Reference
ContactPoint	schema:ContactPoint	owl:equivalentClass	vccard:Kind	https://schema.org/ContactPoint
Person	schema:Person	owl:equivalentClass	foaf:Person subclass of foaf:Agent	https://schema.org/Person
Organization	schema:Organization	owl:equivalentClass	foaf:Organization subclass of foaf:Agent	https://schema.org/Organization

4 EPOS-DCAT-AP Properties per Class

The following section describes the properties used in EPOS-DCAT Application Profile. The blue tables describe the properties per classes that already exist in DCAT-AP v1.1 with an additional column called 'Change Type'. *URI* column represents the property URI, *Range* column represents the range of the property, *Usage note* column represents the description of the property, *Cardinality* column represents property cardinality restrictions, *Change type* column represents the type of change made in EPOS-DCAT-AP extension. The orange tables describe the added classes to meet the requirements of the EPOS-DCAT-AP extension. They are structured like the blue tables, except for the Change Type column, as the properties will be 'added' for all rows.

4.1 Catalog

4.1.1 Mandatory properties for Catalog

URI	Range	Usage note	Card.	Change type
dc:dataset	dc:Dataset	This property links the Catalogue with a Dataset that is part of the Catalogue.	1..n	none
dct:description	rdfs:Literal	This property contains a free-text account of the Catalogue. This property can be repeated for parallel language versions of the description.	1..n	none
dct:publisher	foaf:Agent	This property refers to an entity (organisation) responsible for making the Catalogue available.	1..1	Extended range to schema:Organization
dct:title	rdfs:Literal	This property contains a name given to the Catalogue. This property can be repeated for parallel language versions of the name.	1..n	none

4.1.2 Recommended properties for Catalog

URI	Range	Usage note	Card.	Change type
dc:themeTaxonomy	skos:ConceptScheme	This property refers to a knowledge organization system used to classify the Catalogue's Datasets.	0..n	none
dct:issued	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date of formal issuance (e.g., publication) of the Catalogue.	0..1	none
dct:language	dct:LinguisticSystem	This property refers to a language used in the textual metadata describing titles, descriptions, etc. of the Datasets in the Catalogue. This property can be repeated if the metadata is provided in multiple languages.	0..n	none
dct:license	dct:LicenseDocument	This property refers to the licence under which the Catalogue can be used or reused.	0..1	none
dct:modified	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the most recent date on which the Catalogue was modified.	0..1	none
foaf:homepage	foaf:Document	This property refers to a web page that acts as the main page for the Catalogue.	0..1	none

4.1.3 Optional properties for Catalog

URI	Range	Usage note	Card.	Change type
dc:record	dc:CatalogRecord	This property refers to a Catalogue Record that is part of the Catalogue	0..n	none
dct:hasPart	dc:Catalog	This property refers to a related Catalogue that is part of the described Catalogue	0..n	none
dct:isPartOf	dc:Catalog	This property refers to a related Catalogue in which the described Catalogue is physically or logically included.	0..1	none
dct:rights	dct:RightsStatement	This property refers to a statement that specifies rights associated with the Catalogue.	0..1	none
dct:spatial	dct:Location	This property refers to a geographical area covered by the Catalogue.	0..n	none
epos:resource	rdfs:Resource	This property links the Catalogue with a Resource.	0..n	added

4.2 Catalog Record

4.2.1 Mandatory properties for Catalog Record

URI	Range	Usage note	Card.	Change type
dct:modified	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the most recent date on which the Catalog Record was modified.	1..1	none
foaf:primaryTopic	dc:Dataset	This property links the Catalogue Record to the Dataset described in the record.	1..1	none

4.2.2 Recommended properties for Catalog Record class

URI	Range	Usage note	Card.	Change type
adms:status	skos:Concept	This property refers to the type of the <i>latest</i> revision of a Dataset's entry in the Catalogue. It MUST take one of the values :created, :updated or :deleted depending on whether this <i>latest</i> revision is a result of a creation, update or deletion.	0..1	none
dct:conformsTo	rdfs:Resource	This property refers to an Application Profile that the Dataset's metadata conforms to	0..1	none
dct:identifier	rdfs:Literal	This property contains the main identifier for the Catalog Record.	0..1	added
dct:issued	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date on which the description of the Dataset was included in the Catalogue.	0..1	none

4.2.3 Optional properties for Catalog Record

URI	Range	Usage note	Card.	Change type
dct:description	rdfs:Literal	This property contains a free-text account of the record. This property can be repeated for parallel language versions of the description.	0..n	none
dct:language	dct:LinguisticSystem	This property refers to a language used in the textual metadata describing titles, descriptions, etc. of the Dataset. This property can be repeated if the metadata is provided in multiple languages.	0..n	none
dct:source	dc:CatalogRecord	This property refers to the original metadata that was used in creating metadata for the Dataset	0..1	none
dct:title	rdfs:Literal	This property contains a name given to the Catalogue Record. This property can be repeated for parallel language versions of the name.	0..n	none

4.3 Dataset

4.3.1 Mandatory properties for Dataset

URI	Range	Usage note	Card.	Change type
dct:description	rdfs:Literal	This property contains a free-text account of the Dataset. This property can be repeated for parallel language versions of the description.	1..n	none
dct:identifier	rdfs:Literal	This property contains the main identifier for the Dataset, e.g. the URI or other unique identifier in the context of the Catalogue.	0..n	1..1
dct:title	rdfs:Literal	This property contains a name given to the Dataset. This property can be repeated for parallel language versions of the name.	1..n	none

