

INSPIRE Thematic Cluster on Land Cover and Land Use - State of Play regarding Coverages

Lena Hallin-Pihlatie – facilitator

**INSPIRE KEN workshop
on WCS and raster encoding**

Barcelona
29-30 September
2015

www.jrc.ec.europa.eu

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Stimulating innovation
Supporting legislation*



Inspire Thematic Cluster Platform

Platform launched 12/2014

<https://themes.jrc.ec.europa.eu/>

To build and support thematic communities in implementing INSPIRE

To identify and resolve thematic issues

To get a better overview of the status of implementation per theme

To support the work of the INSPIRE Maintenance and Implementation Group(MIG)

The header of the website features the INSPIRE logo on the left, which includes the text 'INSPIRE - Infrastructure for Spatial Information in Europe'. To the right of the logo is the title 'INSPIRE Thematic Clusters'. Further right is a search bar with the word 'Search' inside. Below the title and search bar is a navigation menu with the following items: 'News', 'Events', 'Categories', 'Clusters', and 'More »'. On the far right of the navigation menu is a link for 'Log in / Register'.

About the INSPIRE Thematic Clusters Platform



Tag cloud

Orthoimagery, S/W tools, Common terminology, **Best Practice**, Land cover, Political/organisational framework, **Data model/scope**, Encoding, EU Thematic Databases, Data used for e-reporting, Codelists, Elevation, **Member State issues**, Data quality, data provision, Statistical Units, Geographical Grids, Thematic use case, land use, interoperability

INSPIRE on Twitter

Twitter

Thematic Cluster Platform structure



Nine thematic clusters

One sub-group per
INSPIRE theme

Nine facilitators





INSPIRE Thematic Clusters

News Events Pages Dashboard Clusters More »

Groups > Land Cover and Land Use Cluster

Land Cover and Land Use Cluster

Image Owner Credit



Description:

This is an open group for people involved and interested in the INSPIRE Cluster Land Cover and Land Use. Please use this group for discussions which are common to both themes within the cluster (Land Cover, Land Use). For discussions focused just on one of these themes, please use the sub-groups created for such purpose:



Land Cover



Land Use

In order to join the group or related sub-groups please use the [ECAS platform](#) and be logged on to the co

Access to Cluster's content

- [Group pages](#)
- [Group discussion](#)

Owner: [Lena Hallin-Pihlatie](#)

Group members: 83

[Open group](#)



INSPIRE Thematic Clusters

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Groups > Land Cover and Land Use Cluster > Land Cover

Land Cover

[Join group](#)

Image Owner Credit



Owner: [Lena Hallin-Pihlatie](#)

Group members: 25

[Open group](#)

Description:

This is an open sub-group for people (data providers, implementers and users) involved and interested in the INSPIRE **Land Cover theme** - within the INSPIRE Thematic Cluster of Land Cover and Land Use.

Please **use this sub-group** to share resources and have discussions which are specific and focused just on the INSPIRE Land Cover theme.

For cross-thematic activities, which are related both to the Land Cover and the Land Use themes, please use the common [Land Cover and Land Use Cluster group](#) created for such purpose.

Brief description: Join this sub-group to share your knowledge, learn and collaborate in solving issues related to the Land Cover theme

Contents of relevance to coverages

General discussion topics of relevance

Possible errors in the Land Cover xml schemas (LC)

- Collection of comments/views -> XML schemas updated (3.0-> 4.0)

Issues related to code lists (LC, LU)

- Corine Land Cover (LC) -> CLC 3-level code list published
- Land Cover Class (LC)

Layer naming convention suggestion for web services

Data transformation experiences (FME, ArcGIS for INSPIRE)

BUT: No answers so far in a discussion topic on [Raster Encoding](#)

Other resources of relevance the LCLU raster community

Two presentations focusing on raster data transformation (LC, LU) in FME:

- [National datasets transformation to INSPIRE specifications with FME: Land Cover, Land Use and Orthoimagineries](#)
- [Experiences with implementing INSPIRE Coverages](#)

Sample raster data

Links to sample datasets provided in the OI theme in a [LCLU discussion topic](#)

Technical Guidelines on Land Use



Land Use is split up into two different types:

- **Existing land use** will be modeled according to three application schemas of which one is:
 - The Gridded Land Use or GLU which correspond to a geo-referenced gridded version of an existing land use (ELU) dataset.
- **Planned Land Use** or PLU which is composed of spatial plans, defined by spatial planning authorities, depicting the possible utilization of the land in the future.

