Openness and Re-use of Computer Applications Policy of the Public Administration of the Basque Autonomous Community

Version 1.1.
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Contents

This Basque Government document is based on the technical work carried out with the support of the CTIC (Martin Álvarez and Jesús Garcia) and CENATIC (Manuel Domínguez and Manuel Velardo) foundations, and with Aldatic (Alfredo Caballero), in the project overseen by the Computer and Telecommunications Director (Serafín Olcoz).

1. Introduction

Decree 159/2012, of 24 July, regulates the openness and reuse of computer applications of the public administration of the Basque Autonomous Community.

In general, Article Four of the Degree deals with the Open Source Computer Application Directory, which is also known as an Open *Apps* repository. Pursuant to this article, "In order to facilitate the reuse of the computer applications, the Open Source Computer Application Directory of the public administration of the Basque Autonomous Community is hereby established and shall be accessed freely, publicly and at no charge through the Internet. This directory shall be managed by the directorate entrusted with the online presence of the Public Administration of the Basque Autonomous Community". Therefore, there should be a *Catalogue of the Open Source Applications* or *Open Apps Catalogue* in the Directory. This catalogue should be published by those entities of the Basque Autonomous Community included in the sphere of application of this Decree, pursuant to its Article Seven.

It is likewise established in the aforementioned Article Four that "this Directory shall be linked with the Computer Applications Directory for its free reuse, which is kept by the Technology Transfer Centre of the Spanish General Administration and with any other similar Directory once the authorities become aware of its online existence". It is also therefore necessary to define a *Catalogue of Other Directories or Repositories that also contain open source applications or Catalogues of Open Apps Repositories,* that are candidates to be reused by the Public Administration of the Basque Autonomous Community, that supplement the catalogue of this type of applications.

Furthermore, Article Five of the aforementioned Decree establishes that "the entities included in the sphere of application of this Decree shall consult the Open Source Computer Application Directory of the Public Administration of the Basque Autonomous Community prior to the acquisition, development or maintenance throughout the life cycle of a computer application, whether it is by their own means or by contracting the relevant services". It goes on to clarify that "The purpose of the consultation is to provide available solutions for their reuse, which can totally or partially meet the needs, improvements or updates to be covered and provided that the security and interoperability technological requirements so allow". Furthermore, once that search has been performed and after any possible modification or complementary development required to obtain or to maintain the desired computer application has been pinpointed, "a report explaining this circumstance" shall be produced. "The report shall set out the grounds for needing to proceed to develop or maintain the open source of a computer application, whether that is using own resources or contracting the relevant services." This article likewise includes in its annexes the information to be logged in each reuse process of a computer application and establishes that such information shall be duly updated pursuant to Article Five

and in the first point of Articles Seven and Eight of the Decree. It is therefore necessary to have a third *Catalogue of the Open Source Application Reuse Processes* or *Catalogue of Reuse Processes of Open Apps,* where each and every one of the conditions and situations that may occur in those processes are specified.

Finally, Article Nine of the Decree likewise establishes that the Directorate responsible for computer and telecommunications shall define the indicators that enable the impact of the openness and reuse of the computer applications envisaged in this Decree to be monitored and assessed. It also establishes that a report analyzing the aforementioned indicators in the above section and the use of the information contained in the Directory shall be published annually. Therefore, a fourth *Catalogue of Reports Analyzing and Exploiting Openness and Reuse Information* is also required.

This document shall include the relevant technical details to structure the resulting four catalogues that the aforementioned Directory must contain so that it can be created according to what is established in the aforementioned Decree, as set out in Annex I hereto, pursuant to the Order of 25 September 2010, by virtue of which the Basque Government Minister for the Interior, Justice and Public Administration approved this Openness and Reuse of Computer Applications Policy of the Basque Autonomous Community[1].

2. Scope of application of the openness and reuse of computer applications policy of the public administration of the Basque Autonomous Community

Pursuant to Article Two of the aforementioned Decree and the ensuing Order, this Openness and Reuse of Computer Applications Policy "shall be applicable to the General Administration of the Basque Autonomous Community, to the Autonomous Bodies and Private Public Entities making up its Institutional Administration". Furthermore, pursuant to the Second Additional Provision, the scope of applications includes the public corporations, foundations, consortia and investee companies referred to in Act 6/2012, of 1 March, which belong to its public sector, and which have approved the relevant agreement so that the contents of the Decree are adopted as own action criteria for each and every one of them.

[1] https://www.euskadi.net/r48-bopv2/es/bopv2/datos/2012/10/1204414a.shtml

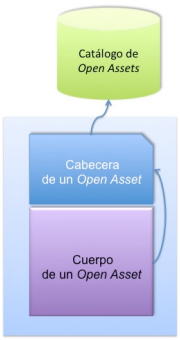
Annex I: Technical Structure of the Information of the Catalogues that must be contained in the Open Sources Applications Directory of the Public Administration of the Basque Autonomous Community

Open Data is a philosophy and practice to ensure that certain information from the Public Sector is freely available and at no charge online and that it can, therefore, be reused by all citizens.

The data catalogue is the mechanism used to open or publish data on line or in other forms. It consists of defining certain records of a catalogue or structured information used to characterize the data sets that are opened and catalogued for their distribution, as well as the entity that publishes them along with the relevant documentation and licenses. This distribution also includes certain terms in the record in order to facilitate their localization and classification in the manual searches or which can be automatically performed using the computer media in the relevant Open Data catalogue.

First generalization

The Open Data concept can be generalized so that it can refer to any information asset or type of the Public Sector that the user wishes to open to consult or reuse. The elemental Open Asset concept thus emerges, where the data as such are a type of these reusable information assets. Thus, another type of elemental Open Asset becomes that of those assets where there body continues to be opaque for the purposes of the process of their openness and cataloguing, but where instead of containing data, the body of the new asset contains text: Open Reports. Thus, a sub-set of the Open Reports is the assets whose body is not only a textual document, but which rather matches the source code of a computer application: Open Apps.



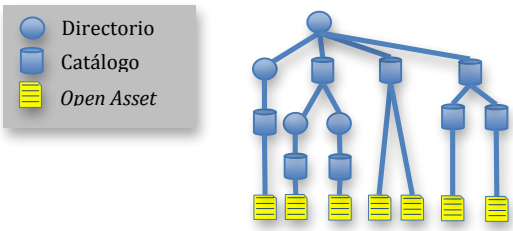
All the elemental Open Assets share the common feature that they are made up of two parts: header and body, and the internal structure of the contents of its body is unknown. However, the structured information of its header is perfectly defined, where the expressions that make it up and which describe the characteristics of an Open Asset include the access to its permanent online address where the file or archive containing the body of the asset in question is located. This archive contains the distribution of the reusable information of the asset that is opened when included on a list of records or Open Assets Catalogue.

Likewise, and following the Open Data approach, the record or header of an elemental Open Asset likewise includes a further link to the file for the documentation relating to the contents of its body and another to its licenses. Furthermore, the elemental Open Assets may be made up not only by the contents of their body, but also by those of other elemental Open Assets of the same type where there is a certain dependency relationship. This is what is known as Linked Data in the Open Data sector, which is the main body and its annexes in text documents, and which is known as the component architecture of an application in the computer sector.

The record or structured information of an Open Asset must then have five links to as many other files to ensure the openness or distribution of its information: the link of the body of the Open Asset where it is located, the one of its documentation, of its licenses, of its component architecture and of its functional description.

Second generalization

On the other hand, a header can be also associated to a list or records or Open Asset Catalogue. The body of the header will rather be the header of another similar catalogue or, recursively and finally, an Open Asset Catalogue header. Therefore, a tree of the catalogues that end up containing elemental Open Assets can be obtained with this second generalization. The result is thus two types of Open Assets, the elemental ones (Open Data, Open Reports and Open Apps) and their containers (Open Asset catalogues). However, as there is no point where there are different types of elemental Open Assets in their catalogue, it may only contain elemental Open Assets of the same type defined for their root catalogue.



Therefore, to avoid the negative impact of this restriction and to be able to have a container or directory capable of having any type of elemental Open Assets, a fork of the aforementioned Open Assets Catalogues is required. The fork is the Open Assets Directory, which can only contain other directories, that, recursively, end up hosting Open Assets Catalogues and that, only through them, end up hosting elemental Open Assets. This opens up the possibility of organizing this container tree with other similar trees by means of using the links to them in the Directories Catalogues.

