ELIS v1.0.0 - Overview Document
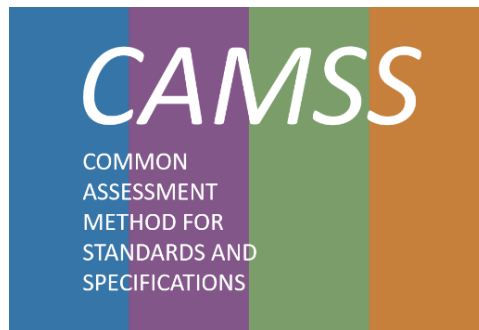
Change Control

Modification	Details
Version 1.0.0	
Initial version	

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1. ACRONYMS

ABB	Architecture Building Block
CISSV	Core Interoperability Standards and Specifications Vocabulary
CLIS	CarTool Library of Interoperability Specifications
DCAT-AP	Data Catalog Vocabulary Application Profile
EIRA	European Interoperability Reference Architecture
EIRA CISSV-AP	EIRA Core Interoperability Standards and Specifications Vocabulary Application Profile
ELIS	EIRA Library of Interoperability Specifications
ESPD	European Single Procurement Document
RDF	Resource Description Framework
SKOS	Simple Knowledge Organisation System
SPARQL	SPARQL Protocol and RDF Query Language
Turtle	Terse RDF Triple Language

2. INTRODUCTION

This document contains the following elements:

- A description of the context in which the EIRA Library of Interoperability Specifications (ELIS) has been developed.

- A description of the analysis performed prior to the population of the ELIS.

- A description of the process for the expression of the ELIS using the Data Catalogue Vocabulary Application Profile (DCAT-AP).

- The Microsoft Excel and DCAT-AP versions of the ELIS.

The ELIS is a library containing the standards and specifications defining the interoperability aspects of the architectural building blocks (ABBs) contained in the European Interoperability Reference Architecture (EIRA). The aim of this library is supporting solutions architects when modelling using EIRA.

For its development, the Cartool Library of Interoperability specifications (CLIS) was used as inspiration. While the CLIS is a library containing very basic information of only technical and semantic interoperability specifications, the ELIS includes much more detailed information of the specifications covering all the EIRA views (including legal and organisational) and, once implemented by a modelling tool, will provide more functionalities than the CLIS, too.

> *"The ELIS is a modelling tool-agnostic but not architecture-agnostic library of interoperability specifications"*

In the following sections, the context in which the ELIS has been developed is explained, as well as the criteria and methodology followed for the inclusion of specifications in it, and the way it will be expressed using DCAT-AP.

3. CONTEXT

The ISA² programme of the European Commission supports the development of solutions that enable the cross-border delivery of interoperable public services in Europe. In order to ensure the interoperability of those services, the EIA action works as an integrator between the Member States and other departments of the European Commission for the development of a joint interoperability architecture for public services. The main output of this action is the European Interoperability Reference Architecture (EIRA©), which implements the European Interoperability Framework (EIF) in the Legal, Organisational, Semantic and Technical (LOST) views of interoperability.

EIRA introduces the concept of "interoperability specification" and defines it as ''a document containing agreed normative statements for Solution Building Blocks used in an information exchange context. They

can refer to existing standards or specifications''[1]. Additionally, interoperability specifications cover the four levels of interoperability defined in EIRA.

The following table defines the interoperability specifications used in EIRA per view:

Interoperability specification	Description
Legal interoperability specifications	Legal interoperability covers the broader environment of laws, policies, procedures and cooperation agreements needed to allow the seamless exchange of information between different organizations, regions and countries. Legal interoperability specifications support interoperability by addressing the core legal interoperability background for solutions
Organisational interoperability specifications	This aspect of interoperability is concerned with how organisations, such as public administrations in different Member States, cooperate to achieve their mutually agreed goals. In practice, organisational interoperability implies integrating business processes and related data exchange. Organisational interoperability also aims to meet the requirements of the user community by making services available, easily identifiable, accessible and user-focused. Organisation interoperability specifications support
Semantic interoperability specification	Semantic interoperability enables organizations to process information from external sources in a meaningful manner. It ensures that the precise meaning of exchanged information is understood and preserved throughout exchanges between parties. In the context of the EIF, semantic interoperability encompasses the following aspects: - Semantic interoperability which is about the meaning of data elements and the relationship between them. It includes developing vocabulary to describe data exchanges, and ensures that data elements are understood in the same way by communicating parties - Syntactic interoperability which is about describing the exact format of the information to be exchanged in terms of grammar, format and schemas
Technical interoperability specification	Technical interoperability specifications support technical interoperability, at the infrastructure level, by addressing the core technical infrastructure interoperability background for solutions