4.3.2 Recommended properties for Dataset class

URI	Range	Usage note	Card.	Change type
dcat:contactPoint	vcard:Kind	This property contains contact information that can be used for sending comments about the Dataset.	0..n	Extended range to schema:ContactPoint
dcat:distribution	dcat:Distribution	This property links the Dataset to an available Distribution.	0..n	none
dcat:keyword	rdfs:Literal	This property contains a keyword or tag describing the Dataset.	0..n	none
dcat:theme, subproperty of dct:subject	skos:Concept	This property refers to a category of the Dataset. A Dataset may be associated with multiple themes.	0..n	none
dct:publisher	foaf:Agent	This property refers to an entity (organisation) responsible for making the Dataset available.	0..1	Extended range to schema:Organization; 0..n

4.3.3 Optional properties for Dataset

URI	Range	Usage note	Card.	Change type
adms:identifier	adms:Identifier	This property refers to a secondary identifier of the Dataset, such as MAST/ADS, DataCite, DOI, EZID or W3ID.	0..n	none
adms:sample	dcat:Distribution	This property refers to a sample distribution of the dataset	0..n	none
adms:versionNotes	rdfs:Literal	This property contains a description of the differences between this version and a previous version of the Dataset. This property can be repeated for parallel language versions of the version notes.	0..n	none
dcat:landingPage	foaf:Document	This property refers to a web page that provides access to the Dataset, its Distributions and/or additional information. It is intended to point to a landing page at the original data provider, not to a page on a site of a third party, such as an aggregator.	0..n	none
dct:accessRights	dct:RightsStatement	This property refers to information that indicates whether the Dataset is open data, has access restrictions or is not public. A controlled vocabulary with three members (:public, :restricted, :non-public) will be created and maintained by the Publications Office of the EU.	0..1	none
dct:accrualPeriodicity	dct:Frequency	This property refers to the frequency at which the Dataset is updated.	0..1	none

dct:conformsTo	dct:Standard	This property refers to an implementing rule or other specification.	0..n	none
dct:created	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date on which the Dataset was created.	0..1	added
dct:hasPart	dcat:Dataset	This property refers to a related Dataset that is part of the described Dataset.	0..n	added
dct:hasVersion	dcat:Dataset	This property refers to a related Dataset that is a version, edition, or adaptation of the described Dataset.	0..n	none
dct:isPartOf	dcat:Dataset	This property refers to a related Dataset in which the described Dataset is physically or logically included.	0..n	added
dct:isVersionOf	dcat:Dataset	This property refers to a related Dataset of which the described Dataset is a version, edition, or adaptation.	0..n	none
dct:issued	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date of formal issuance (e.g., publication) of the Dataset.	0..1	none
dct:language	dct:LinguisticSystem	This property refers to a language of the Dataset. This property can be repeated if there are multiple languages in the Dataset.	0..n	none
dct:modified	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the most recent date on which the Dataset was changed or modified.	0..1	none
dct:provenance	dct:ProvenanceStatement	This property contains a statement about the lineage of a Dataset.	0..n	none
dct:relation	rdfs:Resource	This property refers to a related resource.	0..n	none
dct:spatial	dct:Location	This property refers to a geographic region that is covered by the Dataset.	0..n	none
dct:source	dcat:Dataset	This property refers to a related Dataset from which the described Dataset is derived.	0..n	none
dct:temporal	dct:PeriodOfTime	This property refers to a temporal period that the Dataset covers.	0..n	none
dct:type	skos:Concept	This property refers to the type of the Dataset. A controlled vocabulary for the values has not been established.	0..1	none
foaf:page	foaf:Document	This property refers to a page or document about this Dataset.	0..n	none
owl:versionInfo	rdfs:Literal	This property contains a version number or other version designation of the Dataset.	0..1	none
epos:annotation	oa:Annotation	The information may include quality aspects such as accuracy, reliability, comparability, coherence, relevance, etc.	0..n	added

4.4 Distribution

4.4.1 Mandatory properties for Distribution

URI	Range	Usage note	Card.	Change type
dcat:accessURL	rdfs:Resource	This property contains a URL that gives access to a Distribution of the Dataset. The resource at the access URL may contain information about how to get the Dataset.	1..n	none
dct:identifier	rdfs:Literal	This property contains the main identifier for the Distribution.	1..1	added

4.4.2 Recommended properties for Distribution

URI	Range	Usage note	Card.	Change type
dct:conformsTo	dct:Standard	This property refers to an established schema to which the described Distribution conforms.	0..n	none
dct:description	rdfs:Literal	This property contains a free-text account of the Distribution. This property can be repeated for parallel language versions of the description.	0..n	none

dct:format	dct:MediaTypeOrExtent	This property refers to the file format of the Distribution.	0..1	none
dct:type	skos:Concept	This property refers to the type of the Distribution.	0..1	added