Third generalization

It should also be pointed out that the openness of each of the aforementioned elemental Open Assets is the necessary condition to be able to access them and, therefore, to be able to reuse them. However, that openness is not a sufficient condition for their reuse to be systematic and even less so for the associated information itself can also facilitate the reuse by other parties.

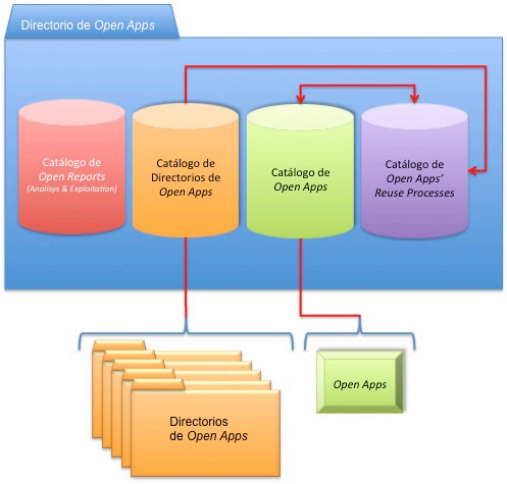
It is therefore necessary to have a third and final generalization consisting of associating a header to each reuse process of an elemental Open Asset or Open Assets' Reuse Process, so that those processes can also be considered as a type of Open Asset that can be catalogued, where the elemental Open Assets are reused and consequently, they also generate new Open Assets which, in turn, are stored in their relevant catalogues. These three generalizations mean that there is a sub-set common to all the headers of all the aforementioned types of Open Assets, whose extension enables the headers of the catalogues and directories to be defined, along with those of the elemental Open Assets and, finally, those of the Open Assets' Reuse Processes.

Thanks to the three generalizations considered, we can conclude by pointing out that there is a robust conceptual model that, by using the mechanisms that have been only so far applied to Open Data, enable the openness process of any type of Open Asset to be carried out, along with the openness of the information corresponding to the systematic application of the reuse process of any elemental Open Asset.

Enactment of Decree 159/2012, of 24 July

It should be added that the structuring of the information contained in the aforementioned headers of the Open Assets also provides the necessary

foundations for that information to be collected and used uniformly. This property means that the approach put forward can be used to define and model the Openness and Reuse of Computer Applications Policy of the Public Administration of the Basque Autonomous Community that enacts Decree 159/2012, of 24 July, which regulates the openness and reuse of computer applications of the Public Administration of the Basque Autonomous Community.



You therefore only need to consider that among the elemental Open Assets, the aforementioned Decree focuses on Open Source Applications or Open Apps, taking into account that, in this case, there must be, at least, an Open Apps Directory which only contains Open Apps Catalogues, Open Apps Directories Catalogues and Open Apps' Reuse Processes Catalogues, along with an Open Reports Catalogues to store the annual reports which analyze the effects of the openness and reuse regulated by the aforementioned Decree along with the exploitation of the information contained in the Open Apps Directory that this Decree creates at Euskadi.net

Finally, it should be pointed out that in the rest of this document, the Open Apps Directory or the Open Source Applications Directory of the Public Administration of the Basque Autonomous Community regulated by the aforementioned Decree is described as its technical specifications, including its modeling in UML standard language (http://www.uml.org/), so that they can then be submitted to international standardization entities, such as W3C (http://www.w3c.es/), Joinup (http://joinup.ec.europa.eu/) or the Interoperability Technical Standards, that the Ministry for the Treasury and Public Administration has prepared pursuant to the First Additional Provision of Royal Decree 4/2010, of 8 January, as candidates for open standards in that field; and (2) implemented electronically to show how they could provide the service required by the aforementioned Decree and they can put into practice the openness and reuse computer applications policy of the entities included in the sphere of application. The more abstract and high definition of the Directory that is created pursuant to the aforementioned Decree is therefore carried out as Open Assets, even though Open Apps are the only type that we are considering in terms of the Decree. Therefore in relation to the second objective given, everything referring herein to Open Assets should be taken on an ad hoc basis for Open Apps, in terms of the aforementioned Decree and the application of the openness and reuse of open source applications policy of the Public Administration of the Basque Autonomous Community.

1. Terms and expressions that define an Open Asset

The header of an Open Asset is defined by means of vocabulary used to structure the resulting information into a record that can be catalogued. There are therefore four categories of expressions: declarative, qualitative, quantitative,

operative and auxiliary. The declarative expressions (DE) enable an Open Asset to be identified, the qualitative ones (CL) complement the declaratives to facilitate their classification search, while the quantitative expressions (CN) describe certain metrics, and finally operative expressions (OP) are those that involve the links to the body of an Open Asset and to the additional information that enables them to be reused.

Finally, each expression used in a header of any Open Asset is defined by five terms that cover their identification, description, type, possible mandatory nature and category. The definitions of those types of greater complexity are included in an annex.

Identity	Description	Type	Mandatory	Multiplicity	Category
e.g.: Name	e.g.: Text identifying the Directory	e.g.: Text	e.g.: Mandatory	e.g.: Multiple	DE

1.1. Types of basic data

The following are found amongst the predefined basic data, with their corresponding backup on predefined open standards

Data type	Description
Text	Complex type consisting of: • Textual contents (Chain data type*) • Optional Language* code expressed in textual content pursuant to ISO 639-2: http://www.loc.gov/standards/iso639-2/php/code_list.php.
String	UNICODE String of values (http://www.unicode.org/standard/standard.html).
URI	*Uniform Resource Identifier* (URI*). Text string pursuant to RFC 3986 (http://www.ietf.org/rfc/rfc3986.txt).
Date	Textual string representing a date and time pursuant to ISO 8601 (http://dotat.at/tmp/ISO_8601-2004_E.pdf).
Numeric	Numerical string representing a sub-set of the real numbers expressed using decimal numbers.
Boolean	This represents the mathematic concept of binary logic: true/false

2. Open Asset

The expressions common to the header of any *Open Asset* are listed below.

Identity	Description	Type	Mandatory	Multiplicity	Category
Id *Open Asset*	URI* (*Uniform Resource Identifier)* of the localizer of the permanent Internet address were an *Open Asset* is located.	URI*	Mandatory		DE (Internal for Open Apps)
Name	Identifier assigned to an *Open Asset.*	Text*	Mandatory		CL
Alternative name	Second identifier assigned to an Open Asset to complete its name with an abbreviation or alternative name in general.	Text*			CL
Description	Short textual description of an Open Asset.	Text*	Mandatory		DE
HomePage	URI (*Uniform Resource Identifier*) of the access of the permanent online address where an Open Asset is hosted.	URI*			DE
Logo	URI of the access of the permanent	URI*			DE

Identity	Description	Type	Mandatory	Multiplicity	Category
	online address where the logo of an Open Asset is hosted.				
Publisher	List of contact names of the Publishers* of an Open Asset. In a computer implementation, as in the case of Open Apps, the publishers will have the necessary security policies and publishing permits to perform their work. Its values will therefore be provided by the administrator of the relevant computer system.	Person*	(Mandatory for Open Apps)	Multiple	CL
Funder	List of contact names of the Funders* involved in this Open Asset.	Person*		Multiple	CL
Type of	Type of *Open Asset**.	Type of *Open Assets**	Mandatory	(Multiple for Directories in Open Apps)	CL
Language	Languages* in which an Open Asset is expressed.	Language*	(Mandatory for Open Apps)	Multiple	CL
Spatial coverage	It is the most specific Spatial Coverage* used to define the classification of places where an Open Asset is valid or is applicable. It can be any country in the world and, in the case of Spain, Autonomous Community, Province and Municipality can also be selected.	Spatial coverage*	(Mandatory for Open Apps)	Multiple	CL
Theme	Theme* refers to the sector spatial coverage of an Open Asset.	Theme*	(Mandatory for Open Apps)	Multiple	CL
Keyword	Key word* associated to an *Open Asset*.	Text* (Labels formed by a reusable list are given in Open Apps.)		Multiple	CL
Updating frequency	Updating frequency* of an Open Asset.	Updating frequency*			DE
Intended audience	It indicates the intended audience* of the Open Asset.	Intended audience*		Multiple	CL
Included in	Container that houses this Open Asset.	Open Assets container*		(There are only Directories and Catalogues for Open Apps)	DE
Open asset distribution	The Open Asset Distribution establishes the relationship between its header and body.	Distribution*		Multiple	DE

Amongst the aforementioned types the following may be found, in order of appearance:

2.1.Person*

Person allows the contact information associated to an individual to be defined, with the following properties:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE
Name	Name of the person.	Text*	Mandatory	Multiple	DE
Email	Electronic mail.	Text*	(Mandatory for Open Apps)	Multiple	CL

Tel	Telephone number.	Text*	(Mandatory for Open Apps)	Multiple	CL
Organization	Organization the person belongs to.	Text*	(Mandatory for Open Apps)	Multiple	OP

2.2.Organization*

Organization allows information associated to a section or department of an organization to be defined:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE
Name	Name of the organization.	Text*	Mandatory	Multiple	DE
Department	Department.	Text*		Multiple	CL
Section	Section within the organization.	Text*		Multiple	CL

FOAF expressions (http://xmlns.com/foaf/spec/) and vCard standard (http://www.w3.org/TR/vcard-rdf/) will be used for semantic definition of these entities.

