ADMS SPECIFICATION

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http://joinup.ec.europa.eu/asset/adms/release/~~09~~10

CHANGE LOG

In the list below are the changes that were made since version 0.~~8~~9.

Issue	Section	Change
	Throughout	Harmonised footnotes
	Throughout	Made minor editorial corrections and corrected cross-references
	5	Changed capitalisation of data types, properties and relationships
	5.1	Added section to explain relationship between general concepts and Semantic Asset specialisation
	5.2, 5.5	Renamed main concepts Semantic Asset, Semantic Asset Distribution and Semantic Asset Repository
	4, 5.2, 5.6, 6	Renamed Domain to Theme, added Theme Taxonomy
	5.2	Revised example of Asset without Distribution and Asset with multiple Distributions (ADMS 1.0)
	5.3	Revised UML diagram to show general concepts, properties and relationships and how ADMS for Semantic Assets is related to that model
	5.5.1	Deleted relationship Asset.documentation and added four separate relationships Asset.home page, Asset.main documentation, Asset. related documentation and Asset.related web page
	5.5.1	Added property Metadata Date and relationships Metadata Language and Metadata Publisher to Asset
214	5.5.3	Added Repository.includes as reverse property of Asset.repository origin
219	5.5.2	Added Distribution.distribution of as reverse property of Asset.distribution
	5.5.2	Deleted Repostory Origin relationship for Distribution as this relationship can be derived through the Asset
274	5.5.2	Changed cardinality of Distribution.Licence to 1..*, and added note related to multiple licenses
	5.6.9	Changed label to name to make it consistent with RADion
277	6.2	Corrected references to ISO/DIS 25964-2
279	6.4	Added more examples of geographic vocabularies
	6	Removed section on Documentation type vocabulary (now implemented as separate relationships) and Domain vocabulary (which was replaced by Theme). Renamed the section of Subject vocabularies to Theme vocabularies. Added section on Theme Taxonomy
	7.2	Added description of XML schema. Expanded abbreviations and added footnotes with links
	Annex I	Added annex with URIs for ADMS-specific vocabularies

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1. BACKGROUND AND OBJECTIVES

1.1 ABOUT THE ISA PROGRAMME

This specification has been created as part of Action 1.1 of the Interoperability solutions for European public administrations (ISA) programme of the European Commission (EC). This programme funds initiatives to foster the efficient and effective cross-border electronic interactions between European public administrations. Action 1.1 of this programme is targeted towards improving the semantic interoperability of European e-Government systems. Action 1.1 attempts to address these by encouraging the sharing and reuse of semantic assets (see section 1.2 Terminology). As part of Action 1.1, the ISA Programme maintains a repository of semantic interoperability assets on Joinup, the ISA integrated collaborative platform.

1.2 TERMINOLOGY

This document uses the following terminology:

Semantic interoperability is defined as the ability of information and communication technology (ICT) systems and the business processes they support to exchange data and to enable the sharing of information and knowledge: *Semantic Interoperability enables systems to combine received information with other information resources and to process it in a meaningful manner* (European Interoperability Framework 2.0[1]). It aims at the mental representations that human beings have of the meaning of any given data.

A **semantic interoperability asset** is defined[2] as highly reusable metadata (e.g. xml schemata, generic data models) and reference data (e.g. code lists, taxonomies, dictionaries, vocabularies) which are used for eGovernment system development.

This definition is sufficiently broad to allow the inclusion of descriptions of various types of (meta)data to be included and managed in asset repositories. Possible types are for example specifications, guideline documents, metadata schemas, code lists, controlled vocabularies, and references to various types of entities in the real world, such as organisations, people and places.

1.3 LEVELS OF DATA

This document distinguishes four levels of data:

1. eGovernment Primary Resources: primary data resources such as documents, services, software, datasets

[1] European Commission. European Interoperability Framework (EIF) for European public services. ~~European Interoperability Framework~~ http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf

[2] European Commission Joinup e-Library. Towards Open Government Metadata http://joinup.ec.europa.eu/elibrary/document/towards-open-government-metadata

2. eGovernment Metadata: descriptions of those primary information resources such as in metadata records or statements in databases that provide information about these eGovernment resources are and how they can be used.
3. Semantic Interoperability Assets: reference data that is being used in eGovernment metadata such as the ones mentioned in the previous section 1.2.
4. Descriptions of Semantic Interoperability Assets: descriptions of assets that can be contained in and made available from the semantic interoperability repositories.

The focus of Action 1.1 of the ISA Programme is on the semantic interoperability assets. ADMS, the Asset Description Metadata Schema, is proposed as a schema for the descriptions mentioned under the fourth level in the list above, and is intended to facilitate the federation of repositories of interoperability assets.

1.4 A MODEL FACILITATING FEDERATION

ADMS is intended as a model that facilitates federation and co-operation. It is not the primary intention that repository publishers redesign or convert their current systems and data to conform to ADMS, but rather that ADMS can act as a common layer among repositories that want to exchange data.

On the other hand, there is nothing prohibiting developers of new repositories, or publishers of existing repositories if they so desire, to build systems that allow the creation and maintenance of asset descriptions in an ADMS-compliant format.

The model described in this document is, as much as possible, technology-neutral so it can be implemented using different technologies. In section 7 of the specification, information will be provided on how to implement the model in RDF (Resource Description Framework)[3] and XML (eXtensible Markup Language)[4].

[3] W3C. Resource Description Framework (RDF). http://www.w3.org/RDF/
[4] W3C. Extensible Markup Language (XML). http://www.w3.org/XML/

2. APPROACH

The work on ADMS builds on the work that was initiated in December 2010 under Action 1.1 of the ISA Programme. The interim result of Phase 1 was published on the SEMIC.EU site as version 0.6a[5] which was open for public comment in March and April 2011. The comments that were made in that public comment period are being taken into account in this deliverable.

In particular, the UML (Unified Modeling Language)[6] diagrams of version 0.6a were used as the starting point for developing the conceptual model in section 5. Furthermore, the Use Case ~~s~~ in section ~~4~~4 ~~were~~ was informed by the use cases considered in version 0.6a.

The development process of ADMS is based the methodology for the development of core vocabularies described in the document "Process and methodology for Core Vocabularies"[7]. One of the basic considerations of that methodology is that semantic elements will re-use existing vocabularies where possible. This will be the leading principle in the description of RDF and XML schemas in section ~~7~~ 7.

This deliverable has been developed with the help of the ADMS Working Group and reviewed by the ADMS Review Group. These groups consist of a mix of representatives of the EU (European Union) Member States and external experts invited by the European Commission. The members of both groups are listed in section ~~10 Acknowledgements~~ 10 Acknowledgements.

After iterative development of the drafts of this document, a public comment period took place giving interested parties the opportunity to review the specification and provide comments for improvement. After that, the document was submitted for endorsement by the EU Member States.

The specification serves as the basis for a pilot implementation of a federation of asset repositories.

[5] In December 2011, the SEMIC.EU platform was migrated to Joinup. Version 0.6a of the ADMS specification is now available at https://joinup.ec.europa.eu/asset/adms/release/06

[6] OMG. Unified Modeling Language™. UML® Resource Page. http://www.uml.org/

[7] European Commission Joinup e-Library. ISA Deliverable: Process and Methodology for Developing Core Vocabularies. https://joinup.ec.europa.eu/elibrary/document/isa-deliverable-process-and-methodology-developing-core-vocabularies

3. RELATED WORK

Several related activities have been identified as sources for the specification. Consideration has been given to:

- Ontology Metadata Vocabulary (OMV[8])
- Networked Knowledge Organization Systems/Services (NKOS[9])
- CEN eGov-Share[10]
- UN/CEFACT[11]
- Data Catalog Vocabulary (DCAT[12])
- Vocabulary of Interlinked Datasets (VOID[13])
- ISO/IEC 24706[14]

These related activities have informed the definition of the concepts, properties and relationships that are presented in section 5 Conceptual model.

[8] Ontology Metadata Vocabulary – OMV. http://omv2.sourceforge.net/

[9] Networked Knowledge Organization Systems/Services N K O S. http://nkos.slis.kent.edu/

[10] CEN Workshop on 'Discovery of and Access to eGovernment Resources' (WS/eGov-Share) http://www.cen.eu/CEN/sectors/sectors/isss/workshops/Pages/wsegovshare.aspx

[11] UNECE United Nations Economic Commission for Europe. UN Centre for Trade Facilitation and E-business (UN/CEFACT). http://live.unece.org/cefact/index.html

[12] W3C. Data Catalog Vocabulary (DCAT). http://dvcs.w3.org/hg/gld/raw-file/default/dcat/index.html~~http://www.w3.org/egov/wiki/Data_Catalog_Vocabulary~~

[13] W3C. Describing Linked Datasets with the VoID Vocabulary. http://vocab.deri.ie/void, http://www.w3.org/TR/void/

[14] ISO/IEC JTC1 SC32 WG2 Development/Maintenance. ISO/IEC 24706 Information Technology — Metadata for technical standards and specifications documents. http://metadata-stds.org/24706/index.html

4. USE CASE

Business need: e-Government system developers can benefit from *reusing* semantic assets. One of the barriers to reuse is the lack of information about semantic assets. To overcome this barrier, they need to be able to easily *explore* [FRSAD – Functional Requirements for Subject Authority Records[15]], *find, identify, select,* and *obtain* [FRBR – Functional Requirements for Bibliographic Records[16]] semantic assets developed in *different* EU Member States, or other countries and organisations and originally catalogued or located in many *different* locations:

- to **explore** the semantic assets that are available in a particular subject area and to explore the relationships between semantic assets in order to understand the structure of a subject area and its terminology;
- to **find** semantic assets that correspond to the user's stated search criteria (i.e., to locate either a single semantic asset or a set of semantic assets in *multiple* repositories or catalogues as the result of a search using an attribute or relationship of the semantic asset);
- to **identify** a semantic asset (i.e., to confirm that the semantic asset described corresponds to the semantic asset sought, or to compare two or more semantic asset with similar characteristics in *multiple* repositories or catalogues);
- to **select** a semantic asset that is appropriate to the user's needs (i.e., to choose an semantic asset that meets the user's requirements with respect to content, format, etc., or to reject a semantic asset as being inappropriate to the user's needs);
- to **obtain** access to the semantic asset described (i.e., to access an entity electronically through an online connection).

Usage scenario: *Working on a new e-Government project, a user is interested in a specific semantic asset, for example a list of delicts for the European Arrest Warrant project.*

- **Without ADMS:** The user consults various semantic asset repositories and catalogues. To find, identify, select, and obtain semantic assets the user will be faced with a variety of user interface designs, different metadata, different languages, classification schemas, different access credentials and usage rights; etc.;
- **With ADMS:** The user consults one of the federated ADMS-enabled repositories or catalogues. To find, identify, and select semantic assets, the user is able to retrieve information about semantic assets hosted or documented in multiple repositories and catalogues. To obtain the semantic asset, the user is directed to the URL on the repository of origin or another location where the semantic asset can be retrieved.

