Specification of the ARIADNE Catalogue Data Model

Executive Summary

This document describes the data model underlying the catalogue developed by the ARIADNE project for describing the archaeological resources that are made available by the partners of the project for the purposes of discovery, access and integration. These resources include: data resources, such as datasets and collections; services; and language resources, such as metadata formats, vocabularies and mappings. The model is addressed to cultural institutions, private or public, which wish to describe their assets in order to make them known to e-infrastructures.

Document history

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1.3	Figures Added and renaming of Classes and properties	N.Aloia F.Debole	November 21, 2013
1.4	Added Licence Class, new figure for Vocabolary registry and MetadataElement Registry	N.Aloia	November 22, 2013
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1.6	ARIADNE Catalogue Data Model (ACDM) Version 1.0 released, based on document ACDM_rev-20140114-DCU	N.Aloia	January 16, 2014
2.0	Revision after the two workshops in The Hague and Rome	N.Aloia. C.Meghini F.Debole	January 23, 2014
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2.4	Added TextualDocument class Change of definition of Dataset, Collection Changed ariadneSubject to: ArchaeologicalResourceType	C. Meghini N. Aloia F. Debole D. Gavrilis C. Papatheodorou N. Makri	March 20, 2015
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2.5.2	Added description for TemporalRegion and filled in UI controls.	D. Gavrilis	April 30, 2015
2.5.3	Minor changes in formatting and typo	N.Aloia	May 4, 2015
2.5.4	Corrections in the cardinality tables	D. Gavrilis	May 7, 2015
2.5.5	Dimitris corrections (*status* renamed *published* in MetadataElement in MetadataAttribute and in AriadneConcept) and Moved attributes table from ArcheologicalResource to DataResource, landingPage changed to contactPoint (according to DCAT revision). Attributes table added to LanguageResource.	N.Aloia	May 11, 2015
2.5.6	landingPage added, a more detailed decription	D.Gavrilis, C.	July 31, 2015

	for scientificResponsible and technicalResponsible as well the class textualDocument added, dct:identifier changes to optional	Papatheodorou, N. Makri	

1. Introduction

To collect information about the resources that are proposed for discovery, access and possibly integration in the ARIADNE project, the present model is defined, which we call the ARIADNE Catalogue Data Model (ACDM for short).

ACDM is an extension of the Data Catalog Vocabulary (DCAT), a recommendation of the W3C Consortium (http://www.w3.org/TR/vocab-dcat/) that "*is well-suited to representing government data catalogues such as Data.gov and data.gov.uk.*" The reason for adopting the DCAT Vocabulary (apart from re-use) is that DCAT is proposed as a tool for publishing datasets as Open Data. Its adoption places therefore ARIADNE in an ideal position for publishing its resources as Open Data as well.

In addition to DCAT, the ACDM re-uses classes and properties from several other vocabularies. In particular, ACDM makes usage of the following namespaces:

Prefix	*Namespace*
dcat	http://www.w3.org/ns/dcat#
dct	http://purl.org/dc/terms/
dctype	http://purl.org/dc/dcmitype/
foaf	http://xmlns.com/foaf/0.1/
rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#
rdfs	http://www.w3.org/2000/01/rdf-schema#
skos	http://www.w3.org/2004/02/skos/core#
xsd	http://www.w3.org/2001/XMLSchema#

The present document provides a specification of the ACDM. The specification consists of a UML class diagram (Chapter 3) and of a textual description, providing basic information on each class and on each property in the Model (Chapter 4). In addition, a description of the Catalogue itself is provided (Chapter 2).
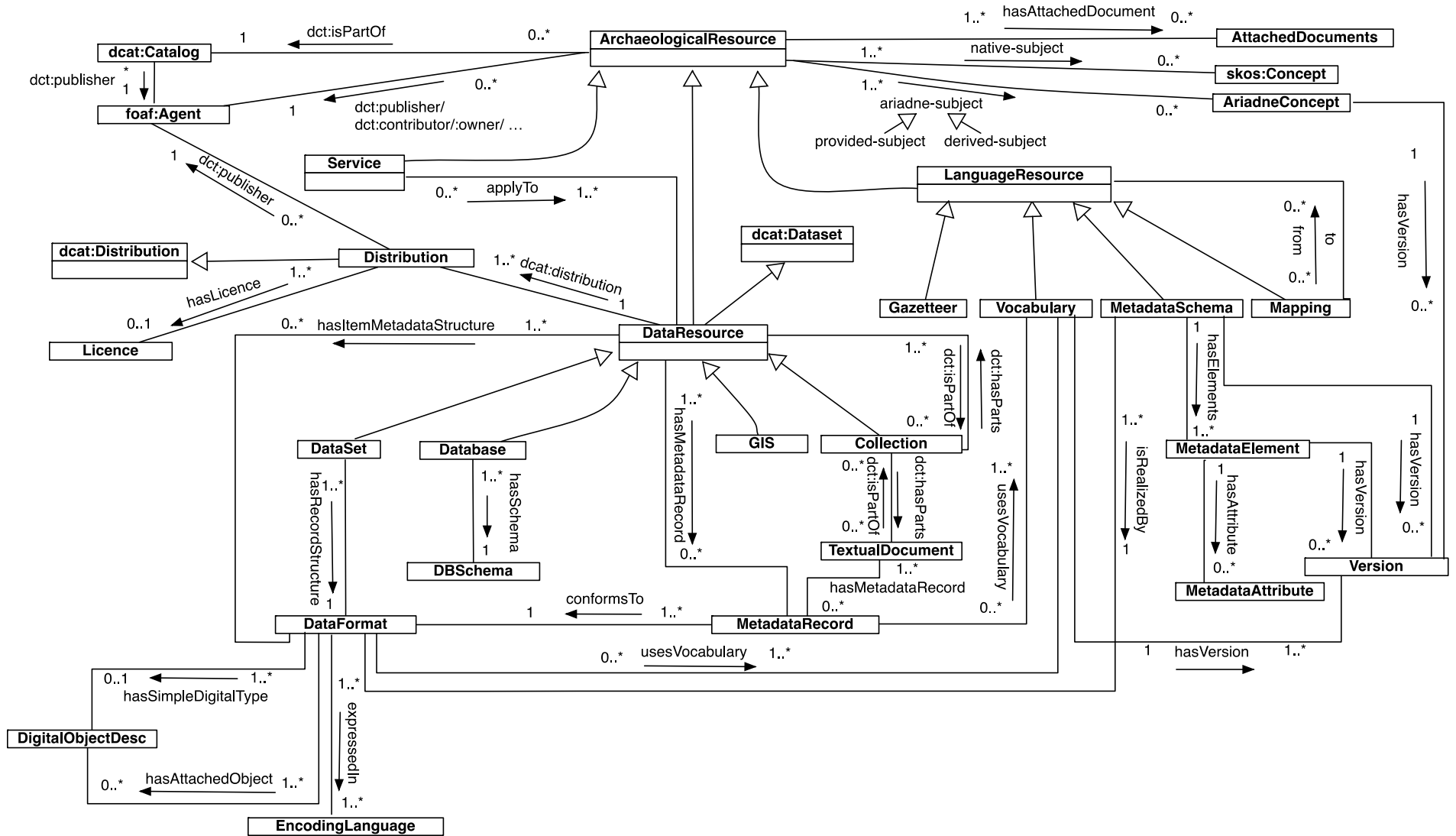
2. The Ariadne Catalog