Table 1: EIRA interoperability specifications per view

As an element of the EIRA©, the ELIS provides a set of interoperability specifications that can be used to define the different interoperability aspects of European public services. The ELIS will constitute a tool for

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[1] https://joinup.ec.europa.eu/sites/default/files/document/2017-01/how_does_eira_support_interoperability_v1_0_0.pdf

supporting architects on the process of modelling public services using EIRA, as it defines the interoperability aspects of the ABBs contained in it.

Additionally, it will also allow them, once implemented in a modelling tool, to work simultaneously with other local libraries, allowing the description of the interoperability of the building blocks of any other architecture with the specifications contained in the ELIS.

4. POPULATION PROCESS

The process through which the ELIS was populated with specifications consisted of the following steps:

- Selection of specifications
- Association of the selected specifications with the corresponding EIRA ABBs
- Research for additional information required within the EIRA CSSIV-AP (BETA).

4.1. Selection

Certain sources of specifications have been identified as reusable for the population of the ELIS. These sources are considered trusted sources of information, and therefore the specifications extracted from them are considered sufficiently mature to be included in the European Library of Interoperability Specifications.

The table below lists the sources of specifications considered for the population of the ELIS:

Source	Description
Advice from experts	Experts in a domain covered by an EIRA ABB may be consulted for the provision of relevant specifications.
CAMSS List of standards	List of the specifications recommended by the member states. A specification recommended by 2 Member states is considered having sufficient interest for its inclusion in the ELIS. [2]
Cartool Library of Interoperability specifications (CLIS)	Previous version of the ELIS, the CLIS is a library of interoperability specifications used in the Cartool to support architects when modelling solutions.

[2]https://joinup.ec.europa.eu/collection/common-assessment-method-standards-and-specifications-camss-list-standards

CEF Technical specifications	The CEF building blocks offer basic capabilities that can be used in any European project to facilitate the delivery of digital public services across borders. [3] For each building block, there is a layer of technical specifications and standards that have to be complied with.
EIRA Solution Architecture Templates (SATs).[4]	A Solution Architecture Template (SAT) is a specification extending the EIRA© providing support to solution architects in a specific solution domain in the form of a template that can be used to design related solutions. A SAT contains the following elements: - A motivation in the form of principles and requirements. - A goal and a description of the supported functionalities. - A sub-set of the EIRA© core Architecture Building Blocks (ABBs) covering the four EIF layers. - A set of specific ABBs extending EIRA©'s views enabling specific functionalities to be provided by implementations derived from the SAT. - The interoperability specifications of selected ABBs and a narrative for each EIRA© view.
European Catalogue of ICT specifications for procurement (EUCat)	List of standards and technical specifications from the information and communication technologies (ICT) domain to be used in procurement. This list contains only standards and technical specifications which were selected against specific rules assessing the compliance with trade agreements and the EU regulation. It was based on national catalogues established by Member States and was submitted to public consultation.[5]
European Interoperability Cartography (EIC)	At European level, the European interoperability cartography (EIC), available via the Joinup platform, is a valuable tool for identifying reusable interoperability solutions.
European Standards	Standard adopted by a European Standardization organization.[6](CEN, CENELEC or ETSI).

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[3] https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/What+is+a+building+Block

[4] https://joinup.ec.europa.eu/collection/european-interoperability-reference-architecture-eira/about#SAT

[5] https://joinup.ec.europa.eu/news/eu-catalogue-ict-standards

[6] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:316:0012:0033:EN:PDF

ICT Technical specifications identified by commission decision to be eligible for referencing in procurement[7]	The rules on European standardization allow the European Commission (EC) to identify ICT technical specifications - that are not national, European or international standards - to be eligible for referencing in public procurement. This allows public authorities to make use of the full range of specifications when buying IT hardware, software and services, allowing for more competition in the field and reducing the risk of lock-in to proprietary systems. Prior to their identification by the EC, these specifications must be assessed by the Multi Stakeholder Platform (MSP), which is an advisory body of the EC. The tool used by the MSP for the assessment of these specifications is CAMSS.
International standards	Standards adopted by an international standardization body (e.g. ISO[8])
Technical specifications assessed through CAMSSaaS[9]	CAMSS-as-a-Service consists of a service which aims at assessing standards and specifications on demand through the use of CAMSS Tools. The author of the assessments is the CAMSS Team.
Trans-European Solutions (TES)	TES cartography means a repository of Trans-European interoperability solutions for European public administrations provided by European Union institutions, presented in a common format and modelled using the European Interoperability Reference Architecture.[10]

Table 2: Sources of specifications

For each specification, the sources are indicated within the excel version of the ELIS v1.0.0 BETA (Annex I) as criteria of selection.