Derived requirements: The ADMS must specify:

- The *minimal subset* (the ADMS Core) of metadata that must be exposed to federation partners and that are needed for the most frequent search cases;
- A subset of recommended metadata extensions;
- How to deal with multilingual properties;

[15] IFLA. Functional Requirements for Subject Authority Data (FRSAD). http://www.ifla.org/en/node/1297

[16] IFLA. Functional Requirements for Bibliographic Records. http://www.ifla.org/publications/functional-requirements-for-bibliographic-records

- How to expose or exchange the metadata (the preferred API to exchange metadata descriptions).

Similar to the [FRBR] the table below contains a list of conceivable asset metadata properties and relationships. Plotted against each property and relationship are the five generic user tasks (i.e., explore, find, identify, select, and obtain). The symbols used in the tables (■ □ ○) indicate the relative value of each attribute or relationship in supporting a specific user task focused on a particular entity. The symbol ■ signifies that an attribute or relationship is highly important for supporting the designated task; the symbol □ signifies moderate importance; and the symbol ○ signifies relatively low importance. The absence of a symbol indicates that the attribute or relationship has no discernible relevance to that particular user task or sub-task. The properties and relationships greyed out have not been included in the ADMS conceptual model.

To **explore** semantic assets, high importance is attributed to metadata properties and relationships that allow exploring a set of related semantic assets that share common characteristics in a particular subject area (~~domain~~theme, subject, spatial coverage, interoperability level, related regulation, repository of origin, publisher type, and core concept). Medium importance is given to metadata properties and relationships that in more restricted cases will be used to explore a set of linked or similar semantic assets or a set of related information sources (publisher, related project, used by).

To **find** semantic assets, high importance is attributed to metadata properties and relationships that serve to identify a semantic asset (title, alternative title, identifier, publisher, version, and URI) and that are typically used as a primary search term (multilingual description, keyword). Medium importance is given to properties and relationships that are useful subdivisions of search results (subject, spatial coverage, format, asset type), that are useful secondary search criteria (theme~~domain~~) or that will serve to direct the user from one entity to another entity (related asset, translation, is replaced by etc.). Low importance is given to properties and relationships that under limited circumstances can be used to qualify a search (core concepts and concepts).

To **identify** semantic assets, high importance is attributed to metadata properties and relationships that serve to identify a semantic asset (title, identifier, publisher, version, and URI) and that differentiate semantic assets that have common characteristics (created, modified, replaced by, format, asset type, status). Medium importance is given to metadata that in specified circumstances will serve to differentiate semantic assets (theme~~domain~~, subject, spatial coverage, status, licence class, usage).

To **select** semantic assets, high importance is attributed to metadata properties and relationships that are a significant indicator of the asset's content (format, asset type, core concept, concept, status) or that may signal requirements for viewing or reusing the asset (licence, language). Medium importance is attributed to metadata that only in specific cases indicate an asset's content (theme~~domain~~, subject, spatial coverage, usage).

To **obtain** semantic assets, high importance is attributed to metadata properties and relationships that serve to identify a semantic asset (title, identifier, publisher, version, and URI) to differentiate semantic assets that have common characteristics (created, modified, format, replaced by, asset type) and to locate the source from which the semantic asset (its Distribution) may be obtained (access URL, repository of origin) in the majority of the cases. Medium importance is given to metadata that in specified circumstances will serve to differentiate semantic assets.

Metadata category	*Metadata property or relationship*	*Description*	*Explore*	*Find*	*Identify*	*Select*	*Obtain*
descriptive metadata	name	the title of the semantic asset		■	■		■
	alternative name	the alternative name		■			
	description	descriptive text		■	■		
	keyword	word/phrase that describes the asset		■			
	identifier	any identifier for the asset		■	■		■
	ID	uniform resource identifier		■	■		■
	version	version number of the asset		■	■		■
	related asset	assets related to the asset		□			
	current version	most current version of the asset		□	□		□
	next version	next version of the asset					□
	previous version	previous version of the asset					□
	distribution	a distribution of the asset					□
applicability	theme~~domain~~	the theme~~domain~~ of the semantic asset	■	□		□	
	subject	a pre-defined list of subjects	■	□		□	
	spatial coverage	geographic region in which the asset applies	■	□		□	
	Interoperability level	level according to the European Interoperability Framework (EIF 2.0)[17] that an Asset is related to	■	□	■		
	related regulation	related regulations from which the asset is derived.	■				
provenance	repository of origin	repository or catalogue that contains the primary description of the semantic asset	■	■			
	publisher	organisation responsible for the publication of the semantic asset	□	■	■		■
	publisher type	the kind of publisher	■				
	date of creation	date of creation			■		
	date of last modification	date of last modification			■		

[17] European Commission. European Interoperability Framework (EIF) for European public services. http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf

Metadata category	Metadata property or relationship	Description	Explore	Find	Identify	Select	Obtain
	development project	development project as part of which the semantic asset was developed	□				
format	format	format in which an asset is distributed	■	□	■	■	
	asset type	type of the asset	■	□	■	■	
availability	licence	A document giving official permission to do something with a Resource				■	
	licence class	the class of licences that govern (re-)use of distributions (e.g. BSD)	■		□		
	licence type	coarse type of rights and obligations that come with the licence					
	status	status in the context of a particular workflow process			□	■	
	translation	a translated version of the asset		□			
	language	language of the asset		□	□		
accessibility	access URL	URL of the distribution of the semantic asset					■
	documentation	documentation of the asset					○
	sample	a sample of the asset					○
	homepage	an associated web page					□
usage	used by	the organisations that use the asset	□		□	□	
	used in dataset	the dataset that uses the asset			□	□	
	used in public service	the electronic public service in which the semantic asset is used			□	□	
	implemented by software asset	the software asset that uses the semantic asset			□	□	
defined concepts	core concept	any core concept that the asset (implicitly) relates to	■	○			
	included item	the concept that the asset includes		○		■	
statistics	#concepts	the number of concepts defined by the asset (includes individual concepts)					
	#relationships	the number of relationships defined by the asset					
	#properties	the number of properties defined by the asset					
	#downloads	the number of downloads of the distribution of the asset					

5. CONCEPTUAL MODEL

5.1 INTRODUCTION

The domain model presented here covers the description of resources that are related to Semantic Interoperability Assets as defined in section 1.2. These concepts, i.e. Semantic Asset Repository, Semantic Asset and Semantic Asset Distribution, described in section 5.2, are specialisations of more general concepts Repository, Asset and Distribution. Another specialisation of the general concept Asset is for example the Open Source Software Asset that is covered in the ADMS/F.OSS project[18].

The conceptual model called RADion that includes the general concepts Repository, Asset and Distribution is described in more detail in a separate document[19].

The UML diagram in section 5.3 includes the concepts, properties and relationships of the general concepts Repository, Asset and Distribution as well as the additional properties and relationship of the specialised concepts related to Semantic Interoperability Assets.

~~5.1~~5.2 DOMAIN MODEL

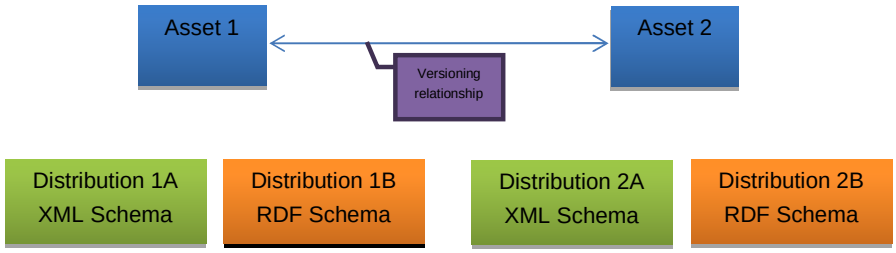
In the context of federation of repositories of Semantic Interoperability Assets, a number of concepts are relevant. The primary concepts to be described by ADMS are the following:

- A ***Semantic Asset Repository*** is a system or service that provides facilities for storage and maintenance of descriptions of Semantic Assets and Semantic Asset Distributions, and functionality that allows users to search and access these descriptions. A Semantic Asset Repository will typically contain descriptions of several Semantic Assets and related Semantic Asset Distributions.

- A~~n~~ ***Semantic Asset*** in the model is an abstract entity that reflects the intellectual content of the asset and represents those characteristics of the asset that are independent of its physical embodiment. This abstract entity combines the FRBR entities *work* (a distinct intellectual or artistic creation) and *expression* (the intellectual or artistic realization of a work)[20].
  Assets can be versioned. Every time the intellectual content of an asset changes, the result is considered to be a new asset that can be linked to previous and next versions of the Asset.
  The physical embodiment of an Asset is called a Distribution. A particular Asset may have zero or more Distributions.

[18] European Commission. Joinup. Asset Description Metadata Schema for Software (ADMS.F/OSS), an XML and RDF vocabulary to describe software, in particular free and open-source software (F/OSS) assets. http://joinup.ec.europa.eu/asset/adms_foss/home
[19] RADion. https://joinup.ec.europa.eu/asset/radion/release/01.
[20] IFLA. Cataloguing Section. Functional Requirements for Bibliographic Records, section 3. Entities. http://archive.ifla.org/VII/s13/frbr/frbr_current3.htm

- A ***Semantic Asset*** ***Distribution*** in the model represents a particular physical embodiment of a~~n~~ Semantic Asset, which is an example of the FRBR entity *manifestation* (the physical embodiment of an expression of a work).
  A Distribution is typically a downloadable computer file (but in principle it could also be a paper document) that implements the intellectual content of an Asset.
  A particular Distribution is associated with one and only one Asset, while all Distributions of an Asset share the same intellectual content in different physical formats.
  Distributions themselves are not versioned. If Distribution D1 is the manifestation of Asset A1 and D2 is the manifestation of Asset A2, a version relationship will be expressed between A1 and A2, not between D1 and D2. For an illustration of two Assets that each have two Distributions (representations in different formats) see the diagram below.



Concrete examples of the relationship between Assets and Distributions are:

- An Asset without a Distribution: even before ~~we have finalised~~ the ADMS 1.0 specification is finalised~~and are working on draft version 0.9~~, we can ~~already create~~ a description of what version 1.0 will be can already be made; for example, a ~~we can write a~~ description ~~for~~ of it can be written, the publisher is already known and the language will be ~~we know who will publish it, and we know it will be in~~ English. A link to the distribution, ~~We can only link it to~~ the physical document, can only be made when the work is done; ~~at becomes available;~~ until that time, the Asset will have no Distribution associated with it.

- An Asset and Distribution embedded in a single file: there are Assets that are specification documents, such as for example a standard published by W3C or OASIS. In those cases, the single file has some characteristics that are related to the intellectual content such as its description, its language, its version, and some characteristics that are related to the downloadable file (its location, its format, the usage conditions).

- An Asset with multiple Distributions: ADMS itself ~~version 0.8 of ADMS (~~(available at http://joinup.ec.europa.eu/asset/adms/release/0810) has ~~three~~ two Distributions associated with it: a ~~specification document,~~ an RDF schema and an XML schema. ~~All three~~Both these files are physical embodiments of the Asset ADMS.