For interoperability purposes, the Ariadne Project makes the Ariadne Catalogue an instance of the dcat:Catalog class, which is part of the DCAT Vocabulary. The following table provides the metadata record of the Ariadne Catalogue, expressed in RDF through the properties defined for the dcat:Catalog class by the DCAT specification.

Attribute	Value	Note
dct:identifier	http://ariadne-infrastructure/resource/Catalogue	*The URI of the Catalogue according to the Ariadne naming scheme*
dct:identifier	http://ariadne-infrastructure/data/Catalogue	*The present metadata record in RDF format, accessible as Linked Data*
foaf:homepage	http://ariadne-infrastructure/page/Catalogue	*The web page of the Catalogue*
dct:title	"ARIADNE Catalogue"@en	*We may have one title for each relevant language*
dct:description	"A Catalogue describing the resources of the Ariadne Infrastructure"@en	*We may have one description for each relevant language*
dct:issued	*Date of the launch of the Ariadne portal^^xsd:date*	*To be defined*
dct:modified	*Date of last modification of the Catalogue^^xsd:date*	*To be updated after every modification*
dct:language	http://id.loc.gov/vocabulary/iso639-2/eng	*To be defined*
dct:license	http://creativecommons.org/licenses/by/1.0/	*To be defined*
dct:rights		*To be defined*
dct:spatial		*To be defined*
dct:publisher	http://ariadne-infrastructure/resource/Ariadne-project	*To be defined*

3. UML Diagram of the ACDM

The UML diagram including the classes and the most important associations of the ACDM is provided on next page. For readability, the diagram does not show all associations defined on the dcat:Dataset class. Every association other than sub-class has an arrow depicted next to its name, showing the orientation of the name.

dcat:Catalog

ArchaeologicalResource

AttachedDocuments

skos:Concept

AriadneConcept

foaf:Agent

Service

LanguageResource

dcat:Dataset

dcat:Distribution

Distribution

Licence

DataResource

Gazetteer

Vocabulary

MetadataSchema

Mapping

DataSet

Database

GIS

Collection

MetadataElement

Version

DBSchema

TextualDocument

MetadataAttribute

DataFormat

MetadataRecord

DigitalObjectDesc

EncodingLanguage

dct:isPartOf

dct:publisher

dct:publisher/
dct:contributor/:owner/ ...

hasAttachedDocument

native-subject

ariadne-subject

provided-subject   derived-subject

applyTo

hasVersion

from   to

dct:publisher

hasLicence

dcat:distribution

hasItemMetadataStructure

hasElements

hasMetadataRecord

dct:isPartOf

dct:hasParts

isRealizedBy

hasVersion

hasSchema

dct:isPartOf   dct:hasParts

usesVocabulary

hasAttribute

hasRecordStructure

conformsTo

hasMetadataRecord

hasVersion

usesVocabulary

hasSimpleDigitalType

expressedIn

hasAttachedObject

hasVersion

1   0..*   1..*   0..*   1..*

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4. Description of the ACDM

The central notion of the model is the class ArchaeologicalResource that has as instances the main resources described in the Catalogue. These resources are categorized in:

- *services*, representing the services owned by the Ariadne partners and lent to the project for discovery and access;
- *language resources*, representing vocabularies (also known as ontologies), metadata schemas, mappings (between language resources in general) and gazetteers. As language resources of new types (*e.g.*, subject heading systems, thesauri and so on) are introduced into the Catalogue, the model will be extended to accommodate them;
- *data resources*, representing the various types of data *containers* owned by the Ariadne partners and lent to the project for discovery, access and possibly integration. Data resources are categorized in collections, datasets, databases and GIS. As data resources of new types are introduced into the Catalogue, the model will be extended to accommodate them.

An important class of the model is that of formats, called DataFormat, whose instances represent the formats that realize metadata schemas, or that define the structure of the records of datasets. Analogously, the ACDM includes the class DBSchema to represent the instances of database schemas.

Finally, there is the class MetadataRecord for representing collection- or dataset-level metadata records, which are stored in the catalogue for documentation, discovery and assessment of similarity between data resources.

A definition of each class is given in the sequel, along with the attributes that pertain to the class and the associations that have the class as domain. For each attribute the obligation is specified, through one of the following values:

- Mandatory, meaning that a value *must* be provided for the attribute
- Recommended, meaning that it is strongly *recommended* that a value be provided for the attribute
- Optional, meaning that a value for the attribute *may* or *may not* be provided.

For associations, cardinality constraints are given in both directions and, when applicable, it is indicated whether a value is recommended.