		Temporal reference	
		Existing <i>Land Use</i>	Planned <i>Land Use</i>
Geometry	Vector data	Polygons	ELU
		Polygons, lines, points	PLU
		Points	SLU
	Raster data	GLU	PLU

Table 3 – Classification of the *Land Use* application schemas according to their temporal reference and geometry definition

The Gridded Land Use: UML Overview

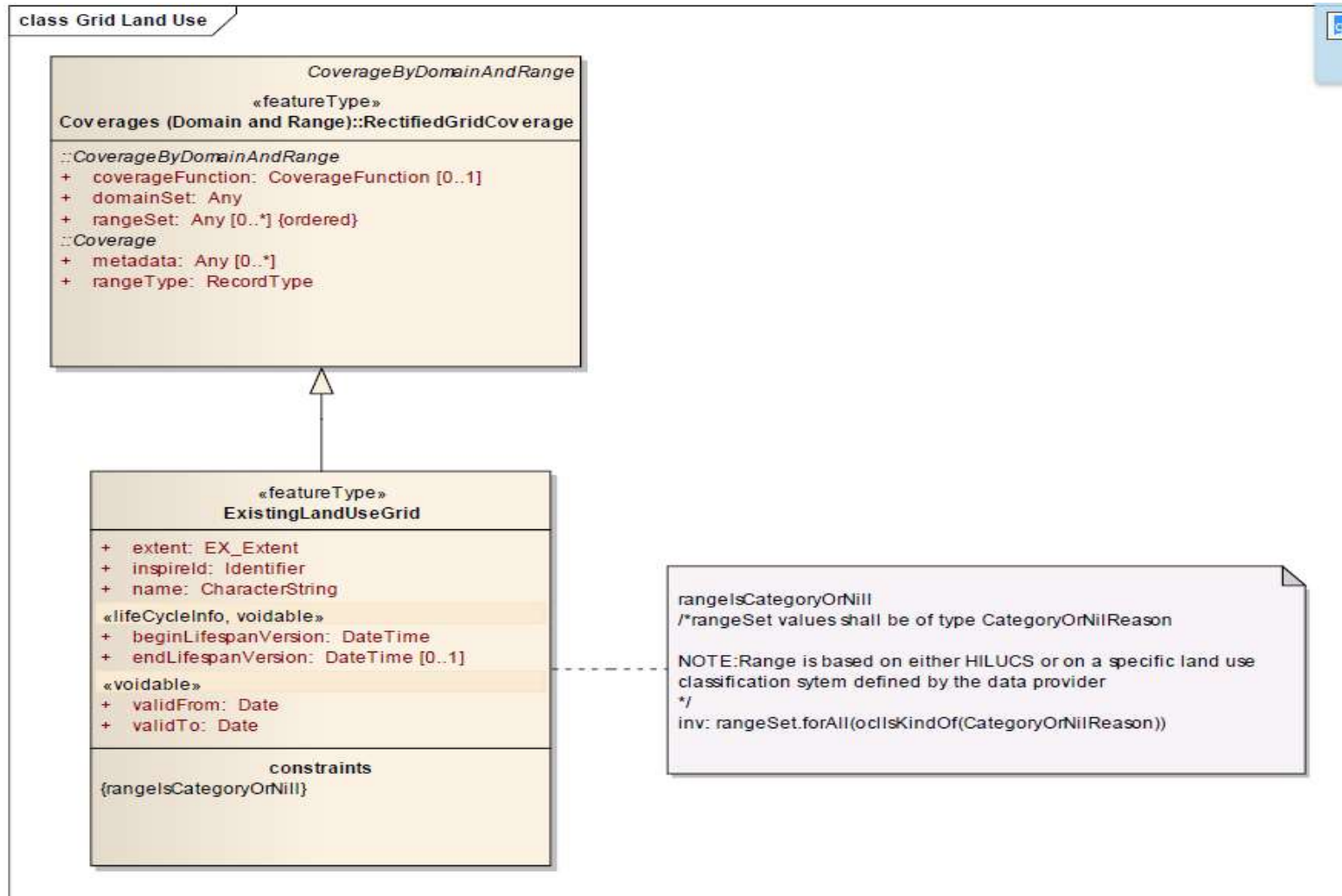


Figure 22 – UML Overview of the gridded land use coverage

Planned Land Use: “raster delivery”

- The scanned version of any maps included in spatial planning documents may be associated to a spatial plan using the «dataType» DocumentCitation.
- The objective for the provision of scanned maps is twofold:
 - allow the provision of the scanned version of the official spatial plan together with the vector SpatialPlan because only the paper based version is the official one in many member states,
 - allow the provision of spatial plans in digital form **where no vector data exists.**
- The scanned version of a spatial plan has to be provided either as **text, image or geo-referenced image.** The MIME extension should be used to inform on its format

