

ELF code lists

1 Introduction

This document describes how the ELF code lists are implemented, the choices made and the reasons behind these choices.

2 GML dictionaries vs. SKOS

According to the GML 3.3 standard, the use of GML dictionaries is now deprecated for the purpose of implementing code lists. The current best-practice is to generally use URIs for referring to code lists and code list items, and use the Resource Description Framework (RDF) for encoding their descriptions [5, p. 72-73].

The Simple Knowledge Organization System (SKOS) is an RDF vocabulary for representing semi-formal knowledge organization systems, such as thesauri, taxonomies, classification schemes and subject heading lists [9]. Several well-known thesauri are available as SKOS data [11], including:

- [GEMET](#), the General Multilingual Environmental Thesaurus of the European Environment Information and Observation Network (EIONET)
- [EuroVoc](#), the EU's multilingual thesaurus
- the [UNESCO thesaurus](#)
- [AGROVOC](#), is a controlled vocabulary covering all areas of interest of the Food and Agriculture Organization (FAO) of the United Nations

SKOS is mentioned as possible machine-readable format for code lists in the INSPIRE Generic Conceptual Model [4], and the INSPIRE registry provides beta-support for RDF and SKOS in the [INSPIRE code list register](#).

Given the direction in which the geospatial community is developing, as described above, and as also mentioned in [6], the choice in favour of SKOS in the European Location Framework is a natural and future-oriented one.

3 Creating ELF SKOS files

Several tools for creating and maintaining thesauri are available, see e.g.

https://en.wikipedia.org/wiki/Simple_Knowledge_Organization_System#Tools for a non-exhaustive overview. Other tools are [The Re3gistry](#), the software behind the [INSPIRE registry](#), and [UKGovLD Registry](#), a proof-of-concept implementation of a Linked Data Registry service of the UK Government Linked Data Working Group. [ShapeChange](#) also provides a way to generate SKOS files on the basis of code lists modelled in UML.

However, the following had to be taken into account:

- It was unclear which tool would be best to use in ELF.
- ELF WP2 did not have enough resources (time and knowledge) available to investigate and compare all the different tools available within the given timeframe.
- There was no time allocated in the project plan to install a tool and learn how to use it.

- ELF WP2 could within a reasonable amount of time learn how to create a minimal implementation of a SKOS code list, and manually create all the code lists needed in ELF (the data model of ELF has less than 20 code lists).
- ELF WP2 was already behind schedule with the delivery of the data specifications.

Given this context, the best choice for a first, minimal and working implementation of ELF code lists was considered to be to create and edit the SKOS files manually.

Note that this also means that the code lists are not modelled as such in the data model itself or somewhere else. The code lists in the UML model are empty, as is the case in the INSPIRE Annex II and III data models.

3.1 Format

ELF WP2 did have experience with XML because of the task of creation of GML application schemas on the basis of the UML model. Therefore the RDF/XML serialisation format was chosen, and not e.g. Turtle.

3.2 URLs

An ELF code list is identified by a URL having the following structure, using slashes (“slash namespaces”) to separate the different parts:

`http://www.locationframework.eu/codelist/{nameOfCodeList}`

An ELF code list is identified by a URL having the following structure:

`http://www.locationframework.eu/codelist/{nameOfCodeList}/{codeListItemIdentifier}`

This structure follows the URI design rule “Follow the pattern `http://{domain}/{type}/{concept}/{reference}`” [1] and is also the structure of the INSPIRE code lists, e.g. <http://inspire.ec.europa.eu/codelist/AdministrativeHierarchyLevel/1stOrder/>

Most of the code lists defined in ELF are based on already existing code lists (that are not available as SKOS). Filling this integer in {codeListItemIdentifier} has the following advantages:

- It makes the mapping of data in the existing ERM data model to data in the ELF data model easier for the data providers
- URI design rule “Re-use existing identifiers” [1] is followed.



Figure 1: 10 rules for persistent URIs [1]

3.3 Content

The initial implementation is aimed towards providing an online, working version of the ELF code lists as soon as possible. Later on, during the current project or afterwards, the implementation can be extended, adding more content (e.g. translations) and managing the content through a dedicated tool.

Hierarchical code lists are implemented using the `skos:broader` element. As a best practice, the `skos:topConceptOf` is also used [2]. Where translations are already available, these can be included too, using the `xml:lang` attribute.

3.4 Metadata

The Dublin Core metadata terms [3] are used for metadata. A description of a concept scheme is added using the `<dcterms:description>` element (recognised by [SKOS Play](#), see also next section). Reference to web sites where the original code list (item) is defined, are added using the `dcterms:source` element (not recognised by [SKOS Play](#)).

3.5 Visualisation

The ELF code lists can quickly be visualised using e.g. the online tool [SKOS Play](#) (note that not all the metadata will be visualised since they reside in the `dcterms` namespace, not in the SKOS namespace). This tool was also used to generate an HTML-version of the code lists that is placed alongside the RDF-files, see also section 4, Publishing ELF SKOS files.