In addition to these primary concepts, there are a number of secondary or supporting concepts:

- ***Asset Type***: classification of an Asset according to a controlled vocabulary, e.g. code list, metadata schema
- ***Contact Information***: contact point for further information about an Asset
- ***Documentation***: document that further describes an Asset or gives guidelines for its use
- ~~***Domain***: government sector that an Asset or Repository applies to, e.g. "law" or "environment" according to a controlled vocabulary~~
- ***File Format***: technical format in which a Distribution is available , e.g. PDF (Portable Document Format)[21] for a document or~~,~~ XSD (XML Schema Definition)[22] for an XML schema etc.
- ***Geographical Coverage***: country or region to which an Asset or Repository applies
- ***Item***: item that is contained inside ~~-~~an Asset, e.g. an individual term in a vocabulary, an individual code in a code list or some other 'atomic' element of an Asset
- ***Interoperability Level***: level according to the European Interoperability Framework (EIF 2.0)[23] for which an Asset is relevant
- ***Language***: language of an Asset if its contains textual information, e.g. the language of the terms in a controlled vocabulary or the language ~~that~~ in which a specification is written ~~in~~
- ***Licence***: conditions or restrictions that apply to the use of a Distribution, e.g. whether it is in the public domain, or that some restrictions apply like in cases attribution is required, or that it can only be used for non-commercial purposes etc.
- ***Period of time***: time period relevant for an Asset, e.g. for its validity
- ***Publisher***: organisation making a Repository, Asset or Distribution available
- ***Representation Technique***: machine-readable language in which a Distribution is expressed
- ***Status***: indication of the maturity of an Asset or Distribution
- ~~***Subject***: theme or subject of an Asset, e.g. "elections" or "immigration" according to a general or domain specific controlled vocabulary~~***Theme***: sector that an Asset applies to, e.g. "law" or "environment" according to a controlled vocabulary
- ***Theme Taxonomy***: a controlled vocabulary that contains terms that are used as Themes for the Assets in a Repository

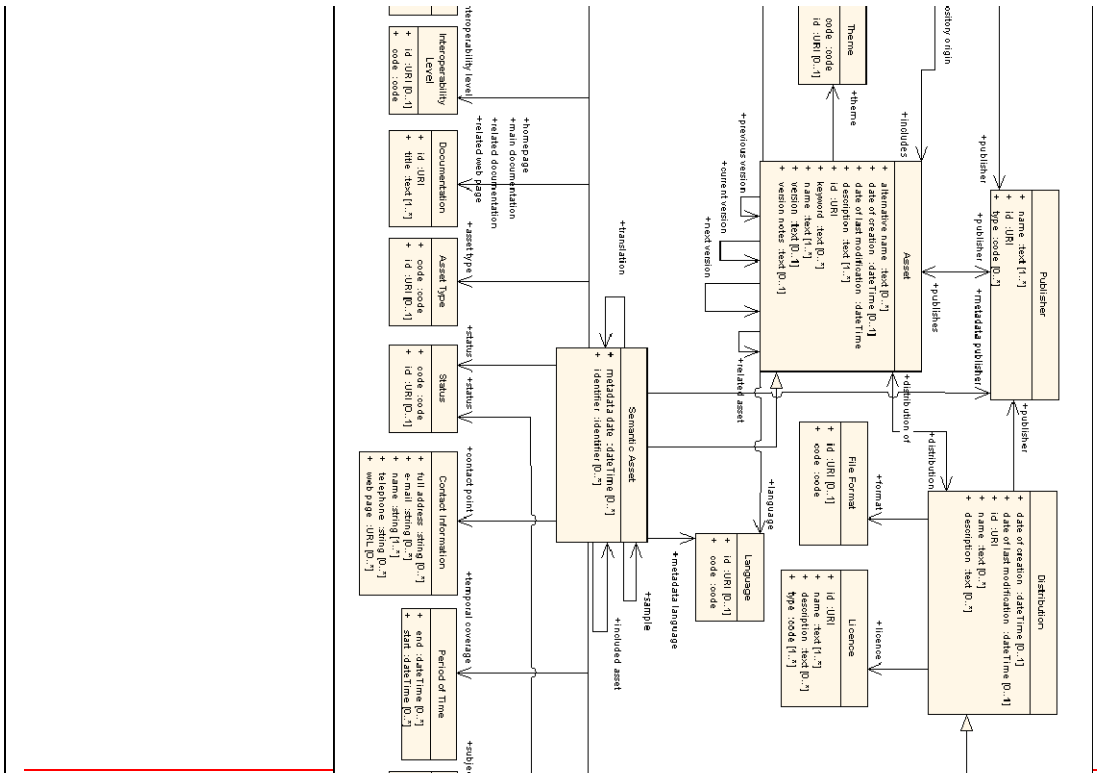
These supporting concepts are further described in section 5.6~~5.6~~5.5~~5~~.

[21] Adobe. Portable Document Format (PDF). http://www.adobe.com/pdf/
[22] W3C. XML Schema Definition Language (XSD) 1.1 Part 1: Structures. http://www.w3.org/TR/xmlschema11-1/
[23] European Commission. European Interoperability Framework (EIF) for European public services. http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf

~~5.2~~5.3 UML DIAGRAM

The model presented in the next figure shows the various concept types with their relationships and the descriptive information for the three ~~main~~ general concepts Repository, Asset and Distribution and the specific ADMS concepts Semantic Asset Repository, Semantic Asset and Semantic Asset Distribution. These ~~.~~

~~The concepts~~Concepts, with their properties ~~properties~~ and relationships, are described in more detail below the diagram.


Publisher
Distribution
Asset
Semantic Asset
Theme
File Format
Licence
Language
Interoperability Level
Documentation
Asset Type
Status
Contact Information
Period of Time
+publisher
+publishes
+includes
+distribution
+format
+licence
+language
+theme
+translation
+sample
+included asset
+metadata language
+related asset
+previous version
+current version
+next version
+interoperability level
+homepage
+main documentation
+related web page
+asset type
+status
+contact point
+temporal coverage

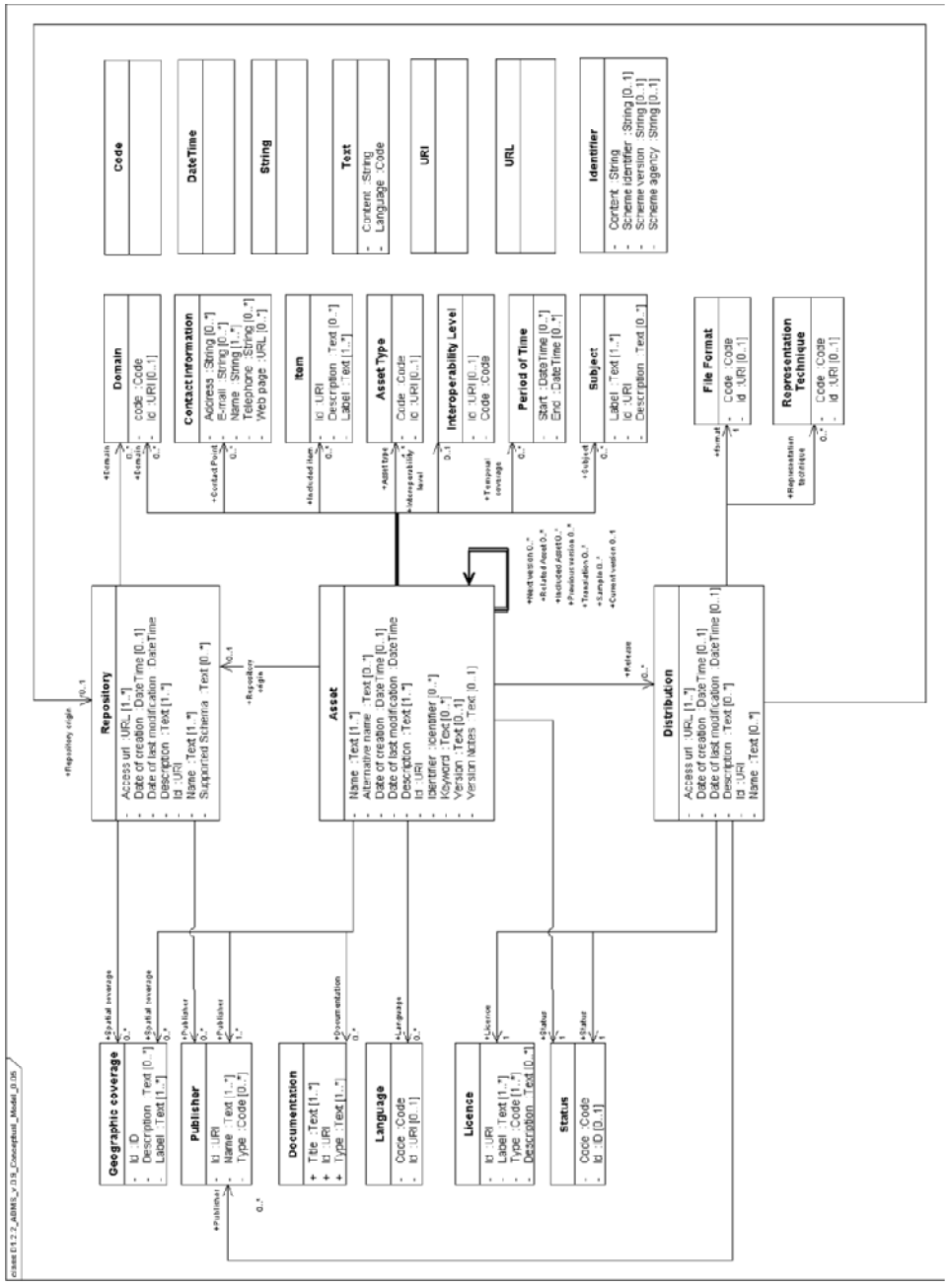


Figure 1: ADMS Conceptual Model

5.35.4 DATA TYPES

Data type	Description
cCode	String; value from a code list (see for examples section 6 6)
dDateTime	String; syntax conforming to ISO8601[24,25]
iIdentifier	Complex type (based on UN/CEFACT Identifier. Type[26]) consisting of: • a content string which is the identifier (data type String) • an optional identifier for he identifier scheme (data type String) • an optional identifier for the version of the identifier scheme (data type String) • an optional identifier for the agency that manages the identifier scheme (data type String)
sString	String of UNICODE[27] characters
tText	Complex type consisting of: • a content string (data type String) • an optional language code from RFC5646[28] (data type ~~Code~~code)
URI	String; syntax conforming to RFC 3986[29]
URL	String; syntax conforming to RFC 1738[30]