Planned Land Use: UML overview

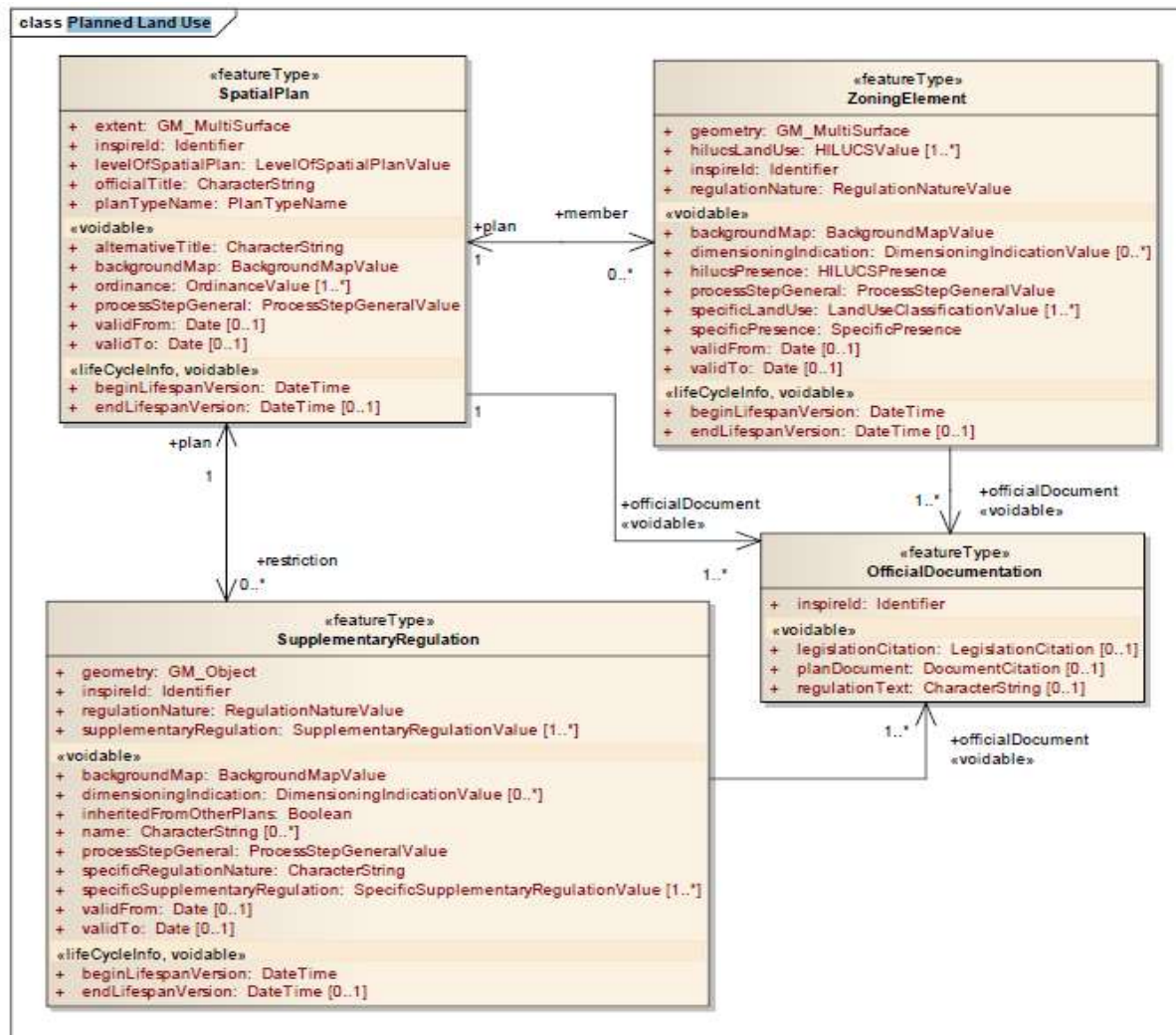


Figure 23 – UML Overview of the Planned Land Use application schema

Technical Guidelines on Land Cover

- Data compliant with this LC DS shall implement LandCoverVector or LandCoverRaster application schema (TG Requirement 2)