2.3.Type of Open Assets*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

The Type of *Open Assets* may be values taken from container, elemental or process. The elemental Open Assets may only form part of Open Assets Catalogues:

- *Open Data*
- *Open Apps*
- *Open Reports*

The *Open Assets* containers contain other Open Assets either directly or indirectly, to aid their openness and location:

- Open Assets Catalogues. They may only contain Open Assets of the same time.
- Open Assets Directories. They may only contain other Open Assets Directories or Catalogues and nothing else, but without any type restrictions.

The process Open Assets, in the case of Open Apps this refers to the fact that they allow the planning and the status of the reuse processes to be discovered and the following may only form part of Open Assets Catalogues:

- Open Assets' Reuse Processes

2.4. Language*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

The ISO 639 standard gives codes for each Language* and groups or families of languages, specifically the aforementioned ISO 639-2 (2002) corresponds to the Codes for language representation. This set of codes and their labels are the ones from the possible values of the Code and Language Label* expressions, in the case of Open Apps.

2.5.Spatial Coverage*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

The Spatial Coverage*, in the case of Open Apps is defined pursuant to the standards approved by the National Institute of Statistics within the Countries. Inside Spain, in the case of Open Apps, the divisions between Autonomous Communities and Cities, Provinces and Municipalities are also considered (http://www.ine.es/ss/Satellite?L=es_ES&c=Page&cid=1254735839296&p=1254735839296&pagename=MetodologiaYEstandares%2FINELayout).

2.6.Theme*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the Theme* is taken from Annex I of the document called "*Operation, maintenance and updating of the Public Information data Catalogue,* available at: http://datos.gob.es/datos/sites/default/files/PLANCISP-GCI-02.2.doc.

The breakdown of the themes referred to is not comprehensive, but should be used to illustrate the relation between the taxonomy used and the classification of information and services that are offered at present by the General State Administration.

2.7.Updating Frequency*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the Updating Frequency can be the following, from less often to more often: Several Years, Yearly, Half-yearly, Monthly, Fortnightly, Weekly, Daily, Hourly or by the Minute.

2.8. Audience*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for

					Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the Audience* for an Open Asset might be: Technical or Not Technical.

3. Distribution*

The Distribution* properties and relations of an Open Asset are shown below.

Identity)	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented individual.	URI*	Mandatory		DE (Internal for Open Apps)
Author	Contact information for the Person* who creates the Distribution*.	Person*	(Mandatory for Open Apps)	Multiple	CL
Current version	Fixed value of current version of a Distribution*. For the Distribution* of the actual contents of an Open Asset its version must coincide with this one.	Text*	(Mandatory for Open Apps)		DE
Creation date	Date* on which a Distribution* is listed. (Calculated by the system)	Date* (Automatic)	(Mandatory for Open Apps)		DE
Format	In the case of a storage system, the Distribution* format the value of which is selected from a list formed by the Information Distribution Formats of an Open Asset* corresponding to the formats and standards borne in the technical interoperability standards established by article 11 of the abovementioned Royal Decree 4/2010 or the standard that substitutes this. They must be pursuant with the nature of the computing applications and data to be processed, giving priority to the purpose for which each format was defined and always avoiding the use of exclusive or closed formats or which have not been published as open standards and therefore, do not guarantee the technological neutrality as is shown in paragraph 3 of article 7 of the abovementioned Decree 159/2012.	Format*	(Mandatory for Open Apps)		CL
Type of	Type of distribution, pursuant to the classification established using a layout of concepts.	Type of Distribution*	(Mandatory for Open Apps)		CL
Use license	Use license* to which a Distribution* is subjected.	Use License*	(Mandatory for Open Apps)	(Multiple for Open Apps and it admits a free text subordinate to the option "others")	CL
Size unit	It defines the Size unit* that determines the size of a Distribution*.	Size unit*	(Mandatory for Open Apps)		DE
Metric: size	Size of a Distribution* expressed in the selected Size unit*.	Numeric*	(Mandatory for Open Apps)		CN
Access URI	Access URL to the contents of the	URI*	Mandatory	Multiple	OP

	distribution.				

These distributions could be specialized in terms of the access method to the information in the following cases: Download, WebService, Feed, pursuant to the candidate's classification with the W3C *Data Catalogue* standard, also known as DCAT (http://www.w3.org/TR/vocab-dcat/#class--catalog).

3.1.Download

This represents a downloadable Distribution* from a file system. This is the case of Open Apps.

3.2.Feed

This represents a Distribution* that corresponds to a distribution channel.

3.3.WebService

This represents a Distribution* that is accessible from Web Services.

3.4.Distribution Type*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled terms.	Text*		Multiple	CL

For Open Apps, each Distribution* of information from an elemental Open Asset can be one of the twelve following types, although for openness, cataloguing and reuse purposes, it has no effect:

1. Contents of the Open Asset.
2. Dependencies of the Open Asset.
3. Component architecture of the Open Asset.
4. Documentation associated to the Open Asset.
5. Functional description of the Open Asset.
6. Reuse steps of the Open Assets' Reuse Process.
7. Concise report of the Open Assets' Reuse Process.
8. Justification report on the change of status of the Open Assets' Reuse Process.
9. Reuse report of the Open Assets' Reuse Process.
10. Report on the Technical Specifications Document.
11. Report on a Deliverable.
12. Use License.

3.5.File Format

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text		Multiple	CL

For Open Apps, the file format classified as open or of generalized use will be used, in the Technical Interoperability Standard from the Standards Catalogue, Decision by the Secretary of State for the Public Administration, of April 20 2012 http://administracionelectronica.gob.es/recursos/pae_020003103.pdf). This list of formats will change as this technical standard changes.

3.6.License

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that allows reference to the license to be made.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL
Access URI	Report associated to the Use License*, corresponding to the twelfth Type of Distribution*.	Distribution*	Mandatory		CL

For Open Apps, the two use licenses cited in the additional rider of the Decree: EUPL 1.1 are implemented (*European Union Public License, Version* 1.1 (EUPL-1.1) or higher), for the source code of the applications and CC-By-SA (*Creative Commons By Share Alike, Version* 3.0 or higher), for the other documentation and a third value of editable text is added to be able to indicate another or other possible use licenses, as is indicated in the abovementioned additional rider. In the last case, these licenses will be associated to a Distribution* where the Use License* is the one associated by the Decree to the documentation.

3.7.Size Metric

It defines the size unit that will determine the File size of an elemental Open Asset.

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI	Mandatory		DE
Code	Value of a list of controlled expressions.	Text	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text		Multiple	CL

For Open Apps, the following values are considered: Kilobytes, Megabytes or Gigabytes and the measurement scale could be extended if necessary in the future.

*4. Open Asset Record**

The header for each Open Asset also has information about its own cataloguing associated to it using an Open Asset Record*.