5.45.5 MAIN CONCEPTS

5.4.15.5.1 Concept: Semantic Asset

Property	Description	Data Type	Cardinality
AAlternative nName	alternative name for the Asset. Note: this information may be used to provide additional access points, e.g. allowing indexing of any acronyms, nicknames, shorthand notations or other identifying information under which a user might expect to find the Asset	~~T~~text	0..*
dDate of cCreation	creation date of this version of the Asset	dDateTime	0..1
dDate of LLast mModification	date of latest update of Asset	dDateTime	1..1
dDescription	descriptive text for the Asset	t~~T~~ext	1..*
IDid	URI for the Asset	URI	1..1
iIdentifier	any identifier for the Asset	iIdentifier	0..*

[24] ISO 8601:2004. Data elements and interchange formats -- Information interchange -- Representation of dates and times. http://www.iso.org/iso/catalogue_detail?csnumber=40874

[25] Id. http://dotat.at/tmp/ISO_8601-2004_E.pdf

[26] UNECE United Nations Economic Commission for Europe. UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT). Core Components Data Type Catalogue Version 3.1. http://www.unece.org/fileadmin/DAM/cefact/codesfortrade/CCTS/CCTS-DTCatalogueVersion3p1.pdf

[27] UNICODE. http://www.unicode.org/standard/standard.html

[28] Internet Engineering Task Force (IETF). RFC 5646. Tags for Identifying Languages. http://www.ietf.org/rfc/rfc5646.txt

[29] Internet Engineering Task Force (IETF). RFC 3986. Uniform Resource Identifier (URI): Generic Syntax. http://www.ietf.org/rfc/rfc3986.txt

[30] Internet Engineering Task Force (IETF). RFC 1738. Uniform Resource Locators (URL). http://www.ietf.org/rfc/rfc1738.txt

Property	Description	Data Type	Cardinality
kKeyword	word of phrase to describe the Asset	Ttext	0..*
metadata date	date of the most recent update of the metadata for the Asset	dateTime	0..1
nName	name of the Asset. Note: in cases that an Asset has parallel names, for example if more than one official name exists, or if an organisation or country has more than one official language, this field can be repeated for all name variants	Ttext	1..*
vVersion	version number or other designation of the Asset	Ttext	0..1
vVersion nNotes	description of changes between this version and the previous version of the Asset	Ttext	0..1

Relationship	Description	Target	Cardinality
aAsset type	type of the Asset	Asset Type	1..*
cContact Ppoint	contact point for further information about an Asset	Contact Information	0..*
cCurrent version	current or latest version of the Asset	Semantic Asset	0..1
~~**Documentation**~~	~~further documentation of the Asset~~	~~Asset~~	~~0..*~~
~~**Domain**~~	~~domain or sector to which the Asset applies~~	~~Domain~~	~~0..*~~
home page	a Web page that is fully dedicated to the Asset	Documentation	0..*
iIncluded Aasset	an Asset that is contained in the Asset being described, e.g. when there are several vocabularies defined in a single document	Semantic Asset	0..*
~~**i**~~**included item**	item that is contained in the Asset (e.g. a concept in a controlled vocabulary, an individual code in a code list or any other 'atomic' element)	Item	0..*
iInteroperability level	interoperability level ~~that~~ for which the Asset is relevant ~~for~~	Interoperability Level	0..1
lLanguage	language of the Asset	Language	0..*
main documentation	the main documentation or specification of the Asset	Documentation	0..*
metadata language	language of the metadata for the Asset	Language	0..*
metadata publisher	organisation making the metadata for the Asset available	Publisher	0..*
nNext version	newer version of the Asset	Semantic Asset	0..*
pPrevious version	older version of the Asset	Semantic Asset	0..*
pPublisher	organisation making the Asset available	Publisher	1..*
rRelated asset	unspecified relationship ~~between Assets~~from the Asset to another Asset	Semantic Asset	0..*
related documentation	documentation that contains information related to the asset	Documentation	0..*
related web page	a Web page that contains information related to the asset	Documentation	0..*

Relationship	Description	Target	Cardinality
dDistribution	implementation of the Asset in a particular format	Semantic Asset Distribution	0..*
rRepository origin	Repository that contains the primary description of the Asset	Semantic Asset Repository	0..1
sSample	sample of the Asset	Semantic Asset	0..*
sSpatial coverage	geographic region or jurisdiction to which the Asset applies	Geographic Coverage	0..*
~~**Subject**~~	~~subject or theme that the Asset covers~~	~~Subject~~	~~0..*~~
sStatus	status of the Asset in the context of a particular workflow process	Status	1..1
tTemporal coverage	time period relevant to the Asset, e.g. its validity	Period of Time	0..*
theme	theme or sector to which the Asset applies	Theme	0..*
tTranslation	translation of the Asset	Semantic Asset	0..*

~~5.4.2~~5.5.2 Concept: Semantic Asset Distribution

Property	Description	Data Type	Cardinality
aAccess URL	URL of the Distribution Note: more than one URL may be available, for example if mirror sites are maintained.	URL	1..*
dDate of cCreation	creation date of the Distribution	~~DateTime~~dateTime	0..1
dDate of ~~l~~Last ~~M~~modification	date of latest update of the Distribution	~~DateTime~~dateTime	0..1
dDescription	descriptive text for the Distribution	~~Text~~text	0..*
id~~I~~D	URI for the Distribution	URI	1..1
nName	name of the Distribution	~~Text~~text	0..*

Relationship	Description	Target	Cardinality
fFormat	format in which the Distribution is available (e.g. PDF, XSD, RDF/XML, HTML, ZIP)	File Format	1..1
lLicence	conditions or restrictions for (re-)use of the Distribution. Note: if multiple licenses are given, these licences apply to all files in the Distribution	Licence	1..~~*1~~
distribution of	the Asset that this Distribution embodies. This is the reverse relationship of Asset.Distribution	Semantic Asset	0..1
pPublisher	organisation ~~responsible for the publication of~~making the Distribution available	Publisher	0..*
~~**Repository origin**~~	~~Repository that contains the primary description of the Distribution~~	~~Repository~~	~~0..1~~
rRepresentation tTechnique	language in which the Distribution is expressed Note: this is different from the file format, e.g. a ZIP file (file format) could contain an XML schema (representation technique)	Representation Technique	0..*

Comment [V1]: Issue 274

Comment [V2]: Issue 219

Relationship	Description	Target	Cardinality
sStatus	status of the Distribution in the context of a particular workflow process	Status	1..1

5.4.35.5.3 Concept: Semantic Asset Repository

Property	Description	Data Type	Cardinality
aAccess URL	URL of the Repository	URL	1..*
dDate of cCreation	creation date of the Repository	DateTimedateTime	0..1
dDate of LLast mModification	date of latest update of the Repository	DateTimedateTime	1..1
dDescription	descriptive text for the Repository	Texttext	1..*
idID	URI for the Repository	URI	1..1
nName	name of the Repository Note: in cases that a Repository has parallel names, for example if more than one official name exists, or if an organisation or country has more than one official language, this field can be repeated for all name variants	Texttext	1..*
sSupported sSchema	Schema according to which the Repository can provide data, e.g. ADMS version 1.0	Texttext	0..*

Relationship	Description	Target	Cardinality
Domain	domain or sector to which the Repository applies	Domain	0..*
includes	an Asset for which a description is included in the Repository. This is the reverse relationship of repository origin	Semantic Asset	0..*
pPublisher	organisation responsible for the publication ofmaking the Repository available	Publisher	0..*
sSpatial coverage	geographic region or jurisdiction to which the Repository applies	Geographic Coverage	0..*
theme taxonomy	taxonomy that contains terms for Themes that are used for the Assets in a Repository	Theme Taxonomy	0..*
Spatial coverage	geographic region or jurisdiction to which the Repository applies	Geographic Coverage	0..*

Comment [V3]: Issue 214

5.55.6 SUPPORTING CONCEPTS

5.5.15.6.1 Concept: Asset Type

Property	Description	Data Type	Cardinality
Codecode	Value from a list of controlled terms; see section 6.2 6.1 for proposed values	Codecode	1..1
IDid	URI identifying the Asset Type	URI	0..1

Comment [V4]: This was an error.

~~5.5.2~~5.6.2 Concept: Contact Information

Property	Description	Data Type	Cardinality
f~~F~~ull a~~A~~ddress	The complete address written as a string, with or without formatting.	String	0..*
e~~E~~-mail	An e-mail address for questions and feedback	String	0..*
n~~N~~ame	A name of the contact point, e.g. organisation or department name, function name or name of a person	String	1..*
t~~T~~elephone	A telephone number for questions and feedback	String	0..*
~~W~~web page	A Web page where contact information is shown, or a Web form where questions and feedback can be entered	URL	0..*
Note: Although both e~~E~~-mail and w~~W~~eb page are optional, one of the two should be provided.			

~~5.5.3~~5.6.3 Concept: Documentation

Property	Description	Data Type	Cardinality
~~I~~Did	URI identifying the Documentation, or the URL where it can be accessed	URI	1..1
t~~T~~itle	Title of the Documentation Note: Documentation may have more than one title, e.g. in different languages	~~Text~~text	1..*
~~**Type**~~	~~Value from a list of controlled terms; see section 6.3 for proposed values~~	~~Text~~	~~1..*~~

~~5.5.4 Concept: Domain~~

~~Property~~	~~Description~~	~~Data Type~~	~~Cardinality~~
~~**Code**~~	~~Value from a list of controlled terms; see section 6.4 for proposed values~~	~~Code~~	~~1..1~~
~~**ID**~~	~~URI identifying the Domain~~	~~URI~~	~~0..1~~

~~5.5.5~~5.6.4 Concept: File Format

Property	Description	Data Type	Cardinality
~~**Code**~~**code**	Value from a list of controlled terms; see section 6.3 ~~6.5~~ for proposed values	~~Code~~code	1..1
~~**ID**~~**id**	URI identifying the File Format	URI	0..1

~~5.5.6~~5.6.5 Concept: Geographic Coverage

Property	Description	Data Type	Cardinality
d~~D~~escription	Descriptive text for the Geographic Coverage	~~Text~~text	0..*
~~**ID**~~**id**	URI identifying the Geographic Coverage	URI	1..1
~~**L**~~**label**	A short phrase describing the Geographic Coverage	~~Text~~text	1..*

~~5.5.7~~5.6.6 Concept: Item

Property	Description	Data Type	Cardinality

Property	Description	Data Type	Cardinality
dDescription	Descriptive text for the Item	~~Text~~text	0..*
~~ID~~id	URI identifying the Item	URI	1..1
l~~L~~abel	A short phrase describing the Item	~~Text~~text	1..*

~~5.5.8~~5.6.7 Concept: Interoperability Level

Property	Description	Data Type	Cardinality
~~Code~~code	Value from a list of controlled terms; see section ~~6.1~~6.1 for proposed values	~~Code~~code	1..1
~~ID~~id	URI identifying the Interoperability Level	URI	0..1

~~5.5.9~~5.6.8 Concept: Language

Property	Description	Data Type	Cardinality
~~Code~~code	Value from a list of controlled terms; see section 6.5 ~~6.7~~ for proposed values	~~Code~~code	1..1
~~ID~~id	URI identifying the Language	URI	0..1

~~5.5.10~~5.6.9 Concept: Licence

Property	Description	Data Type	Cardinality
dDescription	Descriptive text for the Licence	~~Text~~text	0..*
id~~ID~~	URI identifying the Licence, or the URL where the text of the licence is available	URI	1..1
name~~Label~~	A short phrase describing the Licence	~~Text~~text	1..*
~~T~~type	Value from a list of controlled terms; see section 6.7 ~~6.9~~ for proposed values	~~Code~~code	1..*

~~5.5.11~~5.6.10 Concept: Period of Time

Property	Description	Data Type	Cardinality
s~~S~~tart	Beginning of the period	~~DateTime~~dateTime	0..*
e~~E~~nd	End of the period	~~DateTime~~dateTime	0..*
Note: Although both properties are optional, at least one of the two should be provided.			