4.4.3 Optional properties for Distribution

URI	Range	Usage note	Card.	Change type
adms:status	skos:Concept	This property refers to the maturity of the Distribution	0..1	none
dcat:byteSize	rdfs:Literal typed as xsd:decimal	This property contains the size of a Distribution in bytes.	0..1	none
dcat:downloadURL	rdfs:Resource	This property contains a URL that is a direct link to a downloadable file in a given format.	0..n	none
dcat:mediaType, subproperty of dct:format	dct:MediaTypeOrExtent	This property refers to the media type of the Distribution as defined in the official register of media types managed by IANA.	0..1	none
dct:issued	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date of formal issuance (e.g., publication) of the Distribution.	0..1	none
dct:language	dct:LinguisticSystem	This property refers to a language used in the Distribution. This property can be repeated if the metadata is provided in multiple languages.	0..n	none
dct:license	dct:LicenseDocument	This property refers to the licence under which the Distribution is made available.	0..1	none
dct:modified	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the most recent date on which the Distribution was changed or modified.	0..1	none
dct:rights	dct:RightsStatement	This property refers to a statement that specifies rights associated with the Distribution.	0..1	none
dct:title	rdfs:Literal	This property contains a name given to the Distribution. This property can be repeated for parallel language versions of the description.	0..n	none
foaf:page	foaf:Document	This property refers to a page or document about this Distribution.	0..n	none
spdx:checksum	spdx:Checksum	This property provides a mechanism that can be used to verify that the contents of a distribution have not changed	0..1	none
epos:annotation	oa:Annotation	The information may include quality aspects such as accuracy, reliability, comparability, coherence, relevance, etc.	0..n	added

4.5 Agent

4.5.1 Mandatory properties for Agent

URI	Range	Usage note	Card.	Change type
foaf:name	rdfs:Literal	This property contains a name of the agent. This property can be repeated for different versions of the name (e.g. the name in different languages).	1..n	none

4.5.2 Recommended properties for Agent

URI	Range	Usage note	Card.	Change type
dct:type	skos:Concept	This property refers to a type of the agent that makes the Catalogue or Dataset available.	0..1	none

4.6 Category Scheme

4.6.1 Recommended properties for Category Scheme

URI	Range	Usage note	Card.	Change type
dct:description	rdfs:Literal	This property contains a description of the category scheme.	1..n	added
dct:title	rdfs:Literal	This property contains a name of the category scheme. May be repeated for different versions of the name.	1..n	none

4.7 Category

4.7.1 Mandatory properties for Category

URI	Range	Usage note	Card.	Change type
skos:definition	rdfs:Literal	This property contains a statement or formal explanation of the meaning of a concept.	1..1	added
skos:inScheme	skos:ConceptScheme	Relates a resource (for example a concept) to a concept scheme in which it is included.	1..1	added
skos:prefLabel	rdfs:Literal	This property contains a preferred label of the category. This property can be repeated for parallel language versions of the label.	1..n	1..1

4.8 Checksum

4.8.1 Mandatory properties for Checksum

URI	Range	Usage note	Card.	Change type
spdx:algorithm	spdx:checksumAlgorithm_sha1	This property identifies the algorithm used to produce the subject Checksum. Currently, SHA-1 is the only supported algorithm. It is anticipated that other algorithms will be supported at a later time.	1..1	none
spdx:checksumValue	rdfs:Literal typed as xsd:hexBinary	This property provides a lower case hexadecimal encoded digest value produced using a specific algorithm.	1..1	none

4.9 Identifier

4.9.1 Mandatory properties for Identifier

URI	Range	Usage note	Card.	Change type
adms:schemeAgency	xsd:string	This property refers the identifier scheme referenced by its datatype (e.g., DDSS-ID, DOI, etc.).	0..1	added
skos:notation	rdfs:Literal typed with the URI of one of the members of the DataCite Resource Identifier Scheme ⁴	This property contains a string that is an identifier in the context of the identifier scheme referenced by its datatype.	0..1	none

⁴ DataCite Resource Identifier Scheme. <http://purl.org/spar/datacite/ResourceIdentifierScheme>

4.10 Licence Document

4.10.1 Recommended properties for Licence Document

URI	Range	Usage note	Card.	Change type
dct:type	skos:Concept	This property refers to a type of licence, e.g. indicating 'public domain' or 'royalties required'.	0..1	none

4.11 Location

4.11.1 Optional properties for Location class

URI	Range	Usage note	Card.	Change type
locn:geometry	rdfs:Literal	This property associates any resource with the corresponding geometry.	1..n	none

4.12 Period of Time

4.12.1 Recommended properties for Period of Time

URI	Range	Usage note	Card.	Change type
schema:startDate	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the start of the period.	0..1	none
schema:endDate	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the end of the period.	0..1	none

Please note that while both properties are optional, one of the two must be present for each instance of the class `dct:PeriodOfTime`, if such an instance is present.

The start of the period should be understood as the start of the date, hour, minute etc. given (e.g. starting at midnight at the beginning of the day if the value is a date); the end of the period should be understood as the end of the date, hour, minute etc. given (e.g. ending at midnight at the end of the day if the value is a date).