ArchaeologicalResource

This class is the main class of the ARIADNE catalogue, since it has as instances the resources described in the catalogue. These resources are represented by the subclasses of *ArchaeologicalResource*, which are:

- DataResource
- LanguageResource. and
- Service

Associations:

dct:isPartOf associates any archaeological resource in the catalogue with the catalogue. An archaeological resource is part of at least one catalogue. A catalogue comprises at least one archaeological resource.

dct:publisher: associates any archaeological resource with an agent responsible for making the resource publicly accessible (via download, or API, or other). An archaeological resource has exactly one publisher and an agent can publish zero, one or more archaeological resources.

dct:contributor: associates any archaeological resource with an agent primarily responsible for describing the resource in the Catalogue. An archaeological resource has exactly one contributor and an agent can be the contributor of zero, one or more archaeological resources.

dct:creator: associates any archaeological resource with an agent primarily responsible for creating the resource. An archaeological resource has exactly one creator and an agent can be the creator of zero, one or more archaeological resources.

owner: associates any archaeological resource with an agent that is the legal owner of the resource. A resource has exactly one owner and an agent can own zero, one or more archaeological resources.

legalResponsible: associates any archaeological resource with a person holding the legal responsibility of the resource. A resource may have zero or one legal responsible, and a person may be legal responsible of zero, one or more archaeological resources.

scientificResponsible: associates any archaeological resource with a person holding the scientific responsibility of the resource. It is the person who had enough competence and creativity to conceive the service or it is the person who gathered the data on a field. A resource may have zero or one scientific responsible, and a person may be scientific responsible of zero, one or more archaeological resources.

technicalResponsible: associates any archaeological resource with a person holding the technical responsibility of the resource and contact person. It is the person who wrote the code of the service or it is the person who implemented the dataset choosing the technology and then using it to create the dataset. A resource has exactly one technical responsible, and a person may be technical responsible of zero, one or more archaeological resources.

ariadne-subject associates any archaeological resource with a subject from the AAT vocabulary. A resource has at least one ariadne-subject. The ariadne-subject is associated with the AriadneConcept class. We further specialize this property into:

- **provided-subject** associates any archaeological resource with zero, one, or more manually specified subjects drawn from the Getty AAT vocabulary;
- **derived-subject** associates any archaeological resource with zero, one, or more subjects, automatically derived from mapping local vocabularies to the Getty AAT vocabulary.

At least one (or both) of the above elements must be provided.

native-subject associates any archaeological resource with a subject from a vocabulary in use by the original owner of the resource. The native-subject is associated with the skos:Concept class.

hasAttachedDocuments: associates any archaeological resource with the documents that are attached to the resource for illustration purposes. A resource can have zero, one or more documents, and a document can be attached to one or more archaeological resources.

DataResource

This class specializes the class *ArchaeologicalResource*, and has as instances the archaeological resources that are data containers such as databases, GIS, collections or datasets. The class is created for the sole purpose of defining the domain and the range of a number of associations, given below. It is therefore an abstract class, it does not have any instance, it only inherits instances form its sub-classes.

The *DataResource* class defines the properties common to its subclass, mostly using the terms of the DCAT vocabulary, to which it adds properties for specifying:

- the access policy of the resource, and
- the original identifier of the resource.

The following table gives the attributes of this class.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
dct:title		M	input text	
dct:description		R	textarea	
dct:issued	Date of formal issuance (e.g., publication) of the resource.	M	*date picker*	*2013-04-24*
dcterdct:modified	Most recent date on which the resource was changed, updated or modified. If not provided the issued date will be used.	M	*date picker*	*2013-04-24*
originalId	The original identifier of the resource supplied by the content provider	M	*input text*	
dct:identifier	The ARIADNE identifier that will be computed from the original. This could look like: www.ariadne.eu + prefix of the provider + ID of the resource	O	*input text*	*Automaticall y computed by the originalId*
dcat:keyword		O	*input text*	
dct:language	If the resource is multilingual, more than one value must be given for this property	M	*input text (autocomplet e)*	
dcat:landingPage	A Web page that can be navigated to in a Web browser to gain access to the dataset, its distributions and/or additional information.	O	*input text*	
dcat:contactPoint	Link an Archaeological Resource to relevant contact information which is provided using VCard [vcard-rdf].	O	dialog window	VCard [vcard-rdf].
accessPolicy	URI to statement of policy (typically, on an organization's website)	O	*input text*	

dct:accessRights	A statement of any access restrictions on the data resource	M		Creative Commons 2.0 Licence
dct:rights	Information about rights held in and over the data resource	R		
dct:audience	The primary audience(s) of the resource	O		
dct:temporal	See temporalRegion (TemporalRegion)	R	dialog window	
dct:spatial	See spatialRegion (SpatialRegion)	M	dialog window	
dct:accrualPeriodicity		O	*input text*	
dct:extent	The size of the data resource (i.e., number of items in a collection, number of records in a dataset, etc.)	O		
archaeologicalResourceType	Associates any archaeological resource with one or more categories (types), drawn from the following list: • Fieldwork archives • Event/intervention resources, such as grey literature reports • Sites and monuments databases or inventories • Scientific datasets, such as databases of radiocarbon dates • Artefact databases, or image collections • Burial databases	M	*Select box*	

Associations:

dct:isPartOf a data resource can be part of zero, one or more collections. The inverse association dct:hasParts applies for collections (see below).

dcat:distribution: associates a data resource with the distributions of a resource. A resource can have one or more distributions and a distribution is the distribution of exactly one resource.

hasItemMetadataStructure: associates a data resource with the format of the metadata of the members (or items) of the data resource (e.g. metadata of each record in a dataset, or of each item in a collection). A data resource may have zero or more metadata formats associated to his members (items). An item metadata format can be used by one or more data resources.

hasMetadataRecord: associates a data resource with the metadata of the resource as created by the organization holding the resource (for instance, the record describing a dataset in the organization holding the dataset). A data resource may have zero or more metadata records, but the specification is recommended. A metadata record can be used by one or more data resources.

Collection

This class is a specialization of the class DataResource, and has as instances collections in the archaeological domain. In order to be as general as possible, we define an archaeological collection as an aggregation of resources, called the items in the collection. Being aggregations, collections are akin to datasets, but with the following, important difference: the items in a dataset are data records of the same structure (see definition of Dataset below). In contrast, the items in a collection are individual objects different from records (e.g., images, texts, videos, etc.) or are themselves data resources such as collections, datasets, databases or GIS; for instance, a collection may include a textual document, a set of images, one or more datasets and other collections.

For convenience, collection items that are textual documents are explicitly represented in the Catalog as instances of the class TextualDocuments and associated to the collection where they belong.