~~5.5.12~~5.6.11 Concept: Publisher

Property	Description	Data Type	Cardinality
id~~ID~~	URI identifying the Publisher; if no URI is available, the URL of the organisation's home page may be used as an alternative	URI	1..1

Property	Description	Data Type	Cardinality
nName	Name of the organisation responsible for the Asset or Repository Note: A Publisher may have one of more Names, e.g. if the organisation has names in different languages as may be the case in countries with more than one official language	Texttext	1..*
tType	Value from a list of controlled terms; see section 6.86.10	Codecode	0..*

5.5.135.6.12 Concept: Representation Technique

Property	Description	Data Type	Cardinality
Codecode	Value from a list of controlled terms; see section 6.96.11	Codecode	1..1
idID	URI identifying the Representation Technique	URI	0..1
Note: this concept indicates that one of the files in a Distribution is expressed in the Representation Technique. There may also be other files in the Distribution that are expressed in other Representation Techniques or even files that are not representations at all.			

5.5.145.6.13 Concept: Status

Property	Description	Data Type	Cardinality
Codecode	Value from a list of controlled terms; see section 6.106.12	Codecode	1..1
idID	URI identifying the Status	URI	0..1

5.5.15 Concept: Subject

Property	Description	Data Type	Cardinality
Description	Descriptive text for the Subject	Text	0..*
ID	URI identifying the Subject	URI	1..1
Label	A short phrase describing the Subject	Text	1..*

5.5.165.6.14 Concept: DomainTheme

Property	Description	Data Type	Cardinality
Codecode	Value from a list of controlled terms; see section 6.46.11 for proposed values	Codecode	1..1
idID	URI identifying the DomainTheme	URI	0..1

5.6.15 Concept: Theme Taxonomy

Property	Description	Data Type	Cardinality
code	Value from a list of controlled terms; see section 6.12 for proposed values	code	1..1
id	URI identifying the Theme Taxonomy	URI	0..1

~~5.6~~5.7 MULTILINGUAL CONSIDERATIONS

One of the crucial characteristics of the environment in which ADMS will be deployed is that it is intended to support interoperability in a multilingual environment. The following aspects are relevant:

- The content of Assets, as far as they contain textual information, will be produced in different languages; for example, codes in a code list or labels for terms in a controlled vocabulary may be based on a particular language such as is the case for the various language versions of EuroVoc[31].
- Repositories, Assets and Distributions are created, maintained and described in different languages; for example, a repository in Germany will contain descriptions in German; a Belgian registry may contain descriptions in Dutch or French or both.
- Users of the information will have different linguistic and cultural backgrounds and may expect to be able to search in their own language and find material both in their own and in other languages.

While the conceptual model of ADMS described in the previous paragraphs does not explicitly address the potential requirements for multilingual deployment in a federation of repositories, it does contain a number of capabilities to enable the support of multilingual environments.

First of all, all properties that are intended to contain “human-readable text” are defined with data type ~~Text~~text, which is a complex type consisting of text content and an optional language code.

Secondly, all such properties are repeatable, which allows the provision of different language versions with the appropriate language code.

The model does not attempt to declare any of the possible language versions the “main version” to allow flexibility on the side of the user interface in deciding which version to show to the user. If a content provider has provided parallel language versions in the metadata, a multilingual user interface would have the option to match user preferences with one of the available language versions.

The model is also silent on the source of translated information. Parallel language versions may be supplied by the content provider or be generated by automated translation tools.

Apart from the facilities provided for “human-readable text” as outline above, many of the concepts in the model are defined as having data type ~~Code~~code. Data of this type is intended to be language-independent. The semantics of the codes in a code list may be provided in

[31] Eurovoc, the EU’s multilingual thesaurus. http://eurovoc.europa.eu/

multiple languages. For vocabularies, including code lists, recommended for use with ADMS, see section ~~6~~ 6.

6. CONTROLLED VOCABULARIES

Thise section identifies a number of controlled vocabularies to be used for specific concepts in the ADMS model. In this section, the term “vocabulary” is used as shorthand for various types of controlled vocabularies, including taxonomies (collections of controlled category labels or notations representing concepts in a hierarchical structure), thesauri (networked collections of controlled terms representing concepts in a networked structure) and other types of knowledge organisation systems.

In general, use of controlled collections of terms is recommended as far as possible. Where such collections do not exist, repository publishers should consider creating and maintaining such collections to ensure consistent description.

For a number of ADMS-specific vocabularies (Interoperability Type, Asset Type, Licence Type, Publisher Type, Representation Technique, Status) sets of URIs have been defined which are listed in Annex I.

6.1 INTEROPERABILITY LEVEL VOCABULARY

The European Interoperability Framework (EIFv2[30)] distinguishes the following interoperability levels:

- Political
- Legal
- Organisational
- Semantic
- Technical

6.2 ASSET TYPE VOCABULARY

The following semantic interoperability asset types are proposed[33].

- **Core Component**: A core component is a *context-free* semantic building block for creating clear and meaningful data models, vocabularies, and information exchange packages [UN/CEFACT CCTS[34]].

[32] European Commission. European Interoperability Framework (EIF) for European public services. http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf

[33] With permission, some definitions are extracts from ISO 25964-1:2011 “Information and documentation - Thesauri and interoperability with other vocabularies -- Part 1: Thesauri for information retrieval” (http://www.iso.org/iso/catalogue_detail.htm?csnumber=53657), ISO /DIS 25964-2 “Information and documentation -- Thesauri and interoperability with other vocabularies -- Part 2: Interoperability with other vocabularies” (http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=53658) and ISO 9735-1:2002 “Electronic data interchange for administration, commerce and transport (EDIFACT) - Application level syntax rules (Syntax version number: 4, Syntax release number: 1) - Part 1: Syntax rules common to all parts” (http://www.iso.org/iso/catalogue_detail?csnumber=35032) as indicated.

- Related: **Core Vocabulary**: A Core Vocabulary is a simplified, reusable, and extensible data model that captures the fundamental characteristics of an entity in a context-neutral way [EGOV-CV[35]].
- Examples: the Dublin Core Metadata Element Set, the UN/CEFACT Core Component Library.

- **Ontology**: a formal, explicit specification of a shared conceptualization [ISO/DIS 25964-~~1~~2:~~2011~~].
  - **Examples:** SNOMED CT (Systematized Nomenclature of Medicine -- Clinical Terms)
- **Domain Model**: A domain model is a conceptual view of a system or an information exchange that identifies the entities involved and their relationships [NIEM Glossary[36]].
  - Examples: the ADMS Conceptual Model in Section 5
- **Schema**: A schema is a concrete view on a system or information exchange, describing the structure, content, and semantics of data.
  - Examples: Trade Mark XML (TM-XML[37]).
- **Information Exchange Package Description.** A collection of artifacts that define and describe the structure and content of an information exchange [NIEM Glossary]. An Information Exchange Package Description has a specific information exchange context and may refer to other semantic assets.
  - Related: **Semantic Interoperability Agreement**: Concrete and binding agreement that sets out the precise obligations of parties cooperating across an 'interface' to achieve semantic interoperability [EIFv2].
  - Examples: the ADMS specification, CEN/ISSS Business Interoperability Interfaces for Public procurement in Europe (CENBII[38]), Global Justice Information Exchange Package (GJXDM[39]).
- **Thesaurus**: controlled and structured vocabulary in which concepts are represented by terms, organized so that relationships between concepts are made explicit, and preferred terms are accompanied by lead-in entries for synonyms or quasi-synonyms [ISO 25964-1:2011].
  - Examples: EuroVoc[40], AGROVOC[41], GEMET[42].
- **Taxonomy**: scheme of categories and subcategories that can be used to sort and otherwise organize items of knowledge or information [ISO/DIS 25964-2~~ISO 25964-1:2011~~].

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[34] UNECE United Nations Economic Commission for Europe. UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT). Core Components Data Type Catalogue Version 3.1. http://www.unece.org/fileadmin/DAM/cefact/codesfortrade/CCTS/CCTS-DTCatalogueVersion3p1.pdf

[35] European Commission Joinup e-Library. ISA Deliverable: Process and Methodology for Developing Core Vocabularies. https://joinup.ec.europa.eu/elibrary/document/isa-deliverable-process-and-methodology-developing-core-vocabularies

[36] NIEM – National Information Exchange Model. Glossary. http://www.niem.gov/glossary/

[37] TM-XML. A Trade Mark XML Open Standard Initiative. TM-XML Specifications. http://www.tm-xml.org/

[38] CEN BII 2. http://www.cenbii.eu/

[39] US Department of Justice. Information Technology Initiatives. The Global Justice XML Data Model (Global JXDM). http://it.ojp.gov/jxdm/

[40] Eurovoc, the EU's multilingual thesaurus. http://eurovoc.europa.eu/

[41] Food and Agriculture Organization of the United Nations, Agricultural Information Management Standards. AGROVOC. http://www.fao.org/agrovoc/

[42] EIONET. GEMET Thesaurus. http://www.eionet.europa.eu/gemet

  - Examples: International Standard Industrial Classification (ISIC[43]), European classification of economic activities (NACE[44]), United Nations Standard Products and Services Code (UNSPSC[45]), the Nomenclature of Territorial Units for Statistics (NUTS[46]).
- **Code List**: Complete set of data element values of a coded simple data element [ISO 9735-1:2002, 4.14].
  - Example: ISO639-3 language codes[47].
- **Name Authority List**: controlled vocabulary for use in naming particular entities consistently [ISO/DIS 25964-2~~ISO 25964-1:2011~~].
  - Example: IANA Media Types[48], geonames.org[49].
- **Mapping**: relationship between a concept in one vocabulary and one or more concepts in another [ISO/DIS 25964-2~~ISO 25964-1:2011~~].
- **Syntax Encoding Scheme**: Syntax Encoding Schemes indicate that the value is a string formatted in accordance with a formal notation, such as "2000-01-01" as the standard expression of a date. [DCMI Glossary].
  - Example: xsd:date[50], W3CDTF[51], ISO 8601:2004[52]
- **Service Description**: A service description is a set of documents that describe the interface to and semantics of a service [W3C WS-GLOSS[53]].

The table below gives an overview of interoperability asset types per interoperability level in the European Interoperability Framework (EIFv2). Political, legal, organisational, and technical interoperability assets are greyed out, as they are outside the scope of this specification.