4.13 Resource

4.13.1 Recommended properties for Resource

URI	Range	Usage note	Card.	Change type
dct:type	skos:Concept	This property refers to the type of the Resource.	0..1	added

4.14 Annotation

4.14.1 Properties for Annotation

URI	Range	Usage note	Card.
dct:created	xsd:dateTime	Date when this annotation was created.	0..1
dct:creator	schema:Person or schema:Organization	This property refers to an entity (Person or Organization) responsible for making the annotation.	0..1

4.15 Address

4.15.1 Mandatory properties for Address

URI	Range	Usage note	Card.
vcard:country-name	rdfs:Literal	The country. For example, USA. You can also provide the two-letter ISO 3166-1 alpha-2 country code.	1..1
vcard:locality	rdfs:Literal	The locality in which the street address is, and which is in the region. For example, Mountain View.	1..1
vcard:postal-code	rdfs:Literal	The postal code. For example, 94043.	1..1
vcard:street-address	rdfs:Literal	The street address. For example, 1600 Amphitheatre Pkwy.	1..1

4.16 ApiDocumentation

4.16.1 Mandatory properties for ApiDocumentation

URI	Range	Usage note	Card.
hydra:description	rdfs:Literal	This property contains a description of the Api documentation.	1..1
hydra:entrypoint	rdfs:Literal typed with URI	This property refers to the API entry point.	1..1
hydra:title	rdfs:Literal	This property contains the title of the Api documentation.	1..1

4.17 ContactPoint

4.17.1 Recommended properties for ContactPoint

URI	Range	Usage note	Card.
schema:contactType	rdfs:Literal	This property contains information about the role of the Contact Point.	0..1

4.17.2 Optional properties for ContactPoint

URI	Range	Usage note	Card.
schema:availableLanguage	rdfs:Literal	This property contains information about the language used by the Contact Point. Please use one of the language codes from the IETF BCP 47 standard .	0..n
schema:email	rdfs:Literal	This property contains the email address of the Contact Point.	0..n
schema:telephone	rdfs:Literal	This property contains the telephone number of the Contact Point.	0..n

4.18 Equipment

4.18.1 Mandatory properties for Equipment

URI	Range	Usage note	Card.
schema:description	rdfs:Literal	This property contains a free-text description of the Equipment.	1..1
schema:identifier	rdfs:Literal or schema:Property Value	This property contains the main identifier for the Equipment.	1..1
schema:name	rdfs:Literal	This property contains a name given to the Equipment.	1..1

4.18.2 Recommended properties for Equipment

URI	Range	Usage note	Card.
dct:type	skos:Concept or rdfs:Literal typed with URI	This property refers to the type of the Equipment.	0..1
schema:manufacturer	schema:Organization	This property refers to an Organisation responsible for manufacturing the Equipment.	0..1
schema:serialNumber	rdfs:Literal	This property contains the serial number for the Equipment.	0..1

4.18.3 Optional properties for Equipment

URI	Range	Usage note	Card.
dcat:contactPoint or schema:contactPoint	schema:ContactPoint	This property contains contact information that can be used for sending comments about the Equipment.	0..n
dcat:theme	skos:Concept	This property refers to a category of the Equipment. An Equipment may be associated with multiple themes.	0..n
dct:isPartOf	epos:Equipment or epos:Facility	This property refers to an Equipment or a Facility in which the described Equipment is included.	0..n
dct:relation	rdfs:Resource	This property refers to a related resource (e.g., Dataset, WebService, Service, etc.).	0..n
dct:spatial	dct:Location	This property refers to a geographical location of the Equipment.	0..n
dct:temporal	dct:PeriodOfTime	This property refers to a temporal period that the Web Service covers.	0..n
epos:filter	rdfs:Literal	This property describes the filter that the instrument uses to produce data.	0..1
epos:dynamicRange	schema:QuantitativeValue	This property contains the full-scale measuring ability, in nT (unit and value).	0..1
epos:orientation	rdfs:Literal	This property describes how the instrument is oriented.	0..1
epos:resolution	rdfs:Literal	This property contains the resolution in nT.	0..1
epos:samplePeriod	schema:QuantitativeValue	This property contains the sample period in mS (unit and value)	0..1
epos:annotation	oa:Annotation	The information may include quality aspects such as accuracy, reliability, comparability, coherence, relevance, etc.	0..n
foaf:page	rdfs:Literal typed with URI	This property refers to a page or document about the Equipment.	0..n

4.19 Facility

4.19.1 Mandatory properties for Facility

URI	Range	Usage note	Card.
dct:description	rdfs:Literal	This property contains a free-text description of the Facility.	1..1
dct:identifier	rdfs:Literal	This property contains the main identifier for the Facility.	1..1
dct:title	rdfs:Literal	This property contains a name given to the Facility.	1..1

4.19.2 Recommended properties for Facility

URI	Range	Usage note	Card.
dcat:theme	skos:Concept	This property refers to a category of the Facility. A Facility may be associated with multiple themes.	0..n

dct:type	skos:Concept or rdfs:Literal typed with URI	This property refers to the type of the Facility.	0..1
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4.19.3 *Optional properties for Facility*

URI	Range	Usage note	Card.
dcat:contactPoint or schema:contactPoint	schema:Contact Point	This property contains contact information that can be used for sending comments about the Facility.	0..n
dct:isPartOf	epos:Facility	This property refers to a Facility in which the described Facility is included.	0..n
dct:relation	rdfs:Resource	This property refers to a related resource (e.g., Dataset, WebService, Service, etc).	0..n
dct:spatial	dct:Location	This property refers to a geographical location of the Facility.	0..1
foaf:page	foaf:Document	This property refers to a page or document about this Facility.	0..n
vcard:hasAddress	vcard:Address	This property contains the physical address of the Facility.	0..1
epos:annotation	oa:Annotation	The information may include quality aspects such as accuracy, reliability, comparability, coherence, relevance, etc.	0..n