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	URI* that identifies an Open Asset Record.	URI*	Mandatory		DE (Internal for Open Apps)
Creation date	Date* on which the record of an Open Asset is created on a catalogue.	Date* (Automatic for Open Apps)	Mandatory		DE
Last modification	Date* of the last modification to the record of an Open Asset on a catalogue.	Date* (Automatic for Open Apps)	Mandatory		DE
Open asset	Type of Open Asset related to this record.	*Open Asset Type**	Mandatory		DE

2. *Open Assets* Container

To define an Open Assets Container, nothing needs to be added to that already defined as the common part for all the Open Assets which, recursively allows an Open Assets Container to contain others of the same type. The header of this Open Asset only has to lead to the body of the Open Assets Container through its Distribution*. In such a way that this class has been defined as an extension of the DCAT class: Catalogue of expressions to be used as standard for W3C Data Catalogue.

Pursuant to that shown when presenting the second generalization that has been done to the Open Data mechanism, the Open Assets Container class has two sub-classes: Open Assets Catalogue and Open Assets Repository.

The definition of this class alongside the two sub-classes allows any combination of storage hierarchies of catalogues and repositories to be established, distributed by an intranet or on the Internet, allowing the semantic federation of Open Assets containers. This possibility offers the advantage as opposed to ontologies such as DCAT or those based on an extension of the applicant for use as W3C RADion standard (http://www.w3.org/ns/radion) and the ones developed as extensions of this: *Asset Description Metadata Schema*, also known as ADMS (http://joinup.ec.europa.eu/asset/adms/topic/public-comments-adms-specification-v08) and its variation for computing applications: ADMS.Sw (https://joinup.ec.europa.eu/asset/adms_foss/description), which have been defined within the framework of the Interoperability Solutions program between Public Administrations in the European Commission ISA/Joinup (http://ec.europa.eu/isa/).

In the case of the abovementioned Decree, the definition of this class and its two sub-classes allows for there to be an Open Apps Repository and that this may contain a Catalogue of Open Reports, another one of Open Apps, another one of Open Apps' Repositories and another one of Open Apps' Reuse Processes.

2.1. Open Assets Catalogue*

Open Assets Catalogue is a sub-class of Open Assets Container that can only contain Open Assets of the same type, either Elemental or Processes.
It does not incorporate any additional properties.

2.2. Open Assets Repository*

Open Assets Repository is a sub-class of Open Assets Container that can contain other repositories and catalogues of any type of Open Asset except for Elemental and Process ones.
It does not incorporate any additional properties.

3. Elemental Open Asset

In addition to the previously defined common vocabulary, the following must be added to be able to complete the characterization of an elemental Open Asset (*Open Data*, *Open Reports* or *Open Apps*):

Identity	Description	Type	Mandatory	Multiplicity	Category
Author	Each Author* of an Elemental Open Asset.	Person*	(Mandatory for Open Apps)	Multiple	CL

Release date	Date* on which an Open Asset is released.	Date*	(Mandatory for Open Apps and automatic if it comes from an Open Apps Reuse Process)		DE
Update date	Date* of last update of an Open Asset.	Date*	(Mandatory for Open Apps and Automatic if it comes from an Open Apps Reuse Process)		DE
Current version	Fixed value of the current version of an Elemental Open Asset.	Text*	(Mandatory for Open Apps)		DE
Fork of	*Open Asset* Elemental, of which it is an independent fork.	Elemental Open Asset*			DE
Temporality	Validity time slot of an elemental Open Asset. It uses "from" "to" values and the latter can provide the option for it to perennial.	Time Interval*	(Mandatory for Open Apps)		DE
Cost unit type	Cost Unit Type*.	Cost Unit Type*	(Mandatory for Open Apps)		CL
Metric: acquisition cost	Acquisition Cost of an elemental Open Asset, using a Cost Unit Type*. Fixed and outcome information from the reuse process for the Open Asset or, failing that, in case of its direct cataloguing, of an estimate or piece of information provided by the Publisher* of the Open Asset.	Numerical*	(Mandatory for Open Apps)		CN
Metric: complexity	Scale used to measure the complexity of a elemental Open Asset, with Metric Values	Metric Values*			CN
Metric: granularity	It measures the conceptual size or granularity of an elemental Open Asset, with Metric Values*.	Metric Values*			CN
Metric: usability	It measures the effort required to learn and operate an elemental Open Asset in terms of Usability, with Metric Values*.	Metric Values*			CN
Metric: reusability	It measures the reuse capacity of an elemental Open Asset outside the context in which it was created in terms of Usability with Metric Values*.	Metric Values*			CN
Distribution package	It is a package of five distributions associated to each of the five first Distribution Type" elements that an Elemental Open Asset* may have. For Open Apps it is a list of at least one of each of the aforementioned five first Distribution Type* elements. Even though different instances of each of them exist, depending on how many formats are available in each	Distribution*	Mandatory (The first five are mandatory for Open Apps)	Multiple	OP

	case.				
Has dependence	List of Dependencies* that apply to an Elemental Open Asset.	Dependence*	(Mandatory for Open Apps)	Multiple	CL
Has part	Each Elemental Open Asset that forms part of this.	Elemental Open Asset*	(Mandatory for Open Apps)	Multiple	OP
Part of	*Open Assets* that use this Open Asset in their composition.	Elemental Open Asset*	(Mandatory for Open Apps)	Multiple	OP
Produced by	*Open Assets' Reuse Process* from which this Open Asset comes.	*Open Assets' Reuse Processes**			OP

3.1.Time Interval

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented time interval.	URI*	Mandatory		DE (Internal for Open Apps)
Beginning	Beginning date* of the interval.	Date*	Mandatory		CN
End	End date* of the interval.	Date*			CN

Time interval between two dates. The end date is optional in case it represents an infinite time interval.

3.2.Cost Unit Type

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, an economic value in Euros may be chosen, or its equivalent in effort, measured in persons/year.

3.3. Metric Values

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the possible metric values are: High, Medium, and Low.

3.4.Dependence*

As backup to the definition of a list of dependencies of an elemental Open Asset, the Dependency* of an elemental Open Asset with its associated properties is shown below:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that allows correct reference to made to an individual.	URI*	Mandatory		DE (Internal for Open Apps)
Class	Class of the Product* on which it depends.	Product* class	Mandatory		CL
Product	Name of the product.	Text*	Mandatory		CL
Version	Version of the product.	Text*	Mandatory		CL
Vendor	Vendor of the product.	Organization*	Mandatory		CL
Use licenses	List of Use Licenses of the product.	Use license*	Mandatory	Multiple	CL
Expiry	Temporary validity or Expiry of the dependence.	Expiry*	Mandatory		DE
Estimated release	Indicated as to whether the release of	Boolean*	Mandatory		DE

	the dependence is foreseen or not.		(if the expiry is temporary)		
Release date	Release date*.	Date*	Mandatory (if the expiry is temporary)		DE
Release cost	Total cost (using a Cost Unit Type*) associated to the release considering its CUT.	Numerical*	Mandatory (if the expiry is temporary)		DE

3.5.Product Class

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, two possible classes of products are considered: *Hardware* and *Software*.

3.6. Expiry

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the Expiry* of dependence may be: Temporary or Permanent.

4. *Open Assets' Reuse Process**

In addition to the common expressions defined above and in the same way that has been done to define an elemental Open Asset, the following expressions have to be added to complete the characterization of an Open Assets' Reuse Process, which in the case of the aforementioned Decree, must be used to define the Open Apps' Reuse Process:

Identity	Description	Type	Mandatory	Multiplicity	Category
Initial budget	Estimated budget, using a Cost Unity Type*, to develop a Open Assets' Reuse Process prior to publishing the Technical Specifications of the relevant call to tender or equivalent.	Numerical*	Mandatory		DE
Reuse memorandum	Distribution List* whose Distribution Type* matches the report explaining the feasibility of reusing elemental Open Assets.	Distribution*	Mandatory		DE
Directories Consulted (Check)	Open Assets directories consulted.	Open Assets Container*	Mandatory	Multiple	CL
Reused open asset	*Open Assets* to be reused.	*Reusable Open Asset**	Mandatory	Multiple	CL
Partner	Information about each Organization* that funds an Open Asset.	Organization*	Mandatory (calculated)	Multiple	CL
Execution status	Status list where the execution of a	Execution Status*	Mandatory		OP

	process can be found.				
Register execution change	Information about the execution change status of a process.	Register Status Change*	Mandatory	Multiple	DE
Openness status	Openness status of a process.	Openness Status*	Mandatory		OP
Register openness change	Information about the openness change status of a process.	Register Openness Change*		Multiple	DE
Baseline	List which contains the reference information of an Open Assets' Reuse Process and its possible evolutions. The last Baseline* is the one in force.	Baseline*	(Mandatory if it is open)	Multiple	OP
Register baseline change	Information about the status change of a Baseline*.	Register Baseline Change*	Mandatory	Multiple	DE
Call for tenders	Report including the Technical Specifications for internal or external purpose, corresponding to the tenth Distribution Type*.	Distribution*	Mandatory		DE
Final budget	Measured cost, using a Cost Unit Type*, used to award the contract for an Open Asset's Reuse Process.	Numerical* (calculated)	Mandatory		DE
Final cost	Measured cost, using a Cost Unit Type*, used to cancel or close an Open Asset's Reuse Process.	Numerical* (calculated)	(Mandatory specify it at some point)		DE