To the best of our knowledge, no vocabulary provides a term for the class of archaeological collection, so we will make this class part of the ARIADNE vocabulary.

For interoperability, Collection is a sub-class of dcmitype:Collection. For interoperability with Europeana, we can be more specific and make Collection a subclass of the collection class defined by Europeana.

Associations:

dct:hasParts associates a collection with the data resources that are in the collection. This association can be used only for stating membership of data resources in a collection. A collection may have one or many data resources as parts. A data resource can be in zero, one or many collections.

Database

This class is a specialization of the class DataResource, and has as instances databases, defined as a set of homogeneously structured records managed through a Database Management System, such as MySQL.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
dbms	The database management system used	M		MySQL

Associations:

hasSchema associates a database with the schema defining the structure of the data in the database. Such schema is an instance of the class DBSchema. A database has exactly one schema, and one schema can be the schema of one or many databases.

Dataset

This class is a specialization of the classes DataResource. It has archaeological datasets as instances. An archaeological dataset is defined as a set of homogeneously structured data records, consisting of fields carrying data values.

Associations:

hasRecordStructure: associates a dataset with a data format defining the structure of its records. Such format is an instance of the class DataFormat. A dataset has exactly one data format, and a data format can be the format of the records of one or more datasets.

GIS

This class is a specialization of the class DataResource, and has as instances data records, consisting of fields carrying data values, which are not managed through a Geographical Information Systems (GISs).

The attributes of this class are given in the following table.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
systemName	Name of the GIS system described.	R	*input text (autocomplete)*	

TextualDocument

This class comprises texts, such as books, articles, reports, and the like. The attributes of the TextualDocument class are the same of the DataResource class. However, some elements like temporal, spatial, accrualPeriodicity, extent, distribution and hasItemMetadataStructure are not included in this class as a textualDocument belongs to a Collection and the class Collection contains this information.

Associations:

dct:isPartOf associates a textual document with a collection where the document belongs. A textual document can be part of zero, one or more collections; a collection can have zero, one or more textual documents.

dct:hasParts associates a collection with the textual document that are in the collection. A collection may have zero, one or more textual document as parts. A textual document can be in zero, one or many collections.

hasMetadataRecord associates a textual document with a native metadata record. A textual document can have at most one metadata record, and a value is recommended; a metadata record belongs to at least one textual document.

LanguageResource

This is the class of all language resources described in the Catalogue for the purposes of re-use or integration within the ARIADNE community. A language resource is a resource of a linguistic nature, whether in natural language (such as a gazetteer) or in a formal language (such as a vocabulary or a metadata schema). It also includes mappings, understood as associations between expressions of two language resources that may be of a formal (e.g., sub-class or sub-property links) or an informal (e.g., natural language rules) nature.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
dct:title		M	input text	
dct:description		R	textarea	
dct:issued	Date of formal issuance (e.g., publication) of the resource.	M	date picker	2013-04-24
dct:modified	Most recent date on which the resource was changed, updated or modified. If not provided the issued date will be used.	M	date picker	2013-04-24
originalId	The original identifier of the resource supplied by the content provider	M	input text	
dct:identifier	The ARIADNE identifier that will be computed from the original. This could look like: www.ariadne.eu + prefix of the provider + ID of the resource	O	input text	AAutomaticcaly completed
dcat:keyword		O	input text	
dct:language	If the resource is multilingual, more than one value must be given for this property	M	input text (autocomplete)	
dcat:landingPage	A Web page that can be navigated to in a Web browser to gain access to the dataset, its distributions and/or additional information.	O	input text	
dcat:contactPoint	Link an Archaeological Resource to relevant contact information which is provided using VCard [vcard-rdf].	R	dialog window	VCard [vcard-rdf].
accessPolicy	URI to statement of policy (typically, on an organization's website)	O	input text	
dct:accessRights	A statement of any access restrictions on the data resource	M		Creative Commons 2.0 Licence
dct:rights	Information about rights held in and over the data resource	R		
dct:audience	The primary audience(s) of the resource	O		

MetadataSchema

This is a subclass of LanguageResource having as instances metadata schemas used in the archaeological domain. This is one of the main class in the metadata registry of ARIADNE (see UML graph on Appendix).

The following table gives the attributes of this class.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
standardUsed	the standard that the schema is based on, if any	O	*input text (autocomplete)*	Dublin Core, MAG, ICCD, MARC, EAD
foaf:homepage	an HTTP URI pointing to the web page describing the schema	O	input text	dublincore.org/documents/dces/
proprietaryFormatDesc	if the format is proprietary, this attribute describes the format in an informal way	O	TextArea	

Associations:

isRealizedBy associates a metadata schema with a data format that realizes it in some specific encoding language. A Metadata Schema may be realized by one or many data formats. A data format can be the realization of exactly one Metadata Schema.

hasElements: associates a metadata schema with its metadata elements. A schema has at least one metadata element. One element belongs to exactly one MetadataSchema.

hasVersion: associates a metadata schema with a version of its. A schema might have one or more versions. A version can be the version of exactly one metadata schema

usedby: associates a metadata schema with the organizations using it. A schema is used by at least one organization (including the organization that submits it to the registry); an organization uses at least one schema.

dcat:theme: According to ISO 11179, each MetadataSchema should be associated with a category of a taxonomy or another knowledge organization schema.

Gazetteer
This is the class of gazetteers, i.e. geographical indexes or dictionaries.

Mapping
An instance of this class represents a mapping between two language resources.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
name	The name of the mapping	M	Input text	

foaf:homepage	The HTTP URI to the web resource giving or describing the mapping	O		Input text	

Associations:

from: associates a mapping to the source language resource. A mapping has exactly one source language resource and a language resource can be the source of zero, one or many mappings.

to: associates a mapping to the target language resource. A mapping has exactly one target language resource and a language resource can be the target of zero, one or many mappings.

Vocabulary

This is a subclass of LanguageResource. An instance of this class represents a vocabulary or authority file, used in the associated structure. The instances of this class define the ARIADNE vocabulary registry. The data model of the registry is depicted in Appendix.
The following table gives the attributes of this class.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
status	The current status of the vocabulary	M		draft, reviewed, approved
foaf:homepage	Uri to the vocabulary homepage	O		

Associations:

hasConcept: the concepts of a vocabulary. A vocabulary has at least one concept.

hasVersion: A vocabulary has at least one version.

usedby: A vocabulary should be used by at least one organization (including the organization which submits it to the registry).