4.20 IriTemplate

4.20.1 *Mandatory properties for IriTemplate*

URI	Range	Usage note	Card.
hydra:template	rdfs:Literal	The syntax of the template literal is specified by the [RFC6570] URI Template syntax.	1..1

4.20.2 *Optional properties for IriTemplate*

URI	Range	Usage note	Card.
hydra:mapping	hydra:IriTemplat eMapping	A variable-to-property mapping of the IRI template.	0..n

4.21 IriTemplateMapping

4.21.1 *Mandatory properties for IriTemplateMapping*

URI	Range	Usage note	Card.
hydra:required	rdfs:Literal typed as xsd:boolean	This property contains true if the property is required, false otherwise.	1..1
hydra:variable	rdfs:Literal	This property contains the name of the parameter as required by web service specifications.	1..1
rdf:label	rdfs:Literal	This property contains a short string used to describe the meaning of the parameter.	1..1
rdfs:range	rdfs:Literal	This property contains the type of parameter (e.g., xsd:string, xsd:Boolean, xsd:date, xsd:dateTime).	1..1

4.22 Operation

4.22.1 Recommended properties for Operation

URI	Range	Usage note	Card.
hydra:property	hydra:IriTemplate	This property refers to the IriTemplate of the Web Service operation. This describes the endpoint and parameters mapping for the operation.	0..1
hydra:returns	rdfs:Literal	This property is used to specify the output format of the Operation. The possible values are listed here: https://www.iana.org/assignments/media-types/media-types.xhtml	0..n

4.22.2 Optional properties for Operation

URI	Range	Usage note	Card.
hydra:method	rdfs:Literal	The HTTP method	0..1

4.23 Organization

4.23.1 Mandatory properties for Organization

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:PropertyValue	This property contains the main identifier for the Organization (e.g., PIC, ISNI, etc.).	1..n

4.23.2 Recommended properties for Organization

URI	Range	Usage note	Card.
schema:leiCode	rdfs:Literal	This property contains the Organization identifier that uniquely identifies a legal entity as defined in ISO 17442.	0..1
schema:legalName	rdfs:Literal	This property contains the official name of the Organization.	0..1

4.23.3 Optional properties for Organization

URI	Range	Usage note	Card.
schema:address	rdfs:Literal or schema:PostalAddress	This property contains the physical address of the Organization.	0..1
dcat:contactPoint or schema:contactPoint	schema:ContactPoint	This property refers to the Contact Point defined for the Organization.	0..n
schema:email	rdfs:Literal	This property contains the email address of the Organization.	0..n
schema:logo	rdfs:Literal typed with URI	This property contains the URL of the Organization logo.	0..1
schema:memberOf	schema:Organization	This property refers to an Organization to which this Organization belongs.	0..n
schema:owns	epos:Facility or epos:Equipment	This property refers to a Facility or Equipment of which it is the owner.	0..n
schema:telephone	rdfs:Literal	This property contains the telephone number of the Organization.	0..n
schema:url	rdfs:Literal typed with URI	This property contains the URL of the Organization website.	0..1
epos:associatedProject	foaf:Project	This property refers to a Project in which the Organization is involved.	0..n

4.24 Person

4.24.1 Mandatory properties for Person

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:PropertyValue	This property contains the main identifier for the Person (e.g., ORCID, ScopusID, etc.).	1..n

4.24.2 Optional properties for Person

URI	Range	Usage note	Card.
schema:address	rdfs:Literal or schema:PostalAddress	This property contains the physical address of the Person.	0..1
schema:affiliation	schema:Organization	This property refers to the organization to which the person is affiliated.	0..n
dcat:contactPoint or schema:contactPoint	schema:ContactPoint	This property refers to the Contact Point role defined for the Person.	0..n
schema:email	rdfs:Literal	This property contains the email address of the Person.	0..n
schema:familyName	rdfs:Literal	This property contains the last name of the Person.	0..1
schema:givenName	rdfs:Literal	This property contains the first name of the Person.	0..1
schema:qualifications	rdfs:Literal	This property contains the specific qualifications of the Person.	0..1
schema:telephone	rdfs:Literal	This property contains the telephone number of the Person.	0..n
schema:url	rdfs:Literal typed with URI	This property refers to the URL of the Person curriculum vitae.	0..1

4.25 PostalAddress

4.25.1 Mandatory properties for PostalAddress

URI	Range	Usage note	Card.
schema:addressCountry	rdfs:Literal	The country. For example, USA. You can also provide the two-letter ISO 3166-1 alpha-2 country code.	1..1
schema:addressLocality	rdfs:Literal	The locality in which the street address is, and which is in the region. For example, Mountain View.	1..1
schema:postalCode	rdfs:Literal	The postal code. For example, 94043.	1..1
schema:streetAddress	rdfs:Literal	The street address. For example, 1600 Amphitheatre Pkwy.	1..1

4.26 Project

4.26.1 Mandatory properties for Project

URI	Range	Usage note	Card.
dct:identifier	rdfs:Literal	This property contains the main identifier for the Project.	1..1
dct:title	rdfs:Literal	This property contains the title of the Project.	1..1