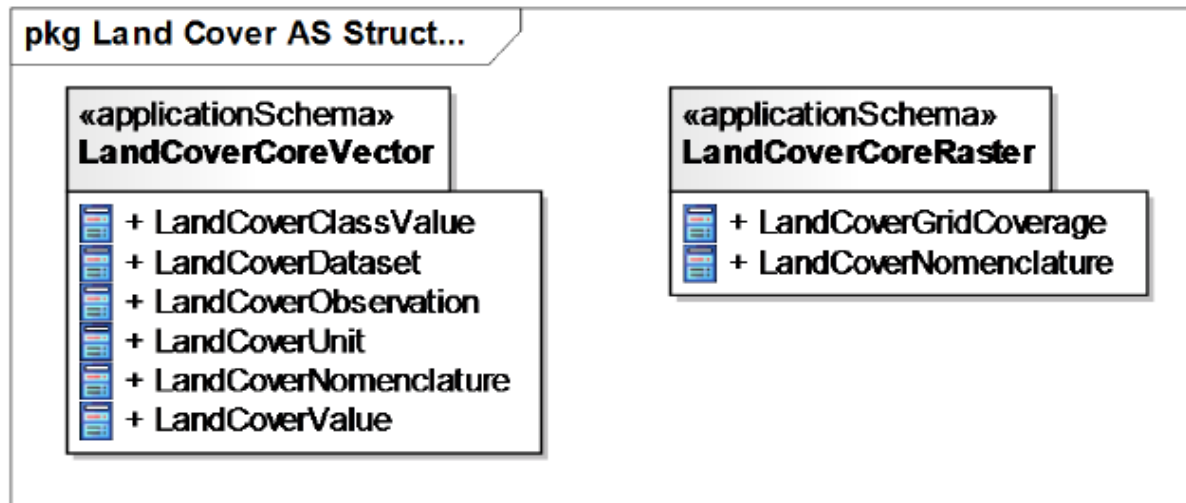


Figure 10 – UML package diagram: Overview of the structure defined for mandatory Land Cover Application Schemas

Land Cover Raster

- The Land Cover Raster application Schema contains the Land Cover Nomenclature application schema
- Theme-specific requirement for providing RGB values and GridCode