Distribution

This class represents an accessible form of an ARIADNE resource as for example a downloadable file, an RSS feed or a web service. It extends the class dcat:Distribution by adding three attributes (numOfRecords, OAI-PMHServerURI, platformDescription).

The following table gives the attributes of this class.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
dct:title		M	input text	*ARIADNE datasets inventory*
dct:description		R	textarea	
dct:issued	Date of formal issuance (e.g., publication) of the distribution.	M	*date picker*	*2013-04-24*
dct:modified	Most recent date on which the dataset was changed, updated or modified.	M	*date picker*	*2013-04-24*
dcat:accessURL		R	input text	
dcat:downloadURL		R	input text	
dct:rights	Information about rights held in and over the data resource	R		
dcat:mediaType		O	*input text (autocomplete)*	
dct:format		R	*input text (autocomplete)*	
dcat:byteSize		O	input text	
numOfRecords		O	input text	
OAI-PMHServerURI		R	input text	
platformDescription		O	textarea	

Associations:

hasLicense: associates a distribution with the class of licenses. A distribution may have zero or one licenses, but it is recommended that the existing ones are specified, while a license might be associated with one or more distributions.

dct:publisher: associates any distribution with an agent responsible for making the resource available. A distribution has exactly one publisher and an agent can make zero, one or more resources available.

DataFormat

An instance of this class describes the structure of a *Datasets,* of a *MetadataSchema*, or of a MetadataRecord.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
dct:description	describes the format in an informal way	R	textarea	
characterSet	the used character set	M	*input text (autocompl ete)*	
XSD	a URI giving, if any, the XML schema of the record structure	R	input text	

Associations:

usesVocabulary: associates a data format with the vocabularies that are used in the instances of the data format. A Data Format can use zero, one or more vocabularies, but it is recommended that the existing ones are specified; and a vocabulary can be used by one or more Data Formats.

hasAttachedObject: associates a data format with the types of digital objects that are attached to its instances. A Data Format can have zero, one or more digital object types attached, and a digital object type can be attached to one or more *DataFormat*. This association applies to datasets with a complex record structure.

hasSimpleDigitalType: associates a data format with the type of the object that make up an instance of the format, in case the data format is simple media object (text, image, video, audio, and so on). A DataFormat can have zero, or one digital object types attached, and a digital object type can be attached to one or more *DataFormat*.

expressedIn: a data format may be expressed in one or more encoding languages and one language can encode one or more DataFormats. For instance a Dublin Core metadata schema may be encoded in XML or in XML:RDF.

DBSchema

An instance of this class describes the structure of a *Database*.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
type	describes if the database is simple or hybrid ()	M	Hybrid/simple	
description	describes in a informal way the entities (table) and the associations of the Database	R	*input text*	

Required Documentation:
The logical schema of the record and a sample of a record are required. These can be provided in several ways, *e.g.*, as a screenshot of the fields, as a document in Excel / XML Schema, etc.)

EncodingLanguage

An instance of this class is an encoding language.

DigitalObjectDesc

An instance of this class represents a digital object type.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
dct:description		R	textarea	
dct:format (MIME)		M	*input text (autocomplete)*	
originalId	the original ID of the object by the content provider	R	input text	
dct:identifier	the ARIADNE identifier that will be computed from the original. This could look like: www.ariadne.eu + prefix of the provider + ID of the object	M (automatic)	input text	
persistentIdentifier	Boolean value indicating whether or not the identifier is persistent	R	*Boolean*	
identifierType		O	*Input text*	*NBN, DOI, PURL*

MetadataRecord

An instance of this class is a metadata record, typically associated with a data resource.

The following table gives the attributes of this class.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
XMLdoc	The metadata record in XML format	M	Textarea	

Associations:

conformsTo: associates a MetadataRecord with a DataFormat. A MetadataRecord may conform to zero, one or many DataFormat, but it is recommended that the existing ones are specified. A DataFormat may have one or many records that conform to it.

usesVocabulary: the vocabularies that are used in the MetadataRecord. A MetadataRecord can use zero, one or more vocabularies, but it is recommended that the existing ones are specified; and a vocabulary can be used by one or more MetadataRecord.

Required Documentation
A complete sample of a metadata record. In the case there are used controlled vocabularies for certain fields, a document that present the voices - if necessary in hierarchical order - to allow a proper mapping with ARIADNE documentations is required.

MetadataElement

An instance of this class describes the features of a metadata element, according to ISO 11179.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
dct:identifier	a URI, if any, giving the element description	R	Input text	http://iflastandards.info/ns/isbd/elements/P1004
dct:title	the name of the element	M	Input text	Title_proper
rdf:domain	If it is a property, its domain is denoted	O	Input text	
rdf:range	If it is a property, its range is denoted	O	Input text	
dct:description		R	Textarea	
dct:source	The XML schema to which the element belongs	O	Input text	
skos:scopeNote	The context of using the element	O	Textarea	
published	The current status of the element	M	Boolean	
cardinality	the cardinality of the element	M	Input text	>=1 means that it is

			(numeri c)	mandatory and it could be repeated
render	The category of its representation	O		Barcode, graphic
datatype	The data type of the element	M	Input text (numeri c)	integer
minValue	The minimum value of the element	O	Input text (numeri c)	
maxValue	The maximum value of the element	O	Input text (numeri c)	
allowValues	The values allowed for this element	O	Select box	Red, Blue, Green
proprietaryFormatDesc	if the format is proprietary, this attribute describes the format in an informal way	O	Textare a	
characterSet	the used character set	M	Input text	

Associations:

hasSubelement: An element might be of simple or complex type. If it is of complex type should have at least a subelement. Also an element might be subelement of different elements.

hasAttribute: An element might have zero or more XML Attributes.

dcat:theme: According to ISO 11179, each data element should be associated with a category of a taxonomy or another knowledge organization schema.

hasRelation: An element might be related to zero or more other elements. According to ISO 11179 the relationship types can be described by the following vocabulary: qualifier of, qualified by, subject of, physical condition, part of, external reference, etc.

hasVersion: A structure defined by an element, its sub-elements and XML attributes might have a version.

usedby: An element should be used by at least one organization (including the organization which submits it to the registry).

dct:creator: An agent primarily responsible for the creation of the metadata element. A metadata element has exactly one creator and an agent can be the creator of one or more schemas.

dct:publisher: An agent responsible for making the metadata element available. A metadata element has exactly one publisher and a publisher can publish one or more elements

TemporalRegion

An instance of this class is a temporal region of one of two forms:
1. a temporal interval (*e.g.*, from 155 B.C. to 243 A.C.) or
2. a named period (*e.g.*, Neolithic).