4.26.2 Recommended properties for Project

URI	Range	Usage note	Card.
dct:description	rdfs:Literal	This property contains the description of the Project.	0..1

dcat:contactPoint or schema:contactPoint	schema:ContactPoint	This property refers to the Contact Point defined for the Project.	0..n
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4.26.3 *Optional properties for Project*

URI	Range	Usage note	Card.
foaf:homepage	foaf:Document	This property refers to a web page that acts as the main page for the Project.	0..1

4.27 PropertyValue

4.27.1 *Mandatory properties for PropertyValue*

URI	Range	Usage note	Card.
schema:propertyID	rdfs:Literal	A commonly used identifier for the characteristic represented by the property, e.g. a manufacturer or a standard code for a property. propertyID can be (1) a prefixed string, mainly meant to be used with standards for product properties; (2) a site-specific, non-prefixed string (e.g. the primary key of the property or the vendor-specific id of the property), or (3) a URL indicating the type of the property, either pointing to an external vocabulary, or a Web resource that describes the property (e.g. a glossary entry). Standards bodies should promote a standard prefix for the identifiers of properties from their standards.	1..1
schema:value	rdfs:Literal	The value of the quantitative value or property value node. The recommended type for values is 'Number'.	1..1

4.28 Publication

4.28.1 *Mandatory properties for Publication*

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:PropertyVa lue	This property contains the main identifier for the Publication.	1..n
schema:name	rdfs:Literal	This property contains the name of the Publication.	1..1

4.28.2 *Recommended properties for Publication*

URI	Range	Usage note	Card.
dct:abstract	rdfs:Literal	This property contains the abstract of the Publication.	0..1
schema:author	schema:Person	This property refers to a Person which is the author of the Publication.	0..1
schema:contributor	schema:Person	This property refers to a Person which is a contributor of the Publication.	0..n
schema:datePublished	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date of first Publication.	0..1
schema:publisher	schema:Organizati on or schema:Person or foaf:Agent	This property refers to an organization or person or agent which is the publisher of the Publication.	0..1

4.28.3 *Optional properties for Publication*

URI	Range	Usage note	Card.
dcat:theme	skos:Concept	This property refers to a category of the Publication. A Publication may be associated with multiple themes.	0..n
schema:issn	rdfs:Literal	This property contains the International Standard Serial Number (ISSN) that identifies the Publication.	0..1
schema:keywords	rdfs:Literal	This property contains the keywords used to describe the Publication. Multiple entries in a keywords list are typically delimited by commas.	0..1
schema:license	rdfs:Literal typed with URI	This property contains the URL of the license document that applies to the Publication.	0..1
schema:numberOfPages	rdfs:Literal typed as xsd:integer	This property contains the number of pages of the Publication.	0..1
schema:volumeNumber	rdfs:Literal	This property contains the volume identifier of the Publication.	0..1

4.29 QuantitativeValue

4.29.1 *Mandatory properties for QualitativeValue*

URI	Range	Usage note	Card.
schema:unitCode	rdfs:Literal	The unit of measurement given using the UN/CEFACT Common Code (3 characters) or a URL. Other codes than the UN/CEFACT Common Code may be used with a prefix followed by a colon.	1..1
schema:value	rdfs:Literal	The value of the quantitative value or property value node. The recommended type for values is 'Number'.	1..1

4.30 Service

4.30.1 *Mandatory properties for Service*

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:PropertyValue	This property contains the main identifier for the Service.	1..n

4.30.2 *Recommended properties for Service*

URI	Range	Usage note	Card.
dcat:contactPoint or schema:contactPoint	schema:ContactPoint	This property refers to the Contact Point defined for the Service.	0..n
schema:description	rdfs:Literal	This property contains the description of the Service.	0..1
schema:name	rdfs:Literal	This property contains the name of the Service.	0..1
schema:provider	schema:Organization or schema:Person	This property refers to an Organisation or Person responsible for making the Service available.	0..1

4.30.3 *Optional properties for Service*

URI	Range	Usage note	Card.
dcat:theme	skos:Concept	This property refers to a category of the Service. A Service may be associated with multiple themes.	0..n
dct:spatial	dct:Location	This property refers to a geographical area covered by the Service.	0..n
dct:temporal	dct:PeriodOfTime	This property refers to a temporal period that the Service covers.	0..n

schema:keywords	rdfs:Literal	This property contains the keywords used to describe the Service. Multiple entries in a keywords list are typically delimited by commas.	0..1
schema:serviceType	rdfs:Literal	This property contains the type of service being offered.	0..1
schema:url	rdfs:Literal typed with URI	This property refers to a page about the Service.	0..1

4.31 SoftwareApplication

4.31.1 Mandatory properties for SoftwareApplication

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:Property Value	This property contains the main identifier for the Software Application.	1..n

4.31.2 Recommended properties for SoftwareApplication

URI	Range	Usage note	Card.
dcat:contactPoint or schema:contactPoint	schema:Contact Point	This property refers to the Contact Point defined for the Software Application.	0..n
schema:name	rdfs:Literal	This property contains the name of the Software Application.	0..1