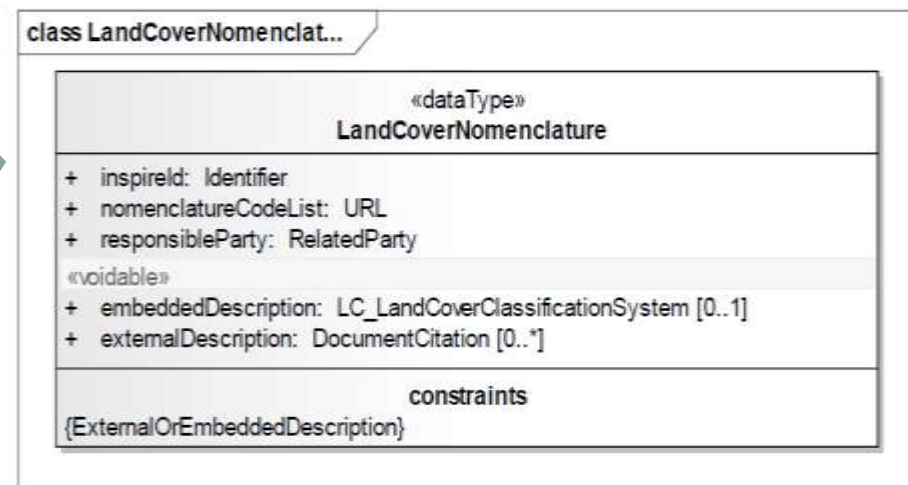
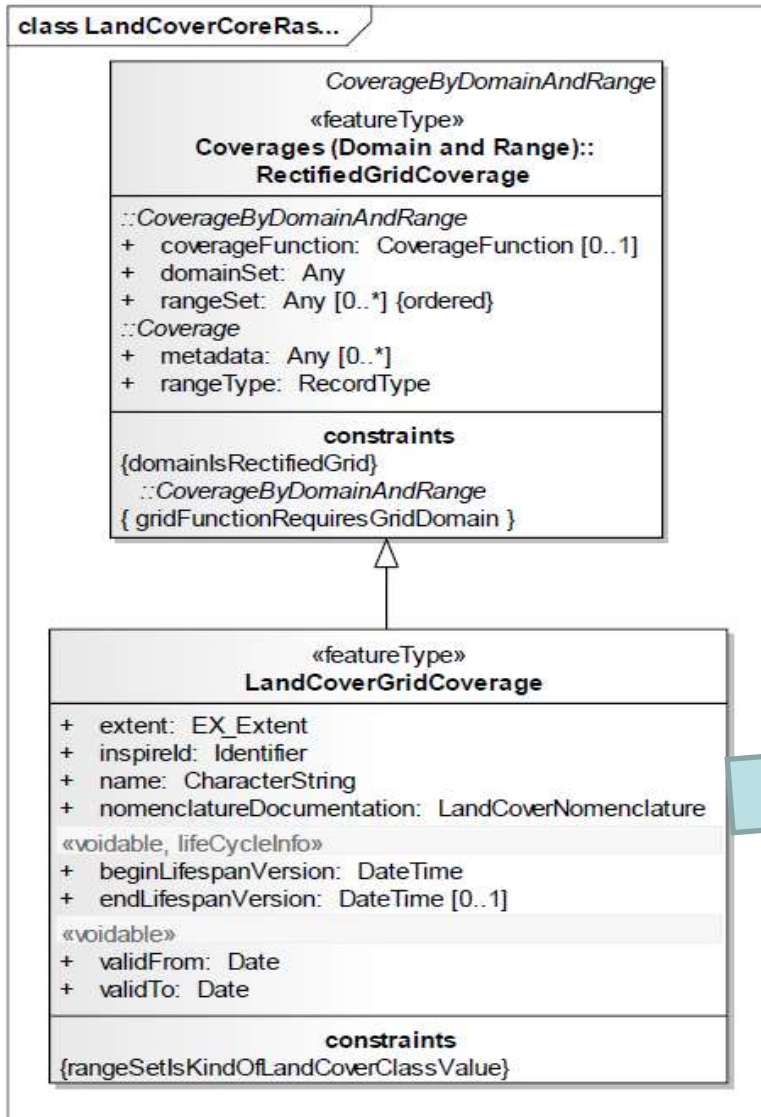