In the former case, the extremes of the interval are given as values of the *from* and *to* attributes.
In the latter case, the named period is given as value of the *periodName* attribute.

- In the case where BC dates have to be supplied, a minus (-) sign could be used as indicated in the expanded Year representation of ISO 8601 (http://www.iso.org/iso/catalogue_detail?csnumber=40874).
- In the case where reduced precision must be applied (e.g. where no day information is available) the respective part could be omitted (according to ISO 8601 reduced precision guidelines).

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
periodName	Name for this period.	M	Select box	
from	A date (indicating start date for this temporal region).	R	Date picker	1800-?-?
until	A date (indicating end date for this region).	R	Date picker	

SpatialRegion

An instance of this class is a spatial region of one of four forms:
1. a region identified by latitude and longitude expressed via the lat and lon attributes, respectively;
2. a bounding box identified by four vertices (expressed via the boundingBoxMinLat, boundingBoxMinLon, boundingBoxMaxLat and boundingBoxMaxLon attributes);
3. a postal address (expressed via the address, numberInRoad, postcode and country attributes);
4. a named place (expressed via the placeLabel attribute).

Attribute	Usage Notes	Obligation M(andatory) O(ptional)	UI control	Example
placeName	A name describing the place.	M	Input text	
coordinateSystem	The coordinate system used to encode coordinates (e.g. EPSG 2763). If not specified, EPSG 4326 will be implied.	O	Input text	
lat	The Latitude	R	Input text (numeric)	
lon	The Longitude	R	Input text (numeric)	
boundingBoxMinLat	The min Lat of the bounding box area	O	Input text (numeric)	
boundingBoxMinLon	The min Lon of the bounding box area	O	Input text (numeric)	
boundingBoxMaxLat	The max Lat of the bounding box area	O	Input text (numeric)	
boundingBoxMaxLon	The max Lon of the bounding box area	O	Input text (numeric)	
address	The address name	O	Input text	
numberInRoad	The number in road	O	Input text	

postcode	Postcode	O	Input text	
country	The country of the place	M	Input text (autocomplete)	

MetadataAttribute

An instance of this class describes an XML attribute a metadata element.

Attribute	Usage Notes	Obligation M(andatory) O(ptional)	UI control	Example
dct:identifier	a URI giving, if any, the attribute description	O	Input text	
dct:title	the name of the attribute	M	Input text	type
dct:description		M	Textarea	
dct:source	The namespace to which the attribute belongs	O	Input text	
contextInfo	The context of using the attribute	O	Textarea	
published	The current status of the attribute	M	Boolean	
cardinality	the cardinality of the attribute	M	Input text (numeric)	>=1 means that it is mandatory and it could be repeated
minValue	The minimum value of the attribute	O	Input text (numeric)	
maxValue	The maximum value of the attribute	O	Input text (numeric)	
allowValues	The values allowed for this attribute	O	Select box	Red, Blue, Green
characterSet	the used character set	M	Input text	

Version

An instance of this class provides information about a version of a vocabulary, concept, metadata schema or metadata element.

Attribute	Usage Notes	Obligation M(andatory) O(ptional)	UI control	Example
dct:title	The name of the version	M	Input text	
dct:modified	The Date of modification of a metadata schema, metadata element, vocabulary or concept	M(automatic)	Date picker	
skos:changeNote	A note on the made modifications	O	Textarea	

Associations:

dct:publisher: An agent responsible for making the a version available. A version has exactly one publisher and a publisher can publish one or more versions.

AriadneConcept

An instance of this class represents a term (concept) used in a vocabulary or authority file.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
dct:identifier	A URI that identifies the concept	R	Input text	
skos:prefLabel	The descriptor of the concept (preffered term)	M	Input text	
skos:scopeNote		R	Texarea	
skos:definition		R	Textarea	
dct:source	The vocabulary the concept exists in	M	Input text	
skos:collection	The facet the concept belongs to	R	Input text	
published	The current status of the vocabulary	M	Boolean	
dct:language	The language of the descriptor	M	Select box	
provided	If the concept is provided (true) or derived (false)	M	Boolean	

Associations:

hasRelation: A concept might be related to zero or more other concepts. The SKOS vocabulary is used for the definition of the relationships between concepts: skos:narrower, skos:broader, skos:related, skos:member, skos:inScheme.

hasVersion: A concept might have zero or more versions.

License

An instance of this class represents a License.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
name	The name of the mapping	M	Input text	
dct:description		R	select box	
URI	The URI of the license website	R	select box	

While for the description of the ARIADNE datasets it was possible to adopt a standard vocabulary (DCAT), as regards the description of the services to be surveyed for ARIADNE, the situation is somewhat more complicated. It should be first clarified the concept of service in the context of this ARIADNE activity. The goal is to survey the various applications, developed by the project partners, for which it is possible to imagine the possibility of integration or reuse. Probably the software applications we are talking about fall into one of the following categories:
1. Ad hoc software packages developed in-house;

2. Applications that make use of GIS software;
3. Applications that make use of databases management systems;
4. Applications that use a combination of the previous categories.

An ARIADNE service, as we intend in the activity of the census, is an instance of one of the 4 categories of software listed above. An ARIADNE service is a software artefact that operates on datasets. From now on, therefore, we are referring the term service in the sense described above except when explicitly specified.

Another important feature of these services is that we do not know a priori how they can be accessed. In addition, in this case we can expect various situations:
- Services to be used locally and requires installation on a specific hardware/software platform:
- Services to be used locally independent from any specific hardware/software platform
- Services to be used on a website (web applications).
- Web services with a standard protocols.