3.6 Validation

The SKOS files were validated using the [W3C RDF Validation Service](#) and using [Skosify](#).

3.7 Example

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
  xmlns:skos="http://www.w3.org/2004/02/skos/core#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dcterms="http://purl.org/dc/terms/"
  xml:base="http://www.locationframework.eu/codelist/">
  <skos:ConceptScheme rdf:about="FunctionalUseCode">
    <skos:prefLabel xml:lang="en">Functional Use Code</skos:prefLabel>
    <dcterms:description xml:lang="en">See also https://www.dgiwg.org/FAD/fdd/view?i=1227</dcterms:description>
    <dcterms:source rdf:resource="https://www.dgiwg.org/FAD/fdd/view?i=1227" />
  </skos:ConceptScheme>
  <skos:Concept rdf:about="FunctionalUseCode/2">
    <skos:inScheme rdf:resource="FunctionalUseCode" />
    <skos:topConceptOf rdf:resource="FunctionalUseCode" />
    <skos:prefLabel xml:lang="en">Commercial</skos:prefLabel>
    <skos:definition xml:lang="en">Of or pertaining to the exchange of merchandise or services, especially on a large scale.</skos:definition>
    <dcterms:source rdf:resource="https://www.dgiwg.org/FAD/fdd/view?i=103759" />
  </skos:Concept>
  <skos:Concept rdf:about="FunctionalUseCode/13">
    <skos:inScheme rdf:resource="FunctionalUseCode" />
    <skos:topConceptOf rdf:resource="FunctionalUseCode" />
    <skos:prefLabel xml:lang="en">Recreational</skos:prefLabel>
    <skos:definition xml:lang="en">Of or pertaining to the refreshment and/or comfort produced by something affecting the senses or body.</skos:definition>
    <dcterms:source rdf:resource="https://www.dgiwg.org/FAD/fdd/view?i=103770" />
  </skos:Concept>
</rdf:RDF>
```

Figure 2: Example of a SKOS file.

Functional Use Code

See also <https://www.dgiwg.org/FAD/fdd/view?i=1227>

- **Commercial** 
 - DEF : Of or pertaining to the exchange of merchandise or services, especially on a large scale.
- **Recreation** 
 - DEF : Of or pertaining to the refreshment and/or comfort produced by something affecting the senses or body.

Figure 3: Visualisation of the file in the previous figure with SKOS Play.

4 Publishing ELF SKOS files

The publishing of RDF vocabularies is described in [7]. Depending on the resources available, the files, all using so-called “slash namespaces” (see also previous section) will be published using either recipe 2 or recipe 4 [7].

Recipe 2 is the simplest possible configuration for a vocabulary that uses a slash namespace and is illustrated in Figure 4 and Figure 5. It satisfies the following requirement of the Semantic Web: *The 'authoritative' RDF description of a vocabulary, class, or property denoted by an HTTP URI can be obtained by dereferencing the URI of that vocabulary, class, or property* [7].



Figure 4: When the code list URI is dereferenced, the RDF description of the vocabulary is served, encoded as RDF/XML (adapted from [7]).

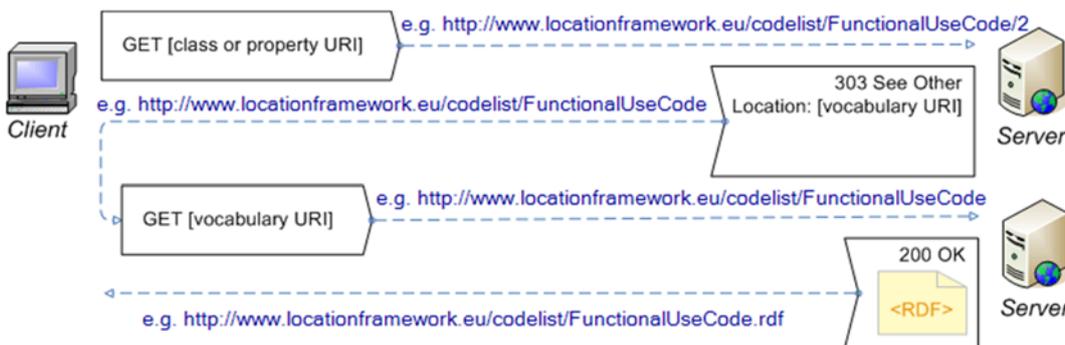


Figure 5: When a code list item URI is dereferenced, the client is directed to the code list URI (adapted from [7]).

In recipe 4, the server is configured to provide either human-readable (HTML) or machine-processable (RDF) content from the code list URI, depending on what is requested, and to redirect the client from code list item URIs to the appropriate content locations.

An overview of all the ELF code lists is available from <http://www.locationframework.eu/codelist>.

5 References

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