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[7] https://ec.europa.eu/growth/industry/policy/ict-standardisation/ict-technical-specifications_en

[8] https://www.iso.org/home.html

[9] https://joinup.ec.europa.eu/release/camssaas/v100

[10]   https://joinup.ec.europa.eu/sites/default/files/distribution/access_url/2018-07/f1aa6a1c-f241-4b03-86a4-fd6342629efe/CarTool%20v2.2.0%20Userguide.pdf

4.2. Association of specifications to ABBs

In EIRA, interoperability specifications can be used to define the interoperability aspects of any of its ABBs. This relationship is modelled using an "association" relationship.

ArchiMate® 3.0.0 is the specification defining the language used by EIRA 2.1.0 as a notation for modelling. It defines an association relationship as "an unspecified relationship, or one that is not represented by another ArchiMate relationship. An association relationship is always allowed between two elements, or between a relationship and an element. The association relationship can be used when drawing a first high-level model where relationships are initially denoted in a generic way, and later refined to show more specific relationship types"[11].

In order to associate the specifications with ABBs, this definition of the association relationship has been used. The specifications compliant with the criteria of selection have been studied and compared with the EIRA ABBs' descriptions to find relationships between them.

The aforementioned EIRA ABBs having potential interoperability specification associated can be found on section 8.2 of the EIRA_v2_1_0_Overview[12].

In the context of this this BETA version of the ELIS, the vast majority of ABBs in the S and T views of EIRA have been associated to at least one interoperability specification.

5. THE DCAT-AP EXPRESSION OF THE ELIS CATALOGUE

5.1. The DCAT-AP representation of the EIRA CISSV-AP

The fact that the catalogue is electronic means that it can be processed by a software application. Thus ELIS is expressed as an electronic catalogue so it can be consumed by software applications like Archi® and other architecture modelling and development tools. For its expression as a machine-readable artefact, the ELIS uses the DCAT-AP specification.

The DCAT Application profile for data portals in Europe (DCAT-AP[13]) is a specification based on W3C's Data Catalogue vocabulary (DCAT[14]) for describing public sector datasets in Europe. DCAT in turn was developed as an application profile of the ADMS vocabulary for the description of assets. Hence, DCAT-

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[11] http://pubs.opengroup.org/architecture/archimate3-doc/chap05.html#_Toc489946003

[12] https://joinup.ec.europa.eu/sites/default/files/distribution/access_url/2018-02/b1859b84-3e86-4e00-a5c4-d87913cdcc6f/EIRA_v2_1_0_Overview.pdf

[13] https://joinup.ec.europa.eu/release/dcat-ap-v11

[14] https://www.w3.org/TR/vocab-dcat/

AP can be used to describe any type of asset (treated as a dataset, especially if you consider that metadata are also data).