Moreover, for the first three categories in the above list, we must know if they are closed services, i.e. they can be used as they are, or if they provide Application Programming Interfaces (API), also we must know if the source code is available.

In addition to a classification of services based on their implementation and a classification based on the way they can be uses (highlighted in the two previous lists), it is very important to classify the ARIADNE services based on their functionality (e.g. map viewer, data entry system, etc.).

Unfortunately, we did not find a standard ontology to describe services with the characteristics discussed above.

To collect information about the ARIADNE services, we referred to the ontology for describing software adopted in dbpedia (http://dbpedia.org/ontology/Software), you can find an example at http://dbpedia.org/page/Lucene.

The creation of a catalogue of ARIADNE services will occur in two phases. In the first phase we will collect as much information as possible to be able to classify the services available in the community and in the second stage we will refine the model, according to the responses obtained, by adding new classes and properties, if necessary.

Service

This class specializes the class *dbpedia.org/ontology/Software*.

The following table gives the attributes of this class.

Attribute	Usage Notes	Obligation M(andatory) R(ecommended) O(ptional)	UI control	Example
dbpedia-owl:About	This is the name of the service	M		
dbpedia-owl:abstract	Contains a description of the service	M		
dbpedia-owl:developer	The company, or the development team	O		
dbpedia-owl:genre	A multivalued property to classify the service	O		dbpedia:Index_(search_engine)
dbpedia-owl:operatingSystem	The OS platform required by the service	M		dbpedia:Cross-platform
dbpedia-owl:programmingLanguage		M if source code is available		dbpedia:Java_(programming_language)
dbpedia-owl:status		M		InProgress, available,
dbpedia-owl:latestReleaseVersion		R		
dbpedia-owl:license		M		
rdfs:comment	Notes and comments	O		
foaf:homepage	Uri to the service homepage	R		
dct:issued	Date of formal issuance (e.g., publication) of the service.	M		*2013-04-24*
dct:modified	Most recent date on which the service was changed, updated or modified. If not specified, the issued date will be used automatically.	M		*2013-04-24*
dcat:downloadURL		R		
dcat:byteSize		O		
exportFacility	If the service provides export functionality for the datasets on which it operates, supply a list of format.	O		csv
installationRequirements		O		

Associations:

applyTo: the DataResource to which the service can be applied. A service can be applied to one or more DataResource but it is recommended that a value be provided, while the DataResource can be served by zero or more Services.

isInRepository: if the source code is available in a repository URI and other information like credential to access the repository are supplied.

hasAttachedDocuments: the documents that are attached to a service for illustration purposes. A service can have zero or more documents, and a document can describe one service.

hasTechnicalSupport

hasAPI: If the service provide an API, a description must be supplied. Should we use a standard like WSDL?

hasComponents: a service may include some other components (e.g. http://dbpedia.org/page/Lucene).

foaf:Agent

This class is used in this schema to model the institutions that make a resource available.

Attribute	Usage Notes	Obligation **M**(andatory) **R**(ecommended) **O**(ptional)	UI control	Example
foaf:name	name of the organization	M	input text	
foaf:phone		O	input text	
foaf:mbox		M	input text	
foaf:skypeID		O	input text	

Associations:

dct:isPartOf associates any foaf:Agent with another foaf:Agent where the former belongs (*e.g.*, a person with the organization they work for).