Interoperability Level	*Interoperability Asset Type*
Political	• Political Interoperability Agreement
Legal	• Legal Interoperability Agreement • Legislative Framework • Contract Template • Licence Template
Organisational	• Organisational Interoperability Agreement • Business Process Model • Business Service Description

[43] US Census Bureau. Standard Industrial Classification (SIC) System. http://www.census.gov/epcd/www/sic.html
[44] http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2
[45] UNSPSC®. The United Nations Standard Products and Services Code®. http://www.unspsc.org/
[46] European Commission. Eurostat. NUTS classification (Nomenclature of territorial units for statistics). http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction
[47] SIL International. ISO 639 Code Tables. http://www.sil.org/iso639-3/codes.asp
[48] IANA Internet Assigned Numbers Authority. MIME Media Types. http://www.iana.org/assignments/media-types/index.html
[49] Geonames. http://www.geonames.org/
[50] W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes: date. http://www.w3.org/TR/xmlschema11-2/#date
[51] W3C. Date and Time Formats. http://www.w3.org/TR/NOTE-datetime
[52] ISO 8601:2004. Data elements and interchange formats -- Information interchange -- Representation of dates and times. http://www.iso.org/iso/catalogue_detail?csnumber=40874
[53] W3C. Web Services Glossary. http://www.w3.org/TR/ws-gloss/

Interoperability Level	*Interoperability Asset Type*
Semantic	• Core Component • Ontology • Domain Model • Schema • Information Exchange Package Description • Thesaurus • Taxonomy • Code List • Name Authority List • Mapping • Syntax Encoding Scheme • Web Service Description
Technical	• Technical Interoperability Agreement • Security Specification • Communication Protocol • Software

In addition to the common Asset Types in the table above, Asset publishers may include data based on local vocabularies.

~~6.3 DOCUMENTATION TYPE VOCABULARY~~

~~The proposed vocabulary for Documentation Type is as follows:~~

- ~~**Home page**: a Web page that is fully dedicated to the asset.~~
- ~~**Related Web page**: a Web page that contains information related to the asset.~~
- ~~**Main documentation**: the main documentation or specification of the asset.~~
- ~~**Related documentation**: documentation that contains information related to the asset.~~
- ~~**Implementation guideline:** documentation that contains information on how to implement a semantic asset.~~

~~6.4~~6.3 FILE FORMAT VOCABULARY

The proposed vocabulary for File Format is the list of IANA MIME Media Types.

~~6.5~~6.4 GEOGRAPHIC COVERAGE VOCABULARY

Several vocabularies are available for geographic coverage. ISO 3166 Alpha 2 codes[54] can be used for countries, while ISO 3166-2[55] specifies official subdivisions of countries. NUTS, the Nomenclature of territorial units for statistics maintained by Eurostat can be used. Other

[54] ISO 3166-1:2006. Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes. http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=39719

[55] ISO 3166-2:2007. Codes for the representation of names of countries and their subdivisions -- Part 2: Country subdivision code. http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=39718

possible vocabularies are GeoNames, DBPedia[56], FAO Geopolitical Ontology[57], UN/LOCODE[58] and The Getty Thesaurus of Geographic Names[59].

~~6.6~~6.5 LANGUAGE VOCABULARY

The proposed vocabulary for Language is the code list defined by IETF RFC 5646[60]. URIs for languages are maintained by lexvo.org[61] (for ISO639-3[62]) and the Library of Congress (for ISO639-2[63]).

Comment [V5]: Issue 279

~~6.7~~6.6 LICENCE VOCABULARY

A proposed vocabulary for the concept Licence is the one defined by Creative Commons[64]. Other licence vocabularies may be considered depending on existing approaches and requirements, e.g. the ISA Open Metadata Licence v1.0[65] under which this specification is issued or the French Cecill licence[66].

~~6.8~~6.7 LICENCE TYPE VOCABULARY

In addition to a reference to a specific licence (see previous section 6.6~~6.8~~) a vocabulary is defined to classify the conditions and restrictions that are related to the specified licence.

The following list of Licence Types is proposed:

- Attribution
- Public domain
- Viral effect (a.k.a. Share-alike)
- Non-commercial use only
- No derivative work
- Royalties required
- Reserved names / endorsement / official status
- Nominal cost
- Grant back
- Jurisdiction within the EU

[56] DBPedia. http://dbpedia.org/About
[57] Food and Agriculture Organization of the United Nations. FAO Country Profiles http://www.fao.org/countryprofiles/geoinfo.asp?lang=en
[58] UNECE United Nations Economic Commission for Europe. UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT). United Nations Code for Trade and Transport Locations (UN/LOCODE). http://www.unece.org/cefact/locode/welcome.html
[59] The Getty Research Institute. Getty Thesaurus of Geographic Names®. http://www.getty.edu/research/tools/vocabularies/tgn/index.html
[60] Internet Engineering Task Force. RFC 5646. Tags for Identifying Languages. http://www.ietf.org/rfc/rfc5646.txt
[61] Lexvo.org http://www.lexvo.org/
[62] SIL International. ISO 639 Code Tables. http://www.sil.org/iso639-3/codes.asp
[63] Library of Congress. ISO 639.2 Registration Authority. Codes for the Representation of Names of Languages Part 2: Alpha-3 Code. http://www.loc.gov/standards/iso639-2/langhome.html
[64] Creative Commons. http://creativecommons.org/
[65] European Commission. Joinup. ISA Open Metadata Licence v1.0. https://joinup.ec.europa.eu/category/licence/isa-open-metadata-licence-v10
[66] CeCILL. Licence française de logiciel libre.http://www.cecill.info/

- Other restrictive clauses
- Known patent encumbrance
- Unknown IPR

~~6.9~~6.8 PUBLISHER TYPE VOCABULARY

~~Asset publishers may use a local controlled vocabulary for Publisher IDs and Names.~~

The proposed vocabulary for Publisher Type is as follows:

- Academia/Scientific organisation
- Company
- Industry consortium
- Local Authority
- National authority
- Non-Governmental Organisation
- Non-Profit Organisation
- Private Individual(s)
- Regional authority
- Standardisation body
- Supra-national authority

Comment [V6]: This was a lay-out error.

~~6.10~~6.9 REPRESENTATION TECHNIQUE VOCABULARY

The proposed vocabulary for Representation Technique is as follows:

- Human Language
- Diagram
- UML (Unified Modeling Language)[67]
- XML Schema[68]
- SKOS (Simple Knowledge Organization Schema)[69]
- RDF Schema[70]
- Genericode[71]
- IDEF (Integration DEFinition Methods)[72]
- BPMN (Business Process Modeling Notation)[73]
- Archimate[74]

[67] OMG. Unified Modeling Language™. UML® Resource Page. http://www.uml.org/
[68] W3C. XML Schema http://www.w3.org/XML/Schema
[69] W3C. SKOS Simple Knowledge Organization System. http://www.w3.org/2004/02/skos/
[70] W3C. RDF Vocabulary Description Language 1.0: RDF Schema. http://www.w3.org/TR/rdf-schema/
[71] Genericode. http://www.genericode.org/
[72] IDEF Integrated DEFinition Methods. http://www.idef.com/
[73] OMG. Business Process Model and Notation. http://www.bpmn.org/
[74] The Open Group. Archimate®. http://www3.opengroup.org/subjectareas/enterprise/archimate

- SBVR (Semantics of Business Vocabulary and Rules)[75]
- DTD (Document Type Definition)[76]
- Schematron[77]
- OWL (Web Ontology Language)[78]
- SPARQL (Query Language for RDF)[79]
- SPIN (SPARQL Inference Notation)[80]
- WSDL (Web Services Description Language)[81]
- WSMO (Web Service Modeling Ontology)[82]
- KIF (Knowledge Interchange Format)[83]
- Prolog[84]
- Datalog[85]
- RuleML (Rule Markup Language)[86]
- RIF (Rule Interchange Format)[87]
- SWRL (Semantic Web Rule Language)[88]
- Topic Maps[89]
- Common Logic[90]

~~6.11~~6.10 STATUS VOCABULARY

The proposed vocabulary for Status is:

- Completed
- Under development
- Deprecated
- Withdrawn

~~6.12~~6.11 ~~SUBJECT~~ THEME VOCABULARIES

Many candidate vocabularies are available for ~~Subject~~Theme. Examples are the European Commission's ECLAS[91] Thesaurus and EuroVoc, GEMET, AGROVOC, ZBW's STW Thesaurus for Economics[92], the Library of Congress' Subject Headings (LCSH)[93] and Thesaurus for

[75] OMG. Semantics of Business Vocabulary and Rules (SBVR). http://www.omg.org/spec/SBVR/
[76] W3C. Document Type Definition. http://www.w3.org/TR/html4/sgml/dtd.html
[77] Schematron. http://www.schematron.com/
[78] W3C. Web Ontology Language (OWL). http://www.w3.org/2004/OWL/
[79] W3C. SPARQL Query Language for RDF. http://www.w3.org/TR/rdf-sparql-query/
[80] SPIN SPARQL Inferencing Notation. http://spinrdf.org/
[81] W3C. Web Services Glossary, W3C Working Group Note. http://www.w3.org/TR/wsdl
[82] WSMO. Web Service Modeling Ontology. http://www.wsmo.org/
[83] Knowledge Interchange Format (KIF). http://www-ksl.stanford.edu/knowledge-sharing/kif/
[84] Prolog. http://en.wikipedia.org/wiki/Prolog
[85] Datalog. http://en.wikipedia.org/wiki/Datalog
[86] RuleML. The Rule Markup Initiative. http://ruleml.org/
[87] W3C. Rule Interchange Format (RIF). http://www.w3.org/TR/2010/NOTE-rif-overview-20100622/
[88] W3C. SWRL: A Semantic Web Rule Language Combining OWL and RuleML. http://www.w3.org/Submission/SWRL/
[89] Topic Maps. http://www.topicmaps.org/
[90] Common Logic Standard. http://iso-commonlogic.org/
[91] ECLAS, the Commission libraries' union catalogue. http://ec.europa.eu/libraries/doc/catalogues/index_en.htm
[92] Leibniz Information Centre for Economics ZBW. STW Thesaurus for Economics. http://zbw.eu/stw/versions/latest/about

Graphic Materials (TGM)[94] and others.~~,~~ The use of these vocabularies is closely linked to the ~~domain~~ theme to which ~~t~~ an Asset is related. It is recommended that terms should be assigned from a vocabulary that is most widely used in the domain covered.

~~6.13 DOMAIN VOCABULARY~~

~~The proposed vocabulary for Domain is the domain level[95] of EuroVoc[96]. In addition to this common Domain vocabulary, Asset publishers may include data based on local vocabularies.~~

6.12 THEME TAXONOMY VOCABULARY

The proposed vocabulary for Theme Taxonomy is the domain level[97] of EuroVoc. In addition to this common Theme Taxonomy vocabulary, Asset publishers may include data based on local vocabularies.