4.1.Reusable Open Asset*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the resource.	URI*	Mandatory		DE
Reused open asset	*Open Asset* to be reused.	Elemental Open Asset*	Mandatory	Multiple	CL
Metric: reusability	It measures the capacity to reuse each of the elemental Open Assets to be reused in the context of this process with Metric Values*. It must comply with the list above mentioned list of expressions.	Metric Values*		Multiple	CN

4.2.Status*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

The Status* concept allows the representation of the status of execution or openness or of any other status in which an Open Assets' Reuse Process can be found. *This concept specializes in the following two concepts:*

4.2.1. Execution Status*

It defines the execution status that an Open Assets' Reuse Process can be in. These statuses can be: Start, Stop, Cancelled or Finished. Starting out from the Start Execution Status it must automatically pass onto Execution Status alone when a real start Date* is available, which is only possible once its Baseline* has been completed and, as a result of this, the Technical Specifications Document has been used that has allowed the corresponding Contracting Process to be carried out, along with its consequent contract-awarding, or an equivalent Process, if it is being performed using own resources. After

this it may pass on from Execution to Stop and from this to Execution several times until it finally ends up in Finished or from any of the two to Cancelled. Lastly, there is also the rare possibility that it may go from Start to Cancel if the process never enters the Execution phase.

4.2.2. Openness Status

Openness Status* where an Open Assets' Reuse Process can be found.
For Open Apps, these can be: Open and Closed.

4.3. Status Change*

To backup the description of an Open Assets' Reuse Process the Status Change* class is defined with the following properties:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that allows reference to be made to the described individual.	URI*	Mandatory		DE (Internal for Open Apps)
Changing date	Changing date* of the Register Type*.	Date*	Mandatory		DE
Register type	Register Type* of Status.	Register Type*	Mandatory		DE
Previous status	It includes the status prior to the change in the Register Type*.	Process Status*	Mandatory		DE
Current status	It includes the status after the change in the Register Type*.	Process Status*	Mandatory		DE
Order	It indicates the order number of this change in the Register Type.	Numerical* (calculated)	Mandatory		DE
Origin	It includes the Origin of the change in the Register Type*.	Origin of the Register Change*	Mandatory		OP
Justification memorandum	Memorandum that justifies the change in the Register Type* corresponding to the eighth Distribution Type*.	Distribution*	(Mandatory for Execution Status* that goes from Stop to Cancelled or for Openness Status* if it moves to Closed)		DE

4.4. Type of Register

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the reuse process status can be Execution Status*, Openness Status*, Baseline* or Milestone*.

4.5. Origin of Change of Register*

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, the origin of the change of a register can be due to different circumstances: Timeless decision of the publisher; Changes due to the awarding of a contract; Reaching of a Milestone* or Changes in the execution of an Open Assets' Reuse Process*.

4.6.Baseline*

Likewise, aimed at clarifying the description of an Open Assets' Reuse Process the expressions used to define a Baseline are also described:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that allows reference to be made to the described individual.	URI*	Mandatory		DE (Internal for Open Apps)
Iteration	Current Baseline* iteration number of an Open Assets' Reuse Process.	Numerical* (calculated)	Mandatory		DE
Estimated start date	Estimated start date of the current Baseline*.	Date*	Mandatory		DE
Real start date	Real start date of the current Baseline*.	Date*	(Mandatory if open)		DE
Estimated finish date	Estimated finish date of the current Baseline*.	Date*	Mandatory		DE
Real finish date	Real finish date of the current Baseline*.	Date*	(Mandatory if open)		DE
Initial budget	Estimated budget, using a Cost Unit Type*, of the execution of the current Baseline* for an Open Assets' Reuse Process.	Numerical*	Mandatory		DE
Final cost	Real cost, measured using a Cost Unit Type*, of the execution of the current Baseline* for an Open Assets Reuse Process.	Numerical* (calculated)	(Mandatory if open)		DE
Operative annexes	Annexes corresponding to the fifth, third and sixth Distribution Types*	Distribution*	(Mandatory if open)	Multiple	OP
Scheduling	List of Milestones* of the current Baseline*.	Milestone*	(Mandatory if open)	Multiple	OP
Succinct memorandum	Memorandum of the seventh Distribution Type*.	Distribution*	(Mandatory if not open)		OP
Dependencies	It includes the reasons for the dependencies on products belonging to third parties, as well as the influence this has on the total contracting cost (TCC), indicating whether these dependencies are temporary or permanent and whether their elimination is foreseen. In the last case, the foreseen date and the total cost associated with this task for each of the aforementioned dependencies will be indicated. Annex of the second Distribution Type*.	Distribution*	Mandatory		OP
Has dependence	Dependencies applying to the current Baseline*.	Dependence*	Mandatory	Multiple	CL

4.7.Milestone

In the same way, to complete the description of Baseline, below there is the list of expressions that define the Milestone* class:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that allows reference to be made to the described individual.	URI*	Mandatory		DE (Internal for Open

					Apps)
Status	Openness status in which a Milestone* can be found.	Openness Status*	(Mandatory if open)		OP
Name	Identifier assigned to a Milestone*.	Text*	(Mandatory if open)		DE
Alternative name	Second identifier assigned to a Milestone* to complete its name with an abbreviation.	Text*			DE
Description	Short textual description of a Milestone*.	Text*	(Mandatory if open)		DE
Estimated start date	Estimated start date* of a Milestone*.	Date*	(Mandatory if open)		DE
Real start date	Real start date* of a Milestone*.	Date*	(Mandatory if open)		DE
Estimated finish date	Estimated finish date* of a Milestone*.	Date*	(Mandatory if open)		DE
Real finish date	Real finish date of a Milestone*.	Date*	(Mandatory if open)		DE
Initial budget	Estimated budget, using a Cost Unit Type*, of the execution of a Milestone*.	Numerical*	(Mandatory if open)		DE
Final cost	Real cost, measured using a Cost Unit Type*, of the execution of the current Baseline of an Open Assets' Reuse Process.	Numerical* (calculated)	(Mandatory if open)		DE
Register change*	Information corresponding to the Status Change Register* of a Milestone*.	Status Register Change*	(Mandatory if open)	Multiple	DE
Operative annexes	Annexes of fifth, third and sixth Distribution Type*.	Distribution*	(Mandatory if open)	Multiple	OP
Succinct memorandum	Memorandum of the seventh Distribution Type*.	Distribution*	(Mandatory if open)		OP
Dependencies	Annex of the second Distribution Type* corresponding to the second predefined value.	Distribution*	Mandatory		OP
Has dependence	Dependencies applying to the Milestone*.	Dependence*	Mandatory	Multiple	CL
Deliverable	Each Deliverable* of a Milestone*.	Deliverable*	(Mandatory if open)	Multiple	OP

4.8.Deliverable*

To complete the description of a Milestone* the expressions corresponding to a Deliverable are defined below*:

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that allows reference to be made to the described individual.	URI*	Mandatory		DE (Internal for Open Apps)
Name	Descriptor assigned to a Deliverable*.	Text*	(Mandatory if open)		DE
Alternative name	Second identifier assigned to a Deliverable* to complete its name with an abbreviation.	Text*			DE
Description	Short description of a Deliverable*.	Text*	(Mandatory if open)		DE
Type of	Type of Deliverable*.	Type of Deliverable*	(Mandatory if open)		DE
Memorandum	Memorandum of a Deliverable*, corresponding to the eleventh Distribution Type*.	Distribution*	(Mandatory if open)		OP
Result	List of Elemental Open Assets the result of which, pursuant to their Type of Elemental Open Assets*, must become part of the	Elemental Open Asset*	(Mandatory if open)	Multiple	OP

	corresponding Open Assets Catalogue to give rise to the list with which each Result is paired with its corresponding catalogue.				