5. Appendix

In this chapter, some of the most relevant ACDM class are described using UML-graph.
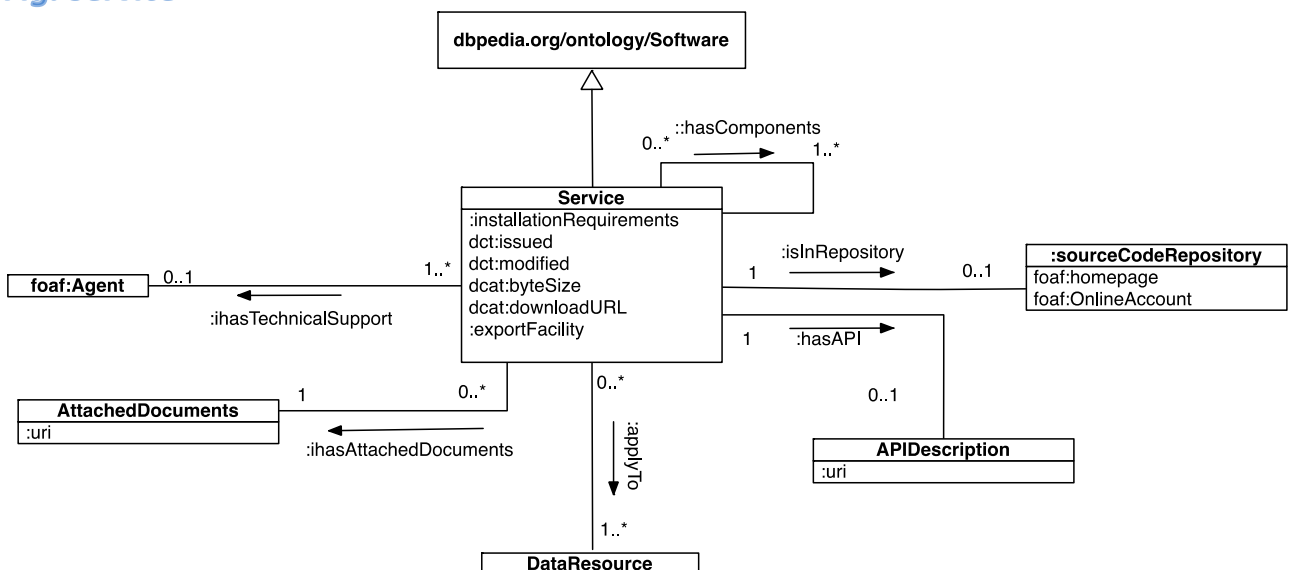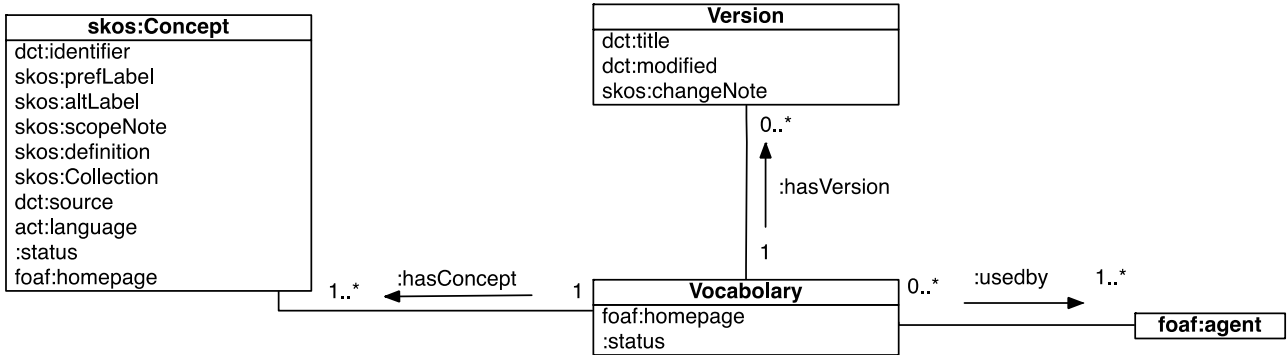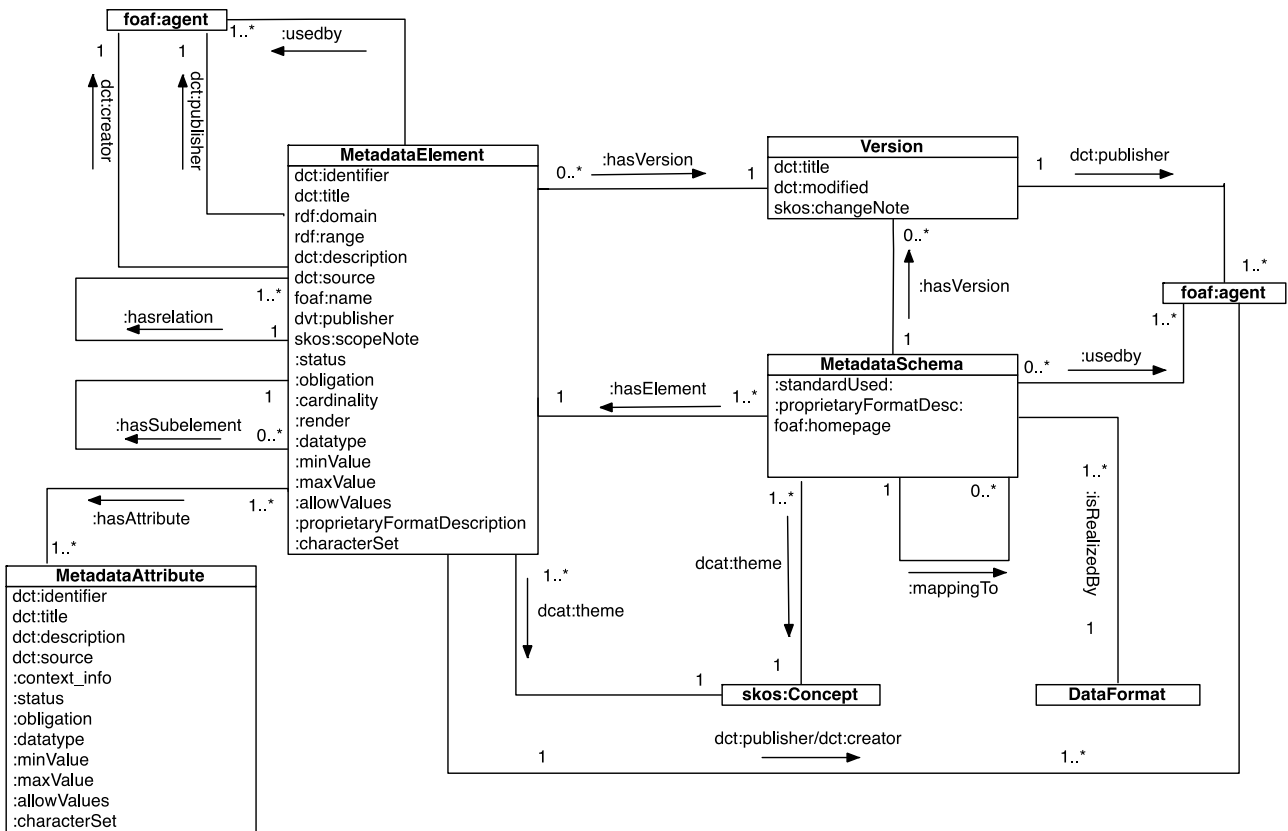
Fig. Service

Fig. Vocabulary

skos:Concept

dct:identifier
skos:prefLabel
skos:altLabel
skos:scopeNote
skos:definition
skos:Collection
dct:source
act:language
:status
foaf:homepage

Version

dct:title
dct:modified
skos:changeNote

0..*

:hasVersion

1

1..*   :hasConcept   1   **Vocabolary**

foaf:homepage
:status

0..*   :usedby   1..*   **foaf:agent**

Fig. MetadataSchema

foaf:agent   1..*   :usedby

1   1   dct:creator   dct:publisher

MetadataElement

dct:identifier
dct:title
rdf:domain
rdf:range
dct:description
dct:source
foaf:name
dvt:publisher
skos:scopeNote
:status
:obligation
:cardinality
:render
:datatype
:minValue
:maxValue
:allowValues
:proprietaryFormatDescription
:characterSet

0..*   :hasVersion   1   **Version**

dct:title
dct:modified
skos:changeNote

1   dct:publisher

0..*

:hasVersion

1

1..*   :hasrelation   1

1   :hasSubelement   0..*

:hasAttribute   1..*

1..*

MetadataAttribute

dct:identifier
dct:title
dct:description
dct:source
:context_info
:status
:obligation
:datatype
:minValue
:maxValue
:allowValues
:characterSet

1   :hasElement   1..*   **MetadataSchema**

:standardUsed:
:proprietaryFormatDesc:
foaf:homepage

0..*   :usedby   **foaf:agent**

1..*

1..*

1..*   1   0..*   :isRealizedBy

dcat:theme   :mappingTo   1..*

dcat:theme   1

1   **skos:Concept**   **DataFormat**

1   dct:publisher/dct:creator   1..*

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Fig. AriadneConcept