~~6.14~~6.13 OTHER VOCABULARIES AND REFERENCE COLLECTIONS

For the entity Item, the relationship could be directly to the items that are contained in the Asset if they can be referenced separately. Alternatively, a standardised concept vocabulary, such as the Universal Data Element Framework (UDEF)[98] could be used.~~Asset publishers may use a local controlled vocabulary for Publisher IDs and Names.~~

[93] The Library of Congress. Subject & Genre/Form Headings. http://www.loc.gov/aba/cataloging/subject/

[94] The Library of Congress. Thesaurus for Graphic Materials. http://id.loc.gov/vocabulary/graphicMaterials.html

~~[95] EuroVoc. Multilingual Thesaurus of the Europeana Union. Subject-oriented version. http://eurovoc.europa.eu/drupal/?q=download/subject_oriented&cl=en~~

~~[96] Eurovoc, the EU's multilingual thesaurus. http://eurovoc.europa.eu/~~

[97] EuroVoc. Multilingual Thesaurus of the Europeana Union. Subject-oriented version. http://eurovoc.europa.eu/drupal/?q=download/subject_oriented&cl=en

[98] The Open Group. Universal Data Element Framework (UDEF). https://www.opengroup.org/udef/

7. RDF AND XML SCHEMAS FOR ADMS

Expressions of ADMS in RDF and XML are linked from Joinup[99].

7.1 RDF SCHEMA

Text to be added.

7.2 XML SCHEMA

The backbone of ADMS in XML is a Common Library of information elements provided by the library of the Universal Business Language (UBL)[100]. The philosophy behind this design is to achieve reusability of information elements defined by the Core Component Technical Specification (CCTS)[101] of UN/CEFACT[102] (the basis of UBL).

[99] http://joinup.ec.europa.eu/asset/adms/release/10

[100] OASIS. Universal Business Language v2.1. http://docs.oasis-open.org/ubl/UBL-2.1.pdf

[101] United Nations Centre for Trade Facilitation and Electronic Business. Core Components Technical Specification Version 3.0 http://www.unece.org/fileadmin/DAM/cefact/codesfortrade/CCTS/CCTS-Version3.pdf

[102] UNECE United Nations Economic Commission for Europe. UN Centre for Trade Facilitation and E-business (UN/CEFACT). http://www.unece.org/cefact/index.html

Field Code Changed

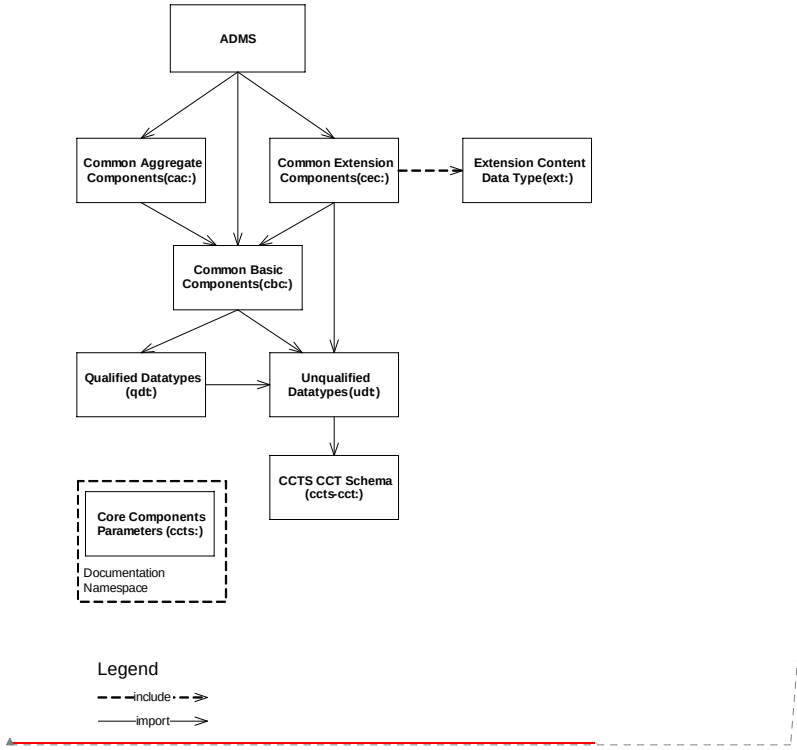

Figure 2. ADMS XML Schema and reuse of UBL and CCTS

Reused schemas:

- **CommonBasicComponents**[103]

  The CommonBasicComponents schema defines the global Basic Business Information Entities (BBIEs) that are used throughout UBL, serving, in effect, as a "global BBIE type database" for constructing documents. BBIEs are the "leaf nodes" of UBL documents, corresponding to individual data fields in traditional printed business forms.

- **CommonAggregateComponents**[104]

  The CommonAggregateComponents schema defines the Aggregate Business Information Entities (ABIEs) that are used throughout UBL, serving, in effect, as an "ABIE type database" for constructing the main documents.

- **UnqualifiedDataTypes**[105]

  This schema defines Unqualified Data Types for BBIE definition. These types are derived from the Core Component Types in CCTS_CCT_SchemaModule[106]. Where an unqualified

[103] http://docs.oasis-open.org/ubl/prd1-UBL-2.1/xsd/common/UBL-CommonBasicComponents-2.1.xsd
[104] http://docs.oasis-open.org/ubl/prd1-UBL-2.1/xsd/common/UBL-CommonAggregateComponents-2.1.xsd
[105] http://docs.oasis-open.org/ubl/prd1-UBL-2.1/xsd/common/UBL-UnqualifiedDataTypes-2.1.xsd

type is not based solely on an XSD data type, all CCTS supplementary components are made available in the UBL Unqualified Data Type from the CCTS_CCT_SchemaModule.

- **QualifiedDataTypes**[107]

  CCTS permits the definition of Qualified Datatypes as derivations from CCTS specified Unqualified Datatypes. In UBL 2.1, all data type qualifications are expressed in the file cva/UBL-DefaultDTQ-2.1.cva[108].The UBL-QualifiedDataTypes-2.1.xsd file in the UBL 2.1 release is included among the schema modules imported by the Common Library and all document-level schema fragments in order to be consistent with the relationship of types

[106] http://docs.oasis-open.org/ubl/prd1-UBL-2.1/xsd/common/CCTS_CCT_SchemaModule-2.1.xsd
[107] http://docs.oasis-open.org/ubl/prd1-UBL-2.1/xsd/common/UBL-QualifiedDataTypes-2.1.xsd
[108] http://docs.oasis-open.org/ubl/prd2-UBL-2.1/cva/UBL-DefaultDTQ-2.1.cva

~~9.~~8. CUSTOMISATION

As ADMS is conceived as a core specification and requirements may evolve over time, there is a need to define a mechanism for extending, and more in general, customising ADMS. Through such customisation, the deployment of ADMS in different environments can be facilitated. Furthermore, this will also enable ADMS to develop over time while functional requirements and technical capabilities evolve.

~~9.1~~8.1 ORGANISATIONAL CONSIDERATIONS

The organisational aspects of customising ADMS will be based on the overall process and methodology for Core Vocabularies[109]. In particular, any changes in the model should be based on identified needs and the development process should lead to community consensus.

~~9.2~~8.2 C~~C~~ONCEPTUAL CONSIDERATIONS

On the conceptual level, the customisation mechanism covers any changes to the model involving the addition of classes, properties and relationships, and options for variations in implementations.

Where the model that has been developed does not meet all business requirements, customisation is possible. Customising a model can be done in a variety of ways (based on the UBL 2 Guidelines for Customization[110]):

- **Annotation**. It is possible to customise a model by adding new information in the form of annotations.
- **Extension**. Extending the model means adding new information to the model that was not previously there.
- **Reduction – Restriction**. A model can be customised by imposing additional restrictions on the information that is captured in the model.
- **Reduction – Subsection**. For some use cases, a model can contain too much information. Using just a subset of the information contained in the original model is another means of customisation.
- **Rename**. When certain naming requirements are in place preventing use of the original model, it can be customised by renaming it.
- **Replacement**. A model can be customised by developing a new model entirely replacing the first model.

[109] European Commission Joinup e-Library. ISA Deliverable: Process and Methodology for Developing Core Vocabularies. https://joinup.ec.europa.eu/elibrary/document/isa-deliverable-process-and-methodology-developing-core-vocabularies

[110] OASIS. UBL 2 Guidelines for Customization. First Edition. http://docs.oasis-open.org/ubl/guidelines/UBL2-Customization1.0cs01.pdf

~~Note that **Reduction** and **CustomisedConcept** are abstract concepts and are not extension mechanisms by themselves.~~

~~9.3~~8.3 FURTHER WORK

Expressions of ADMS are developed in both RDF and XML (see section 7 RDF and XML Schemas for ADMS ~~7~~). These two expression approaches have different customisation capabilities. Guidelines will be created for each of these technologies, considering the options for customisation and the consequences for interoperability in either case.

~~10.~~9. REFERENCES AND LINKS

References are given for the section in which they first appear.

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~~11.~~10. ACKNOWLEDGEMENTS

~~11.1~~10.1 ADMS WORKING GROUP

Title	First Name	Surname	Organisation	Country	Additional Info
Mr	Dimitris	Alexandrou	UBITECH Ltd.	GR	External expert, Commission Internationale de l'Etat Civile (http://www.ciec1.org/)
Mr	Adam	Arndt	Danish National IT and Telecom Agency	DK	Member State Representative, Denmark
Ms	Christina	Bapst	NIEM - National Information Exchange Model	US	External expert
Mr	Oriol	Bausà Peris	INVINET	ES	External expert, CEN Workshops Global eBusiness Interoperability Test Bed methodologies (GITB, http://www.cen.eu/cen/sectors/sectors/iss/workshops/pages/testbed.aspx) and Business Interoperability Interfaces for Public procurement in Europe (BII, http://www.cen.eu/cwa/bii/specs/)
Mr	Pavel	Benda	ASD Software	CZ	External expert
Mr	John	Borras	OASIS	UK	External expert, OASIS eGovernment Member Section (eGov MS, http://www.oasis-egov.org/)
Ms	Carol	Bream	European Commission Central Library	BE	External expert
Mr	Gregory	Chomatas	BetaCONCEPT	GR	Member State Representative, Greece
Mr	Robin	Cover	OASIS	US	External expert
Mr	Max	Craglia	European Commission Joint Research Centre	IT	External expert, INSPIRE Metadata (http://inspire.jrc.ec.europa.eu/index.cfm/pageid/101)
Mr	Noel	Cuschieri	Malta Information Technology Agency (MITA)	MT	Member State Representative, Malta
Ms	Corinne	Frappart	Publications Office of the European Union	EU	External expert
Mr	Cristiano	Fugazza	European Commission Joint Research Centre	IT	External expert, INSPIRE Metadata (http://inspire.jrc.ec.europa.eu/index.cfm/pageid/101)
Mr	Andreas	Gehlert	Federal Ministry of the Interior	DE	Member State Representative, Germany
Mr	Giorgios	Georgiannakis	European Commission SANCO	BE	External expert
Mr	Bart	Hanssens	FEDICT	BE	Member State Representative, Belgium
Mr	Douglas	Hill	GS1	DK	External expert
Mr	Josef	Hruška	Ministry of Interior	CZ	Member State Representative, Czech Republic
Mr	Baden	Hughes	Cabahu Pty Ltd	AU	External expert
Mr	Erik	Jonker	Ministry of Internal Affairs and Kingdom Relations	NL	Member State Representative, The Netherlands