4.9.Type of Deliverable*.

Identity	Description	Type	Mandatory	Multiplicity	Category
Id	Identifier that defines the represented concept.	URI*	Mandatory		DE (Internal for Open Apps)
Code	Value of a list of controlled expressions.	Text*	Mandatory		CL
Label	Label that describes the value represented by the element on the list of controlled expressions.	Text*		Multiple	CL

For Open Apps, a Milestone* must always have a Memorandum, but it does not always have to generate a list of deliverable results. This is the reason for the Type of Deliverable* that can be: Report or list of each Result.

Annex II: Equivalence list of Open Assets with the existing standards, mainly, DCAT and ADMS.Sw

1. Semantic equivalence of Open Assets with DCAT

Before being presented as an applicant to W3C standard in 2009, there was a preliminary version of DCAT that had been produced by DERI (*Digital Enterprise Research Institute*, Galway, Ireland) aimed at seeking the interoperability between *Open Data* catalogues available on Internet portals and to do this, they selected and compared the metadata used to describe the data sets in the 7 catalogues of governmental data that were most relevant at the time.

In DCAT there are three main classes that characterize the ontology: *Catalogue*, *Dataset* and *Distribution*. Intuitively, in DCAT C*atalogue* is associated with the portal through which it is published on the Internet. A *Dataset* can exist, forming part of a *Catalogue* or not, before it comes into existence or even without the *Distribution* that related it to the corresponding logical object that it describes ever having existed. Likewise, a *Dataset* can have several *Distributions*, a point that is very useful in order for the corresponding logical object to be available in several different formats, for example.

Given that *Open Assets* has been built as an extension of DCAT, there is no doubt that a semantic equivalence can be found amongst the Open Asset Containers, specifically between an Open Data Catalogue and a DCAT Catalogue, and vice versa. As well as amongst the Elemental Open Assets, along with their Distribution, and a DCAT Dataset, along with its Distribution and vice versa.

2. Semantic equivalence of Open Assets with RADion

At the beginning of 2012, the Joinup initiative by the ISA program, edited by the European Commission, defined a basic ontology: RADion, the main classes of which are *Repository*, *Asset* and *Distribution* (these initials give the name to RADion), aimed at the fact that both ADMS and ADMDS.SW as well as DCAT, could be considered as extensions of RADion. Therefore it may be said that the aforementioned equivalences existing between some Open Assets classes with others from DCAT and transitively, thanks to the fact that these have a RADion extension, mean that they also are with the extension of the main classes of this ontology.

Having established a relationship between Open Assets and RADion, similar relationships may also be established between some classes of Open Assets and others of ADMS or ADMS.Sw, as the latter two are extensions of RADion. In particular, in the case of Open Apps, the possibility of establishing equivalences amongst some of its classes and those of ADMS.Sw is tempting. Therefore, following the line shown when dealing with the equivalences between the Open Assets and DCAT, an attempt could be made to establish a relationship between an Open App and a specific type of ADMS.Sw Software Release, at the same time as relating an Open Apps Distribution to an ADMS.Sw Software Package, as well as between an Open Apps Catalogue and an ADMS.Sw Repository. Although this is not the case between an Open Apps Reuse Process and an ADMS.Sw Software Project, due to the fact that each one of these classes refer to related, complementary concepts, but which are different since the first of them includes the client's point

of view and the second includes the point of view of the developer or supplier of a computing application.

3. Deficiencies in the management of intellectual copyright and in that of contents on RADion, ADMS and ADMS.Sw, as well as on DCAT

When defining the DCAT ontology, it seems that the relationship that must exist between a Catalogue and a possible logical object, as might be a Repository, with which it could be associated intuitively, was not taken into account. This explains that this Catalogue lacks the property of containing other classes of the Catalogue type, which is one of the main characteristics that define a Repository. However DCAT allows a Catalogue to be described, which can be associated to a Repository, the Dataset of which describe Repositories, which in practice could resolve this expressive lack pertaining to DCAT. Although this solution leads to having two types of classes in its ontology to define the same logical object or to resolve this inconsistency making a Repository really correspond to a non-existent class on DCAT, but that can be generated as a hybrid using Catalogue and Dataset.

An identical problem arises with RADion and its derivatives: ADMS and ADMS.Sw, with the added difficulty that in this case a RADion Repository does try to correspond to the Repository logical object, which shows that although they apply the same practical solutions considered for the case of DCAT, the ontology for RADion and DCAT have an important deficiency at source owing to the fact they have centered on interoperability and also not having correctly considered how each of their classes relate to the corresponding logical objects on which their implementations are based.

Furthermore, on DCAT a Dataset is considered to be able to have a License associated to it, whilst this is not the case for any of its possible Distributions, a concept that is mistaken since each of these should really be able to have this License since, in addition, it does not have to be the same for each Distribution of the same Dataset. This conceptual mistake pertaining to DCAT in the representation of the Intellectual Property Rights, (IPRs) not only occurs for each Dataset, but it also extends to the Catalogue, as this is not the one that had an associated License, but rather its corresponding and at present non-existent Distribution. A point that could be resolved when revising the DCAT ontology and observing that a Catalogue can have an associated “Use license of the asset” because a Catalogue is an asset, as intuitively is a Dataset as well, therefore the truth is that an ontology to use DCAT to represent what to date attempted to associate the License property to both Catalogue and to Dataset in the most suitable way, would change to consider that both are types of Dataset, the former elemental and the latter a container of the elementals, and that the License of each of them goes in its corresponding Distribution. Additionally, this would also resolve the Catalogue’s current lack in containing other Catalogues since Dataset would already have this property.

This solution, which is also applicable to RADion and to its derivatives to resolve this same ontological deficiency related to how the corresponding IRPs are managed and to the hierarchical storage capacity of the Repositories. Therefore, it

may be concluded that, in reality, a more basic, suitable ontology may be defined to correctly represent the basic logical objects that are managed both on DCAT and on RADion, that is to say, an ontology solely based on Asset and Distribution which, due to the affinity with the RADion etymology, could be called ADion.

The adoption of this more basic and general ontology, ADion, does not involve making any changes to the current implementations based on DCAT or on RADion or on the derivatives ADMS and ADMS.Sw. What happens is that simply these would not make the most of the advantages of dealing with their IPRs suitably or to be able to correctly manage a distributed, hierarchical network of its containers that would be semantically linked, by construction, in such a way that they would continue to have these deficiencies regarding the management of their IPRs and they would have to continue federating the corresponding Catalogue and Repository by hand or using an external program, but not semantically.

Finally, it is worth adding that DCAT also does not manage the IPRs of the documentation that could be associated to a Dataset or the documentation related to a Catalogue, as it does not even consider this. The semantic solution to ensure that the subjacent ontology does not leave this conceptual loose end pending would also mean a modification of Distribution; in truth a Dataset: Distribution modification, in such a way that this would not only correspond to the Distribution of the actual contents of the Dataset, but rather to the corresponding Distribution package, and also to the associated documentation. To do this it would also be necessary to generalize the concept of elemental Dataset along the line that has been opted for when defining Open Assets.