The figure below shows the DCAT-AP classes and properties that are used to represent the EIRA CISSV-AP vocabulary:
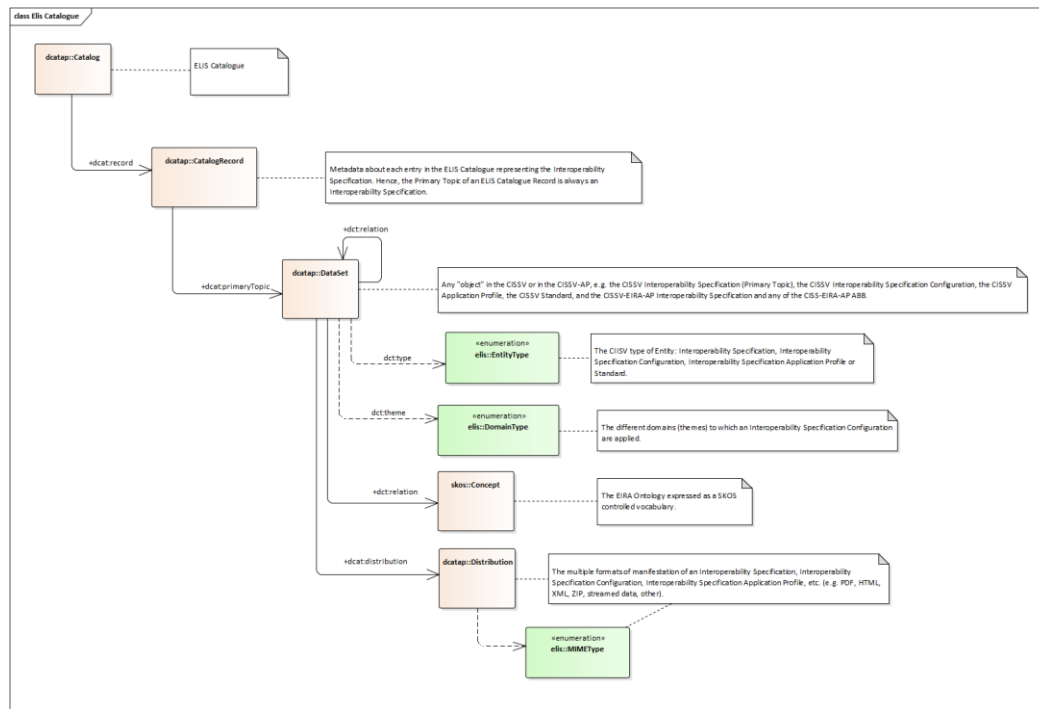

Figure 1: Mapping the EIRA CISSV-AP into DCAT-AP

This other figure intends to represent how the DCAT-AP conceptual data model above would look like once implemented. This example uses the Interoperability Specification "ESPD", in the Domain eProcurement, to illustrate how it would be mapped into the DCAT-AP-based ELIS Catalogue instance:
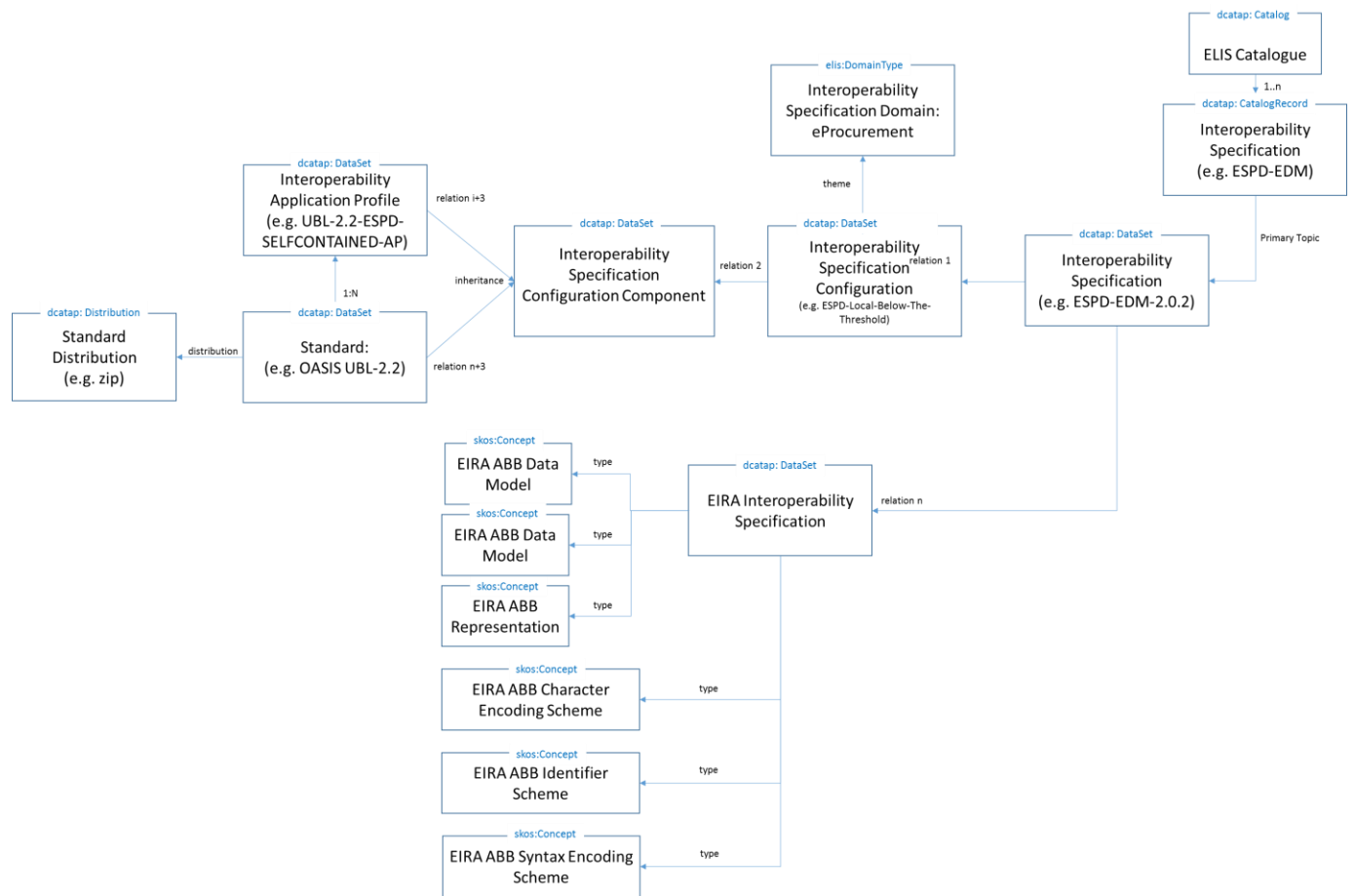
Figure 2: ESPD ELIS DCAT-AP expression