4.31.3 Optional properties for SoftwareApplication

URI	Range	Usage note	Card.
dcat:theme	skos:Concept	This property refers to a category of the Software Application. A Software may be associated with multiple themes.	0..n
dct:relation	hydra:Operation	This property refers to the WebService Operation linked to the application.	0..n
schema:description	rdfs:Literal	This property contains the description of the Software Application.	0..1
schema:downloadUrl	rdfs:Literal typed with URI	If the Software Application can be downloaded this property contains the URL to download it.	0..1
schema:installUrl	rdfs:Literal typed with URI	This property contains the URL at which the application may be installed.	0..1
schema:keywords	rdfs:Literal	This property contains the keywords used to describe the Software Application. Multiple entries in a keywords list are typically delimited by commas.	0..n
schema:license	rdfs:Literal typed with URI	This property contains the URL of the license document that applies to the Software Application.	0..1
schema:mainEntityOfPage	rdfs:Literal typed with URI	This property refers to the web page URL which describes the Software Application.	0..1
schema:potentialAction	schema:ControlAction	This property describes the object upon which the action is carried out and the result produced in the action.	0..1
schema:softwareRequirements	rdfs:Literal or URI	Component dependency requirements for application. This includes runtime environments and shared libraries that are not included in the application distribution package, but required to run the application.	0..1
schema:softwareVersion	rdfs:Literal	This property contains the version of the Software Application instance.	0..1

4.32 SoftwareSourceCode

4.32.1 Mandatory properties for SoftwareSourceCode

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:PropertyVa lue	This property contains the main identifier for the Software Source Code.	1..n

4.32.2 Recommended properties for SoftwareSourceCode

URI	Range	Usage note	Card.
dcat:contactPoint or schema:contactPoint	schema:ContactPoi nt	This property refers to the Contact Point defined for the Software Source Code.	0..n
schema:name	rdfs:Literal	This property contains the name of the Software Source Code.	0..1

4.32.3 Optional properties for SoftwareSourceCode

URI	Range	Usage note	Card.
dcat:theme	skos:Concept	This property refers to a category of the Software Source Code. A Software may be associated with multiple themes.	0..n
schema:codeRepository	rdfs:Literal typed with URI	This property contains the link to the repository where the un-compiled, human readable code and related code is located (SVN, GitHub, CodePlex).	0..1
schema:description	rdfs:Literal	This property contains the description of the Software Source Code.	0..1
schema:keywords	rdfs:Literal	This property contains the keywords used to describe the Software Source Code. Multiple entries in a keywords list are typically delimited by commas.	0..n
schema:license	rdfs:Literal typed with URI	This property contains the URL of the license document that applies to the Software Source Code.	0..1
schema:mainEntityOfPage	rdfs:Literal typed with URI	This property refers to the web page URL which describes the Software Source Code.	0..1
schema:programmingLanguage	rdfs:Literal	This property contains the computer programming language used to develop the Software Source Code.	0..n
schema:runtimePlatform	rdfs:Literal	This property refers to the runtime platform or script interpreter dependencies (Example - Java v1, Python2.3, .Net Framework 3.0).	0..1
schema:softwareVersion	rdfs:Literal	This property contains the version of the Software Source Code instance.	0..1
schema:targetProduct	schema:SoftwareA pplication	This property refers the target Operating System / Product to which the code applies. If applies to several versions, just the product name can be used.	0..n

4.33 WebService

4.33.1 Mandatory properties for WebService

URI	Range	Usage note	Card.
schema:identifier	rdfs:Literal or schema:Property Value	This property contains the main identifier for the Web Service.	1..n

4.33.2 Recommended properties for WebService

URI	Range	Usage note	Card.
dcat:contactPoint or schema:contactPoint	schema:Contact Point	This property contains contact information that can be used for sending comments about the Web Service.	0..n
dcat:theme	skos:Concept	This property refers to a category of the Web Service. A Web Service may be associated with multiple themes.	0..n

hydra:entrypoint	rdfs:Literal typed with URI	This property refers to the API definitions (e.g., WSDL, WADL)	0..1
schema:dateModified	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the most recent date on which the Web Service was modified.	0..1
schema:datePublished	rdfs:Literal typed as xsd:date or xsd:dateTime	This property contains the date of publication of the Web Service.	0..1
schema:description	rdfs:Literal	This property contains a free-text description of the Web Service.	0..1
schema:name	rdfs:Literal	This property contains a name given to the Web Service.	0..1
schema:provider	schema:Organization	This property refers to an Organisation responsible for making the Web Service available.	0..1

4.33.3 *Optional properties for WebService*

URI	Range	Usage note	Card.
dct:conformsTo	hydra:ApiDocumentation	This property refers to the API documentation.	0..n
dct:license	dct:LicenseDocument	This property refers to the licence under which the Web Service can be used or reused.	0..1
dct:spatial	dct:Location	This property refers to a geographical area covered by the Web Service.	0..n
dct:temporal	dct:PeriodOfTime	This property refers to a temporal period that the Web Service covers.	0..n
hydra:supportedOperation	hydra:Operation	This property refers to a web service operation supported by the Web Service.	0..n
schema:keywords	rdfs:Literal	This property contains the keywords used to describe the Web Service. Multiple entries in a keywords list are typically delimited by commas.	0..n