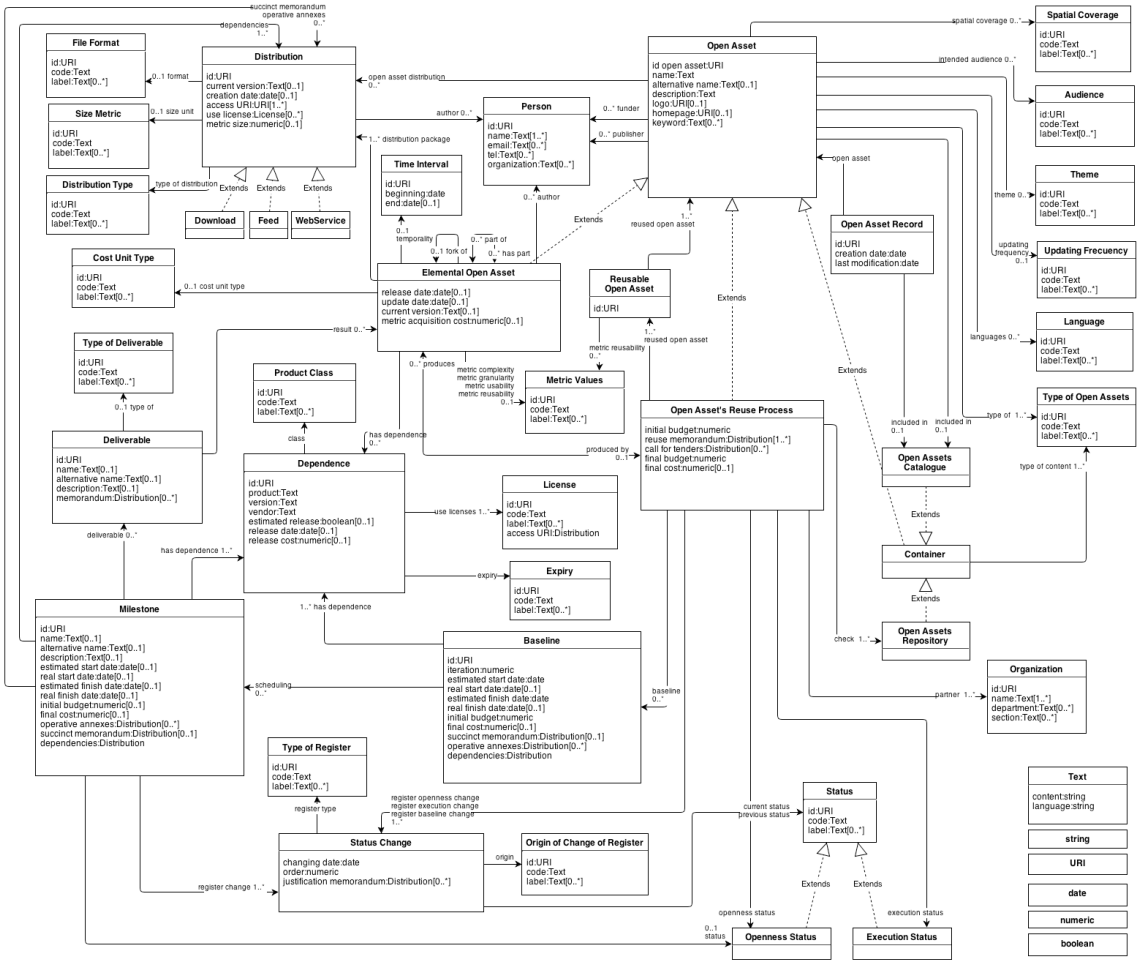
This approach would also work to resolve this question that has been partially, although not completely, dealt with in the derivatives of RADion, since although on ADMS and ADMS.Sw it could be considered that it has been partially resolved by way of Asset: Documentation, a point that does not occur in DCAT, it is also true that the management of its IPRs remains outside ADMS and ADMS.Sw.

To conclude, a theoretical ADion ontology should contemplate different types of elemental Assets, at least for Data, Source Code and Text, as has been done in Open Assets, in order to solve the last problem related to the management of the IPRs and also another type of Asset container to resolve the deficiencies shown about Catalogue and Repository IPR management from the very start, as well as the fact that these classes do not allow their semantic federation or their implantation.

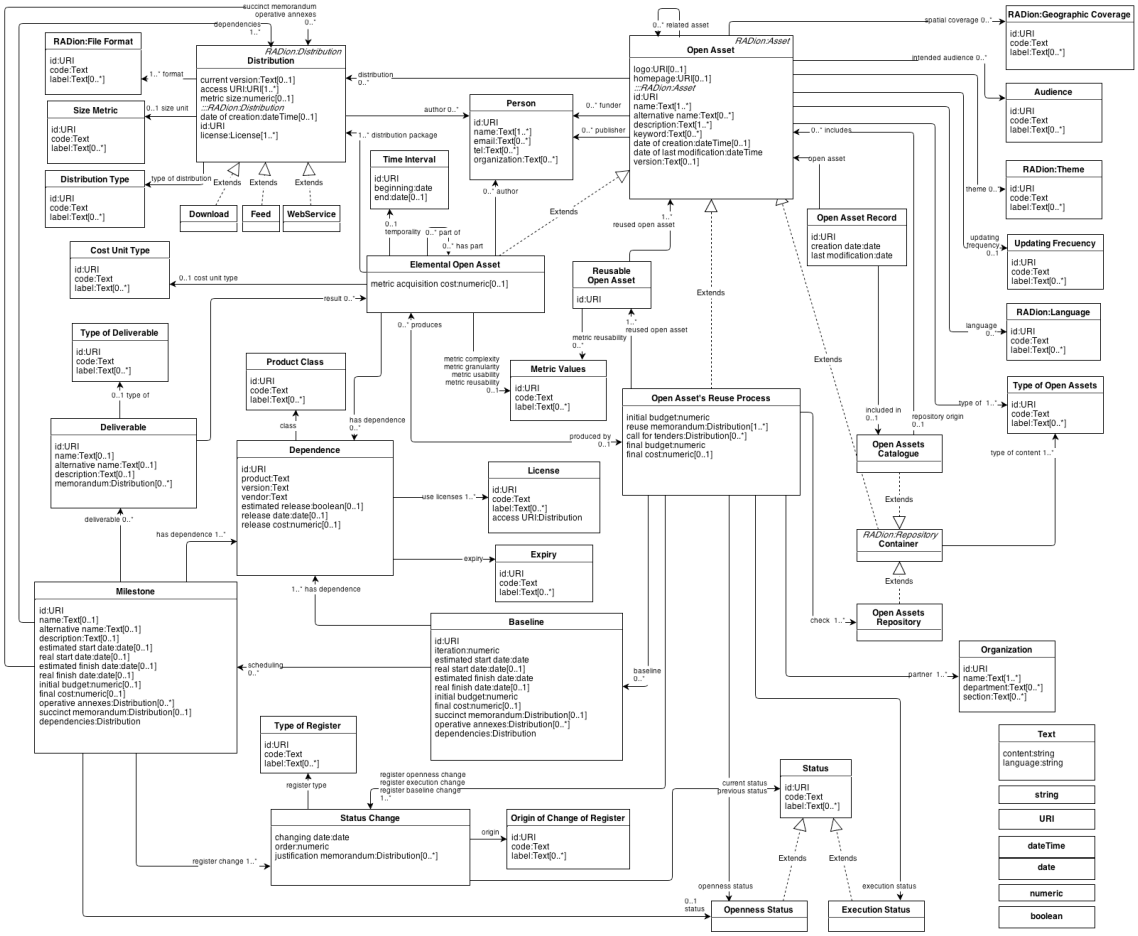
The current definition of Open Assets has been made taking into account the fact that in the future the aforementioned ADion semantics could be generated, therefore, if this were to be the case, Open Assets would not only be an equivalent extension of DCAT by construction, and transitively of RADion, but it would also be an equivalent extension to the aforementioned ADion theoretical ontology.

In the case that an implementation of this model were to require its Open Assets to be included in a root directory shown on internet, as a portal, as occurs with Open Apps, or, for example, that of most or even all the Open Data implementations based on the applicant to RADion, ADMS and ADMS.Sw standards, it would be sufficient to have a "Root Directory" available that would be an instance of a Repository Type Open Asset container, where the URI* of its Distribution* would be its own URI*, as can be seen in Annex IV, in order for the compatibility to be maintained with the aforementioned implementations that exist at present and that are based on the DCAT or ADMS.Sw models, that is to say, in short, on the ones based on those implementations of models that are extensions of the applicant to RADion standard.