Beware of the following:

- The ELIS Catalogue is instantiated using the DCAT-AP class Catalog;
- The ELIS Catalogue has as many entries as instances of DCAT-AP CatalogRecord(s). One CatalogRecord is composed of metadata about each entry in the ELIS Catalogue representing one CIISV Interoperability Specification;
- The Primary Topic of an ELIS Catalogue Record is always an Interoperability Specification, which are implemented as a DCAT-AP DataSet. One Interoperability Specification may be related to other CISSV Interoperability Records;
- The Primary Topic is always related to one Interoperability Specification Configuration, which is implemented as DataSet(s); One Interoperability Specification Configuration is always related to one or more Interoperability Specification.
- The Interoperability Specification Configuration is composed of one or more Interoperability Specification Configuration Components. An Interoperability Specification Configuration Component is always a Standard or an Interoperability Application Profile.

- One Interoperability Specification Application Profile is always base on one Standard, which is normally distributed in one or more different formats;
- One Interoperability Specification is related to one or more EIRA Interoperability Specifications;
- One EIRA Interoperability Specification aspect is represented via one SKOS Concept as defined in the EIRA Ontology;
- Notice that some entities are associated to code lists (Interoperability Specification Domain, MIME and the CISSV Type). Additionally each EIRA Interoperability Specification can express its interoperability aspects via the association to one or other EIRA ABB as defined in the EIRA Ontology (expressed as SKOS Concepts).

The language chosen to represent the ELIS is the Terse RDF Triple Language (Turtle)[15]. Turtle is a textual syntax for Resource Description Framework (RDF) that allows an RDF graph to be completely written in a compact and natural text form, with abbreviations for common usage patterns and data types. Turtle provides levels of compatibility with the N-Triples [N-TRIPLES] format as well as the triple pattern syntax of the SPARQL W3C Recommendation.

This allows software applications to launch queries aiming at obtaining information more specific to EIRA (for instance, for Archi® to retrieve CAMSS assessments about one ABB). See these very simple examples of SPARQL queries:

- List all the interoperability specifications in the ELIS Catalogue:

```
1   PREFIX : <https://joinup.ec.europa.eu/collection/eira/ontology/1.0.0/elis#>
2   PREFIX dcat: <https://joinup.ec.europa.eu/node/69559#>
3   PREFIX dct: <http://purl.org/dc/terms/>
4   PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5   PREFIX owl: <http://www.w3.org/2002/07/owl#>
6   PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
7   PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
8
9   #USER STORY: I, as a software architect, want to get the complete list of Interoperability Specifications catalogued in ELIS, so I can study
    the links between the Interoperability Specification components and the EIRA Building Blocks.
10
11  SELECT *
12      WHERE {
13          ?Catalog_Entry rdf:type dcat:CatalogRecord ;
14              dct:title ?InteroperabilitySpecification ;
15              dct:issued ?Entry_Creation_Date ;
16              dct:publisher ?Entry_Publisher
17
18          }
```

Figure 3: Query 1 - Interoperability specifications

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[15] https://www.w3.org/TR/turtle/