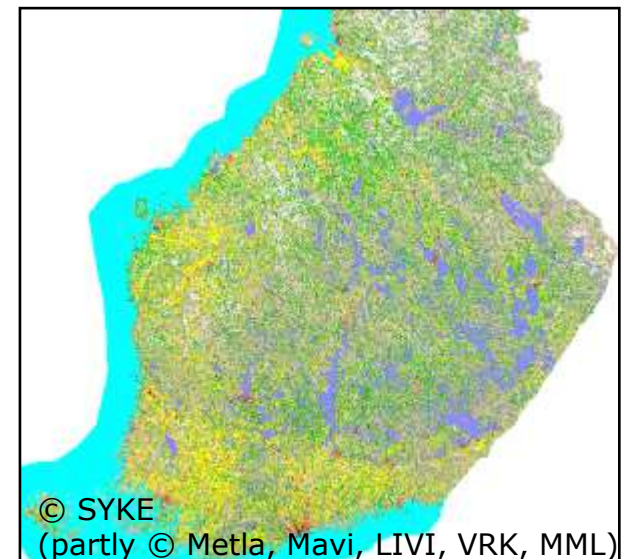
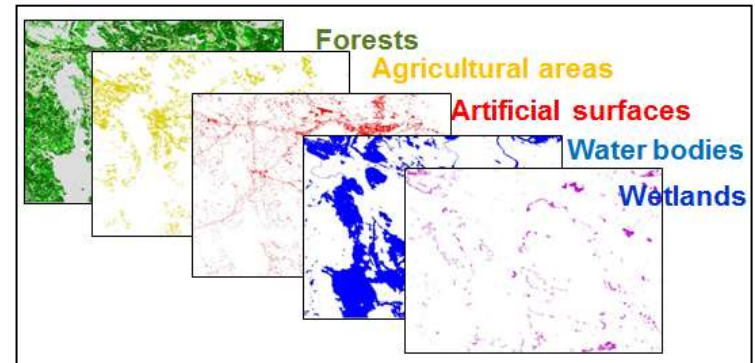