Annex III: UML Model of Open Assets


File Format
id:URI
code:Text
label:Text[0..*]
Distribution
id:URI
current version:Text[0..1]
creation date:date[0..1]
access URI:URI[1..*]
use license:License[0..*]
metric size:numeric[0..1]
Size Metric
id:URI
code:Text
label:Text[0..*]
Distribution Type
id:URI
code:Text
label:Text[0..*]
Download
Feed
WebService
Person
id:URI
name:Text[1..*]
email:Text[0..*]
tel:Text[0..*]
organization:Text[0..*]
Time Interval
id:URI
beginning:date
end:date[0..1]
Open Asset
id open asset:URI
name:Text
alternative name:Text[0..1]
description:Text
logo:URI[0..1]
homepage:URI[0..1]
keyword:Text[0..*]
Spatial Coverage
id:URI
code:Text
label:Text[0..*]
Audience
id:URI
code:Text
label:Text[0..*]
Theme
id:URI
code:Text
label:Text[0..*]
Updating Frecuency
id:URI
code:Text
label:Text[0..*]
Language
id:URI
code:Text
label:Text[0..*]
Type of Open Assets
id:URI
code:Text
label:Text[0..*]
Open Asset Record
id:URI
creation date:date
last modification:date
Cost Unit Type
id:URI
code:Text
label:Text[0..*]
Elemental Open Asset
release date:date[0..1]
update date:date[0..1]
current version:Text[0..1]
metric acquisition cost:numeric[0..1]
Reusable Open Asset
id:URI
Type of Deliverable
id:URI
code:Text
label:Text[0..*]
Product Class
id:URI
code:Text
label:Text[0..*]
Metric Values
id:URI
code:Text
label:Text[0..*]
Open Asset's Reuse Process
initial budget:numeric
reuse memorandum:Distribution[1..*]
call for tenders:Distribution[0..*]
final budget:numeric
final cost:numeric[0..1]
Deliverable
id:URI
name:Text[0..1]
alternative name:Text[0..1]
description:Text[0..1]
memorandum:Distribution[0..*]
Dependence
id:URI
product:Text
version:Text
vendor:Text
estimated release:boolean[0..1]
release date:date[0..1]
release cost:numeric[0..1]
License
id:URI
code:Text
label:Text[0..*]
access URI:Distribution
Expiry
id:URI
code:Text
label:Text[0..*]
Open Assets Catalogue
Container
Open Assets Repository
Milestone
id:URI
name:Text[0..1]
alternative name:Text[0..1]
description:Text[0..1]
estimated start date:date[0..1]
real start date:date[0..1]
estimated finish date:date[0..1]
real finish date:date[0..1]
initial budget:numeric[0..1]
final cost:numeric[0..1]
operative annexes:Distribution[0..*]
succinct memorandum:Distribution[0..1]
dependencies:Distribution
Baseline
id:URI
iteration:numeric
estimated start date:date
real start date:date[0..1]
estimated finish date:date
real finish date:date[0..1]
initial budget:numeric
final cost:numeric[0..1]
succinct memorandum:Distribution[0..1]
operative annexes:Distribution[0..*]
dependencies:Distribution
Organization
id:URI
name:Text[1..*]
department:Text[0..*]
section:Text[0..*]
Type of Register
id:URI
code:Text
label:Text[0..*]
Status Change
changing date:date
order:numeric
justification memorandum:Distribution[0..*]
Origin of Change of Register
id:URI
code:Text
label:Text[0..*]
Status
id:URI
code:Text
label:Text[0..*]
Openness Status
Execution Status
Text
content:string
language:string
string
URI
date
numeric
boolean
succinct memorandum
operative annexes
dependencies
1..*
0..*
spatial coverage 0..*
intended audience 0..*
open asset distribution
0..*
author 0..*
0..* funder
0..* publisher
1..* distribution package
0..1 format
0..1 size unit
type of distribution
Extends
open asset
theme 0..*
updating frequency
0..1
languages 0..*
type of 1..*
included in
0..1
type of content 1..*
0..1 cost unit type
result 0..*
0..* produces
metric complexity
metric granularity
metric usability
metric reusability
0..1
metric reusability
0..*
1..*
reused open asset
0..1 type of
class
has dependence
0..*
produced by
0..1
deliverable 0..*
has dependence 1..*
use licenses 1..*
expiry
1..* has dependence
scheduling
0..*
baseline
0..*
partner 1..*
check 1..*
register type
register openness change
register execution change
register baseline change
1..*
current status
previous status
register change 1..*
origin
openness status
execution status
0..1
status
0..1 temporality
0..1 fork of
0..* part of
0..* has part
0..* author

Annex IV: UML Model of Open Assets based on RADion


RADion:File Format
id:URI
code:Text
label:Text[0..*]
RADion:Distribution
Distribution
current version:Text[0..1]
access URI:URI[1..*]
metric size:numeric[0..1]
::RADion:Distribution
date of creation:dateTime[0..1]
id:URI
license:License[1..*]
Size Metric
id:URI
code:Text
label:Text[0..*]
Distribution Type
id:URI
code:Text
label:Text[0..*]
Download
Feed
WebService
Extends
Time Interval
id:URI
beginning:date
end:date[0..1]
Person
id:URI
name:Text[1..*]
email:Text[0..*]
tel:Text[0..*]
organization:Text[0..*]
RADion:Asset
Open Asset
logo:URI[0..1]
homepage:URI[0..1]
::RADion:Asset
id:URI
name:Text[1..*]
alternative name:Text[0..*]
description:Text[1..*]
keyword:Text[0..*]
date of creation:dateTime[0..1]
date of last modification:dateTime
version:Text[0..1]
RADion:Geographic Coverage
id:URI
code:Text
label:Text[0..*]
Audience
id:URI
code:Text
label:Text[0..*]
RADion:Theme
id:URI
code:Text
label:Text[0..*]
Updating Frecuency
id:URI
code:Text
label:Text[0..*]
RADion:Language
id:URI
code:Text
label:Text[0..*]
Type of Open Assets
id:URI
code:Text
label:Text[0..*]
Open Asset Record
id:URI
creation date:date
last modification:date
Cost Unit Type
id:URI
code:Text
label:Text[0..*]
Elemental Open Asset
metric acquisition cost:numeric[0..1]
Reusable Open Asset
id:URI
Type of Deliverable
id:URI
code:Text
label:Text[0..*]
Deliverable
id:URI
name:Text[0..1]
alternative name:Text[0..1]
description:Text[0..1]
memorandum:Distribution[0..*]
Product Class
id:URI
code:Text
label:Text[0..*]
Metric Values
id:URI
code:Text
label:Text[0..*]
Open Asset's Reuse Process
initial budget:numeric
reuse memorandum:Distribution[1..*]
call for tenders:Distribution[0..*]
final budget:numeric
final cost:numeric[0..1]
Open Assets Catalogue
RADion:Repository Container
Open Assets Repository
Dependence
id:URI
product:Text
version:Text
vendor:Text
estimated release:boolean[0..1]
release date:date[0..1]
release cost:numeric[0..1]
License
id:URI
code:Text
label:Text[0..*]
access URI:Distribution
Expiry
id:URI
code:Text
label:Text[0..*]
Milestone
id:URI
name:Text[0..1]
alternative name:Text[0..1]
description:Text[0..1]
estimated start date:date[0..1]
real start date:date[0..1]
estimated finish date:date[0..1]
real finish date:date[0..1]
initial budget:numeric[0..1]
final cost:numeric[0..1]
operative annexes:Distribution[0..*]
succinct memorandum:Distribution[0..1]
dependencies:Distribution
Baseline
id:URI
iteration:numeric
estimated start date:date
real start date:date[0..1]
estimated finish date:date
real finish date:date[0..1]
initial budget:numeric
final cost:numeric[0..1]
succinct memorandum:Distribution[0..1]
operative annexes:Distribution[0..*]
dependencies:Distribution
Organization
id:URI
name:Text[1..*]
department:Text[0..*]
section:Text[0..*]
Type of Register
id:URI
code:Text
label:Text[0..*]
Status Change
changing date:date
order:numeric
justification memorandum:Distribution[0..*]
Origin of Change of Register
id:URI
code:Text
label:Text[0..*]
Status
id:URI
code:Text
label:Text[0..*]
Openness Status
Execution Status
Text
content:string
language:string
string
URI
dateTime
date
numeric
boolean
succinct memorandum
operative annexes
dependencies
1..* format
size unit
distribution
author
funder
publisher
distribution package
type of distribution
temporality
part of
has part
related asset
spatial coverage
intended audience
includes
open asset
theme
updating frequency
language
reused open asset
cost unit type
result
produces
metric reusability
metric complexity
metric granularity
metric usability
metric reusability
type of
class
has dependence
produced by
use licenses
expiry
has dependence
dependence
deliverable
scheduling
baseline
partner
check
included in
repository origin
type of content
register type
register openness change
register execution change
register baseline change
register change
current status
previous status
origin
openness status
execution status
status