- List all the Interoperability Specification Configurations of every ELIS Catalogue entry (record):

```
1   PREFIX : <https://joinup.ec.europa.eu/collection/eira/ontology/1.0.0/elis#>
2   PREFIX dcat: <https://joinup.ec.europa.eu/node/69559#>
3   PREFIX cissv-ap: <https://joinup.ec.europa.eu/collection/elis/1.0.0/refdata/cissv-ap#>
4   PREFIX foaf: <http://xmlns.com/foaf/0.1/>
5   PREFIX dct: <http://purl.org/dc/terms/>
6   PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
7
8   #USER STORY: I, as a software architect, want to get the whole list of Interoperability Specification Configurations of one CISSV
    Interoperability Specification and its domain
9
10  SELECT  *
11
12      WHERE {
13          ?Catalog_Record rdf:type dcat:CatalogRecord ;
14                      dct:title ?Record_Title ;
15              foaf:primaryTopic ?PrimaryTopic .
16          ?PrimaryTopic dct:relation ?Interoperability_Specification_Configuration .
17          ?Interoperability_Specification_Configuration dct:type cissv-ap:InteroperabilitySpecificationConfiguration ;
18          dct:theme ?Configuration_Domain
19      }
20
```

Figure 4: Query 2 - Interoperability Specification Configurations

- List all the EIRA ABBs contained in the ELIS Catalogue for each Interoperability Specification:

```
1   PREFIX : <https://joinup.ec.europa.eu/collection/eira/ontology/1.0.0/elis#>
2   PREFIX dcat: <https://joinup.ec.europa.eu/node/69559#>
3   PREFIX cissv-ap: <https://joinup.ec.europa.eu/collection/elis/1.0.0/refdata/cissv-ap#>
4   PREFIX foaf: <http://xmlns.com/foaf/0.1/>
5   PREFIX dct: <http://purl.org/dc/terms/>
6   PREFIX eira: <http://data.europa.eu/dr8/v3.0.0>
7   PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
8   PREFIX xsd: <http://www.w3.org/2002/07/owl#>
9
10  #USER STORY: I, as a software architect, want to get the whole list of EIRA ABBS of one CIISV Interoperability Specification
11
12  SELECT  *
13
14      WHERE {
15          ?ELIS_IOPSpec dct:type cissv-ap:InteroperabilitySpecification;
16              dct:title ?title ;
17              dct:relation ?relations.
18          ?relations dct:type eira:InteroperabilitySpecification ;
19              dct:relation ?eira_ABB.
20      }
```

Figure 5: Query 3 - EIRA ABBs of one Interoperability Specification

- List all the interoperability specifications and the Configuration Components Types:

```
1   PREFIX : <https://joinup.ec.europa.eu/collection/eira/ontology/1.0.0/elis#>
2   PREFIX dcat: <https://joinup.ec.europa.eu/node/69559#>
3   PREFIX cissv-ap: <https://joinup.ec.europa.eu/collection/elis/1.0.0/refdata/cissv-ap#>
4   PREFIX foaf: <http://xmlns.com/foaf/0.1/>
5   PREFIX dct: <http://purl.org/dc/terms/>
6   PREFIX eira: <http://data.europa.eu/dr8/v3.0.0>
7   PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
8   PREFIX xsd: <http://www.w3.org/2002/07/owl#>
9   PREFIX dc: <http://purl.org/dc/elements/1.1/>
10
11  #USER STORY: I, as a software architect, want to get the whole list of Interoperability Specifications and their Configuration Component
    Types
12
13 ▼ SELECT  ?Catalog_Entry ?Title ?Configuration ?Domain ?Component ?Component_type
14
15 ▼     WHERE {
16 ▼         ?Catalog_Entry rdf:type dcat:CatalogRecord ;
17              dct:title ?Title ;
18              foaf:primaryTopic ?Interoperability_Specification.
19 ▼         ?Interoperability_Specification dct:type cissv-ap:InteroperabilitySpecification;
20              dct:relation ?Configuration.
21              ?Configuration dct:type cissv-ap:InteroperabilitySpecificationConfiguration ;
22              dct:theme ?Domain .
23          ?Configuration dct:relation ?Component.
24          optional {?Component dct:relation ?Component_Relation.}
25      optional {?Component_Relation dct:type ?Component_type}
26
27
28      }
```

Figure 6: Query 4 – Configuration Component Types

6. REFERENCES

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