Mr	Ioannis	Kanellopoulos	European Commission Joint Research Centre	IT	External expert, INSPIRE Metadata (http://inspire.jrc.ec.europa.eu/index.cfm/pageid/101)
Ms	Anne	Kauhanen-Simanainen	Ministry of Finance	FI	Member State Representative, Finland
Mr	Dávid	Kétszeri	GS1	HU	External expert
Ms	Madeleine	Kiss	Publications Office of the European Union	LU	External expert
Mr	Peep	Küngas	University of Tartu	EE	External expert
Mr	Aigars	Laurinovics	Ministry of the Environmental Protection and Regional Development	LV	Member State Representative, Latvia
Mr	Nikos	Loutas	DERI	IE	External expert
Mr	Fadi	Maali	DERI	IE	External Expert
Mr	David	Mitton	Listpoint	UK	External expert
Mr	Klaus-Dieter	Naujok	ISO/TC 154	US	External expert
Mr	Priit	Parmakson	Estonian Information System's Authority	EE	Member State Representative, Estonia
Mr	Maarten	Peelen	NEN, Netherlands Standardization Institute	NL	External expert
Mr	Andrea	Perego	European Commission Joint Research Centre	IT	External expert, INSPIRE Metadata (http://inspire.jrc.ec.europa.eu/index.cfm/pageid/101)
Mr	Vassilios	Peristeras	European Commission	BE	Project Officer
Mr	Peter	Reichstädter	Federal Chancellery	AT	Member State Representative, Austria
Mr	Radoslav	Repa	Permanent Representation of the Slovak Republic to the European Union	SK	Member State Representative, Slovak Republic
Ms	Nancy	Routzouni	Ministry of Interior	GR	Member State Representative, Greece
Mr	Peter	Schmitz	Publications Office of the European Union	LU	External expert
Ms	Gofran	Shukair	DERI, University of Galway	IE	External expert
Mr	Sebastian	Sklarß	]init[	DE	External expert, XRepository
Ms	Imma	Subirats Coll	Food and Agriculture Organization (FAO)	IT	External expert
Mr	Gabriel	Sultana	Malta Information Technology Agency (MITA)	MT	Member State Representative, Malta
Mr	Alois	Svoboda	Ministry of the Interior	CZ	Member State Representative, Czech Republic
Mr	George	Valchev	Ministry of Transport and ICT	BG	Member State Representative, Bulgaria
Ms	Tran	Van Anh~~hn~~	The Open Technology Foundation		External expert
Mr	Emile	Van de Maas	ICTU	NL	External expert
Mr	Willem	Van Gemert	Publications Office of the European Union	EU	External expert

Mr	Seth	Van Hooland	Université Libre de Bruxelles	BE	External expert
Mr	Arnold	Van Overeem	CapGemini	NL	External expert, OpenGroup/UDEF (https://www.opengroup.org/udef/)
Mr	Neven	Vrček	University of Zagreb	HR	External expert
Mr	Andy	Waters	National Police Improvement Agency	UK	External expert
Ms	Sofia	Zapounidou	University of Macedonia	GR	External expert
Ms	Marcia Lei	Zeng	Kent State University	US	External expert, Knowledge Organization Systems/Services (NKOS, http://nkos.slis.kent.edu/)
Mr	Milan	Zoric	European Telecommunications Standards Institute (ETSI)	FR	External expert

~~11.2~~10.2 ADMS REVIEW GROUP

Title	First Name	Surname	Organisation	Country	Additional Info
Mr	Joseph S.	Azzopardi	Malta Information Technology Agency	MT	Member State Representative, Malta
Mr	Vytautas	Krasauskas	Ministry of the Interior	LT	Member State Representative, Lithuania
Mr	Francisco José	Martín	Ministerio de política territorial y administración pública	ES	Member State Representative, Spain
Mr	Uuno	Vallner	Ministry of Economic Affairs and Communications, Department of State Information Systems	EE	Member State Representative, Estonia

~~11.3~~10.3 THE SEMIC TEAM

- Phil Archer, W3C
- Makx Dekkers, AMI Consult (ADMS editor)
- Débora Di Giacomo, PwC
- João Rodrigues Frade, PwC (ADMS Working Group Chair)
- Stijn Goedertier, PwC
- Thomas Rössler, W3C
- Niels Van Hee, PwC
- Rigo Wenning, W3C

ANNEX I.

This annex specifies the URIs for the ADSM-specific vocabularies that are described in section 6.

I.1 INTEROPERABILITY LEVEL

Base URI: http://purl.org/adms/interoperabilitylevel/

Code	*URI*
Political	http://purl.org/adms/interoperabilitylevel/Political
Legal	http://purl.org/adms/interoperabilitylevel/Legal
Organisational	http://purl.org/adms/interoperabilitylevel/Organisational
Semantic	http://purl.org/adms/interoperabilitylevel/Semantic
Technical	http://purl.org/adms/interoperabilitylevel/Technical

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I.2 ASSET TYPE

Base URI: http://purl.org/adms/assettype/

Code	*URI*
Core Component	http://purl.org/adms/assettype/CoreComponent
Ontology	http://purl.org/adms/assettype/Ontology
Domain Model	http://purl.org/adms/assettype/DomainModel
Schema	http://purl.org/adms/assettype/Schema
Information Exchange Package Description	http://purl.org/adms/assettype/InformationExchangePackageDescription
Thesaurus	http://purl.org/adms/assettype/Thesaurus
Taxonomy	http://purl.org/adms/assettype/Taxonomy
Code List	http://purl.org/adms/assettype/CodeList
Name Authority List	http://purl.org/adms/assettype/NameAuthorityList
Mapping	http://purl.org/adms/assettype/Mapping
Syntax Encoding Scheme	http://purl.org/adms/assettype/SyntaxEncodingScheme
Service Description	http://purl.org/adms/assettype/ServiceDescription

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I.3 LICENCE TYPE

Base URI: http://purl.org/adms/licencetype/

Code	URI
Attribution	http://purl.org/adms/licencetype/Attribution
Public domain	http://purl.org/adms/licencetype/PublicDomain
Viral effect (a.k.a. Share-alike)	http://purl.org/adms/licencetype/ViralEffect-ShareAlike
Non-commercial use only	http://purl.org/adms/licencetype/NonCommercialUseOnly
No derivative work	http://purl.org/adms/licencetype/NoDerivativeWork
Royalties required	http://purl.org/adms/licencetype/RoyaltiesRequired
Reserved names / endorsement / official status	http://purl.org/adms/licencetype/ReservedNames-Endorsement-OfficialStatus
Nominal cost	http://purl.org/adms/licencetype/NominalCost
Grant back	http://purl.org/adms/licencetype/GrantBack
Jurisdiction within the EU	http://purl.org/adms/licencetype/JurisdictionWithinTheEU
Other restrictive clauses	http://purl.org/adms/licencetype/OtherRestrictiveClauses
Known patent encumbrance	http://purl.org/adms/licencetype/KnownPatentEncumbrance
Unknown IPR	http://purl.org/adms/licencetype/UnknownIPR

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I.4 PUBLISHER TYPE

Base URI: http://purl.org/adms/publishertype/

Code	URI
Academia/Scientific organisation	http://purl.org/adms/publishertype/Academia-ScientificOrganisation
Company	http://purl.org/adms/publishertype/Company
Industry consortium	http://purl.org/adms/publishertype/IndustryConsortium
Local Authority	http://purl.org/adms/publishertype/LocalAuthority
National authority	http://purl.org/adms/publishertype/NationalAuthority
Non-Governmental Organisation	http://purl.org/adms/publishertype/NonGovernmentalOrganisation
Non-Profit Organisation	http://purl.org/adms/publishertype/NonProfitOrganisation

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Code	URI
Private Individual(s)	http://purl.org/adms/publishertype/PrivateIndividual(s)
Regional authority	http://purl.org/adms/publishertype/RegionalAuthority
Standardisation body	http://purl.org/adms/publishertype/StandardisationBody
Supra-national authority	http://purl.org/adms/publishertype/SupraNationalAuthority

I.5 REPRESENTATION TECHNIQUE

Base URI: http://purl.org/adms/representationtechnique/

Code	URI
Human Language	http://purl.org/adms/representationtechnique/HumanLanguage
Diagram	http://purl.org/adms/representationtechnique/Diagram
UML (Unified Modeling Language)	http://purl.org/adms/representationtechnique/UML
XML Schema	http://purl.org/adms/representationtechnique/XMLSchema
SKOS (Simple Knowledge Organization Schema)	http://purl.org/adms/representationtechnique/SKOS
RDF Schema	http://purl.org/adms/representationtechnique/RDFSchema
Genericode	http://purl.org/adms/representationtechnique/Genericode
IDEF (Integration DEFinition Methods)	http://purl.org/adms/representationtechnique/IDEF
BPMN (Business Process Modeling Notation)	http://purl.org/adms/representationtechnique/BPMN
Archimate	http://purl.org/adms/representationtechnique/Archimate
SBVR (Semantics of Business Vocabulary and Rules)	http://purl.org/adms/representationtechnique/SBVR
DTD (Document Type Definition)	http://purl.org/adms/representationtechnique/DTD
Schematron	http://purl.org/adms/representationtechnique/Schematron
OWL (Web Ontology Language)	http://purl.org/adms/representationtechnique/OWL
SPARQL (Query Language for RDF)	http://purl.org/adms/representationtechnique/SPARQL
SPIN (SPARQL Inference Notation)	http://purl.org/adms/representationtechnique/SPIN

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Code	URI
WSDL (Web Services Description Language)	http://purl.org/adms/representationtechnique/WSDL
WSMO (Web Service Modeling Ontology)	http://purl.org/adms/representationtechnique/WSMO
KIF (Knowledge Interchange Format)	http://purl.org/adms/representationtechnique/KIF
Prolog	http://purl.org/adms/representationtechnique/Prolog
Datalog	http://purl.org/adms/representationtechnique/Datalog
RuleML (Rule Markup Language)	http://purl.org/adms/representationtechnique/RuleML
RIF (Rule Interchange Format)	http://purl.org/adms/representationtechnique/RIF
SWRL (Semantic Web Rule Language)	http://purl.org/adms/representationtechnique/SWRL
Topic Maps	http://purl.org/adms/representationtechnique/TopicMaps
Common Logic	http://purl.org/adms/representationtechnique/CommonLogic

I.6 STATUS

Base URI: http://purl.org/adms/status/

Code	URI
Completed	http://purl.org/adms/status/Completed
Under development	http://purl.org/adms/status/UnderDevelopment
Deprecated	http://purl.org/adms/status/Deprecated
Withdrawn	http://purl.org/adms/status/Withdrawn

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