Annex I QUICK REFERENCE CLASSES AND PROPERTIES

Class name	Class URI	Mandatory property	Recommended prop.	Optional property
Agent	foaf:Agent	foaf:name	dct:type	
Category	skos:Concept	skos:definition skos:inScheme skos:prefLabel		
Category scheme	skos:ConceptScheme		dct:description dct:title	
Catalogue	dcat:Catalog	dcat:dataset dct:description dct:publisher dct:title	dcat:themeTaxonomy dct:issued dct:language dct:license dct:modified foaf:homepage	dcat:record dct:hasPart dct:isPartOf dct:rights dct:spatial epos:resource
Catalogue Record	dcat:CatalogRecord	dct:modified foaf:primaryTopic	adms:status dct:conformsTo dct:identifier dct:issued	dct:description dct:language dct:source dct:title
Checksum	spdx:Checksum	spdx:algorithm spdx:checksumValue		
Dataset	dcat:Dataset	dct:description dct:identifier dct:title	dcat:contactPoint dcat:distribution dcat:keyword dcat:theme dct:publisher	adms:identifier adms:sample adms:versionNotes dcat:landingPage dct:accessRights dct:accrualPeriodicity dct:conformsTo dct:created dct:hasVersion dct:isPartOf dct:isVersionOf dct:issued dct:language dct:modified dct:provenance dct:relation dct:spatial dct:source dct:temporal dct:type foaf:page owl:versionInfo
Distribution	dcat:Distribution	dcat:accessURL dct:identifier	dct:conformsTo dct:description dct:format dct:type	adms:status dcat:byteSize dcat:downloadURL dcat:mediaType dct:issued dct:language dct:license dct:modified dct:rights dct:title foaf:page spdx:checksum
Document	foaf:Document			
Frequency	dct:Frequency			
Identifier	adms:Identifier	adms:schemeAgency skos:notation		
Kind	vcad:Kind			
Licence document	dct:LicenseDocument		dct:type	
Linguistic system	dct:LinguisticSystem			

Literal	rdfs:Literal			
Location	dct:Location			locn:geometry
Media type or extent	dct:MediaTypeOrExtent			
Period Of Time	dct:PeriodOfTime		schema:startDate schema:endDate	
Provenance Statement	dct:ProvenanceStatement			
Publisher type	skos:Concept			
Resource	rdfs:Resource	dct:type		
Rights statement	dct:RightsStatement			
Standard	dct:Standard			
Status	skos:Concept			

Class name	Class URI	Mandatory property	Recommended prop.	Optional property
Address	vcad:Address	vcad:country-name vcad:locality vcad:postal-code schema:streetAddress		
ApiDocumentation	hydra:ApiDocumentation	hydra:entrypoint hydra:description hydra:title		
ContactPoint			schema:contactType	schema:availableLanguage schema:email schema:telephone
Equipment	epos:Equipment	schema:description schema:identifier schema:name	dct:type schema:manufacturer schema:serialNumber	dcat:contactPoint dcat:theme dct:isPartOf dct:relation dct:spatial dct:temporal epos:filter epos:dynamicRange epos:orientation epos:resolution epos:samplePeriod foaf:page
Facility	epos:Facility	dct:description dct:identifier dct:title	dcat:theme dct:type	dcat:contactPoint dct:isPartOf dct:relation dct:spatial foaf:page vcad:hasAddress
IriTemplate	hydra:IriTemplate	hydra:template	hydra:mapping	
IriTemplateMapping	hydra:IriTemplateMapping	hydra:required hydra:variable rdf:label rdfs:range		http:paramValue hydra:property schema:defaultValue schema:maxValue schema:minValue schema:valuePattern
Operation	hydra:Operation		hydra:property hydra:returns	hydra:method
Organization	schema:Organization	schema:identifier	schema:leiCode schema:legalName	schema:address schema:contactPoint schema:email schema:logo schema:memberOf schema:owns

				schema:telephone schema:url epos:associatedProject
Person	schema:ContactPoint	schema:identifier		schema:address schema:affiliation schema:contactPoint schema:email schema:familyName schema:givenName schema:qualifications schema:telephone schema:url
PostalAddress	schema:PostalAddress	schema:addressCountry schema:addressLocality schema:postalCode schema:streetAddress		
Project	foaf:Project	schema:identifier schema:title	dct:description schema:contactPoint	foaf:homepage
PropertyValue	schema:PropertyValue	schema:propertyID schema:value		
Publication	epos:Publication	schema:identifier schema:name	dct:abstract schema:author schema:contributor schema:datePublished schema:publisher	dcat:theme schema:issn schema:keywords schema:license schema:numberOfPages schema:volumeNumber
QuantitativeValue	schema:QuantitativeValue	schema:unitCode schema:value		
Service	schema:Service	schema:identifier	schema:contactPoint schema:description schema:name schema:provider	dcat:theme dct:spatial schema:keywords schema:serviceType dct:temporal schema:url
SoftwareApplication	schema:SoftwareApplication	schema:identifier	schema:contactPoint schema:name	dcat:theme dct:relation schema:description schema:downloadUrl schema:installUrl schema:keywords schema:license schema:mainEntityOfPage schema:softwareRequirements schema:softwareVersion
SoftwareSourceCode	schema:SoftwareSourceCode	schema:identifier	schema:contactPoint schema:name	dcat:theme schema:codeRepository schema:description schema:keywords schema:license schema:mainEntityOfPage schema:programmingLanguage schema:runtimePlatform schema:softwareVersion schema:targetProduct
WebService	epos:WebService	schema:identifier	dcat:contactPoint dcat:theme hydra:entrypoint schema:datePublished schema:dateModified schema:description schema:name schema:provider	dct:conformsTo dct:license dct:spatial dct:temporal hydra:supportedOperation schema:keywords