Figure 21 – UML class diagram: LandCoverRaster / LandCoverGridCoverage

Figure 13 – UML class diagram: LandCoverNomenclature

Source Data Example: Land Cover

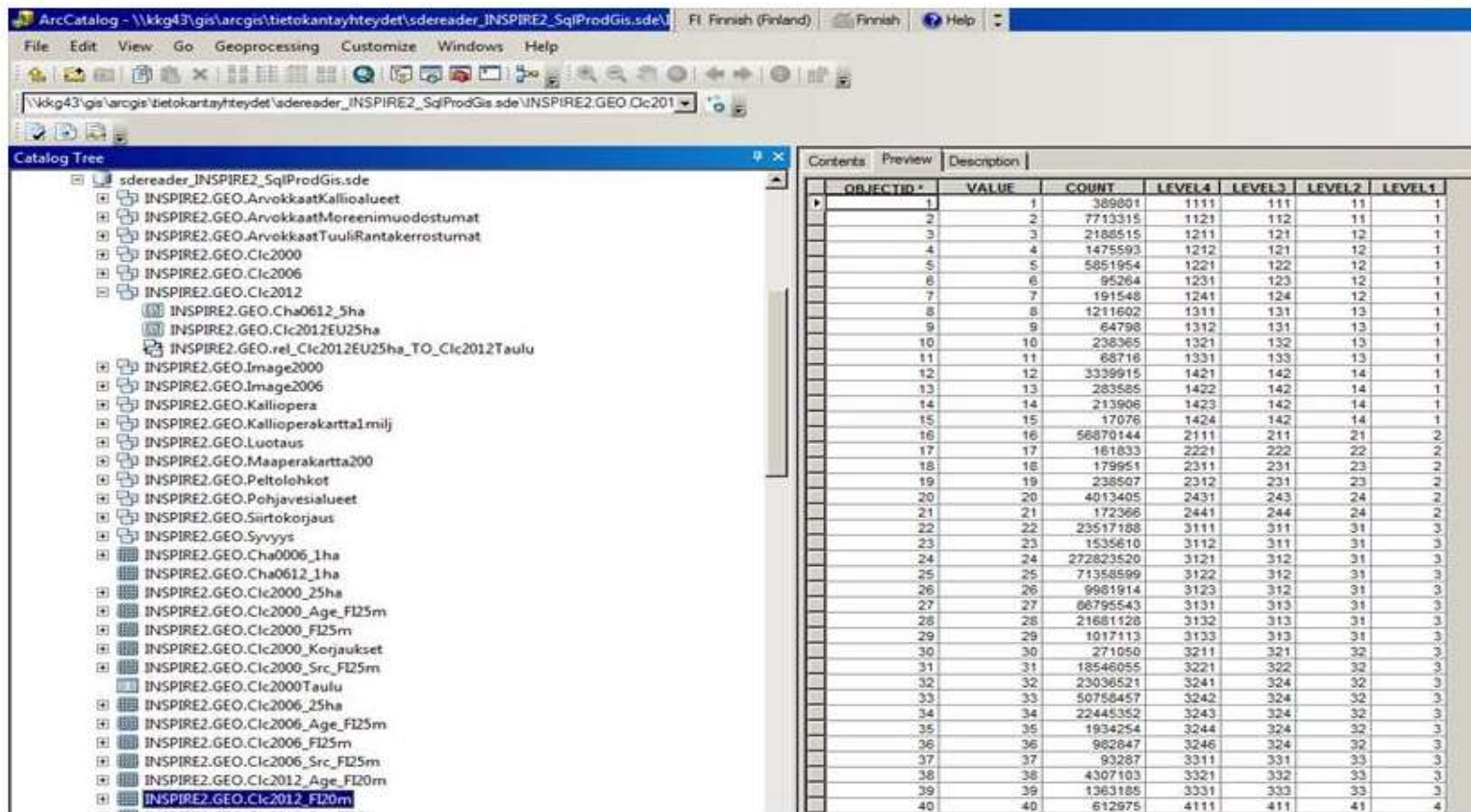
- Data series (resolution)
 - FIHRCLC2000 (25 m)
 - FIHRCLC2006 (25 m)
 - FIHRCLC2012 (20m)
- Contents of the HRCLC product
 - Land Cover **(LC)**
 - CLC 1 level, CLC 2 level, CLC 3 level and CLC 4 level
 - Age Layer
 - Source Layer
 - Change Layer
 - MMU 0,5- 1 ha raster
 - Satellite image mosaic **(OI)**



FIHRCLC =
Finnish High Resolution Corine Land Cover

Storage and maintenance

- All data contents is stored and maintained in ArcSDE (ESRI) in ETRS89 TM35



The screenshot shows the ArcCatalog interface. The Catalog Tree on the left displays a geodatabase structure with various layers. The main window shows a table with columns: OBJECTID*, VALUE, COUNT, LEVEL4, LEVEL3, LEVEL2, and LEVEL1. The table contains 40 rows of data.

OBJECTID*	VALUE	COUNT	LEVEL4	LEVEL3	LEVEL2	LEVEL1
1	1	389801	1111	111	11	1
2	2	7713315	1121	112	11	1
3	3	2188515	1211	121	12	1
4	4	1475593	1212	121	12	1
5	5	5851954	1221	122	12	1
6	6	95264	1231	123	12	1
7	7	191548	1241	124	12	1
8	8	1211602	1311	131	13	1
9	9	64798	1312	131	13	1
10	10	238365	1321	132	13	1
11	11	68716	1331	133	13	1
12	12	3339915	1421	142	14	1
13	13	283585	1422	142	14	1
14	14	213908	1423	142	14	1
15	15	17076	1424	142	14	1
16	16	56870144	2111	211	21	2
17	17	181833	2221	222	22	2
18	18	179951	2311	231	23	2
19	19	238507	2312	231	23	2
20	20	4013405	2431	243	24	2
21	21	172386	2441	244	24	2
22	22	23517188	3111	311	31	3
23	23	1535610	3112	311	31	3
24	24	272823520	3121	312	31	3
25	25	71358599	3122	312	31	3
26	26	9981914	3123	312	31	3
27	27	66795543	3131	313	31	3
28	28	21681128	3132	313	31	3
29	29	1017113	3133	313	31	3
30	30	271050	3211	321	32	3
31	31	18546055	3221	322	32	3
32	32	23036521	3241	324	32	3
33	33	50758457	3242	324	32	3
34	34	22445352	3243	324	32	3
35	35	1934254	3244	324	32	3
36	36	862847	3246	324	32	3
37	37	93287	3311	331	33	3
38	38	4307103	3321	332	33	3
39	39	1363185	3331	333	33	3
40	40	612975	4111	411	41	4

Delivery today: view services

- Data delivered through the Oiva service www.ymparisto.fi/Oiva
 - View services
 - INSPIRE compliant WMS for datasets reported to INSPIRE

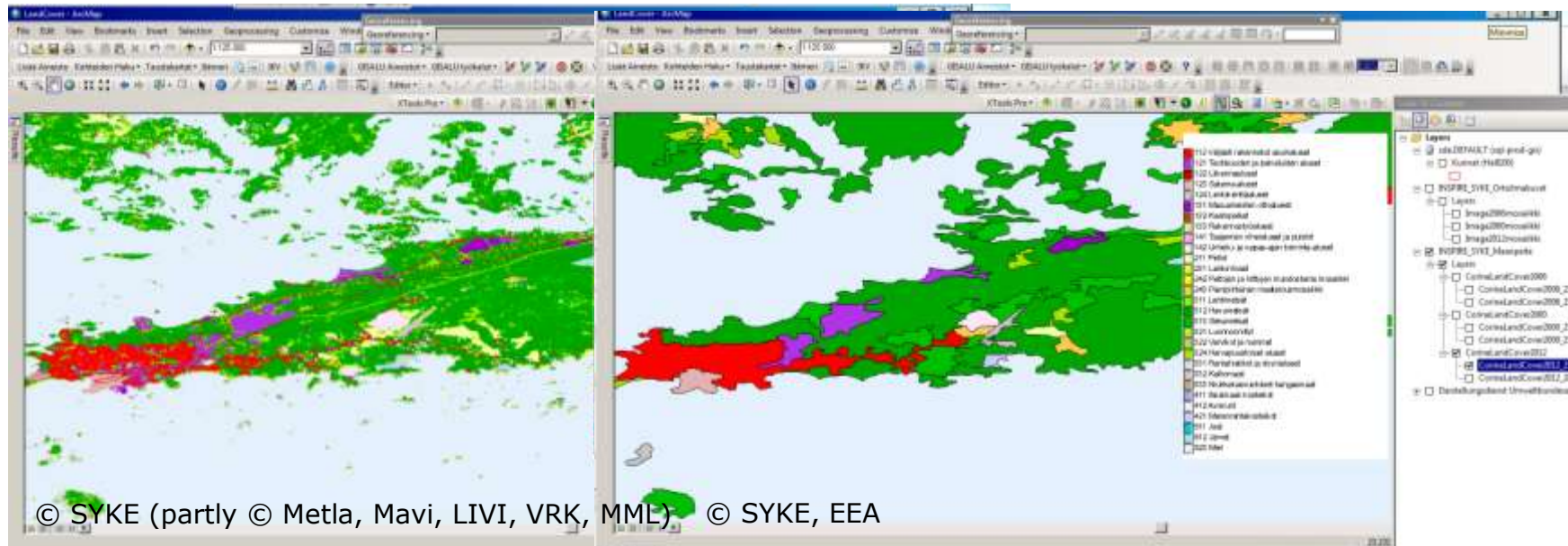
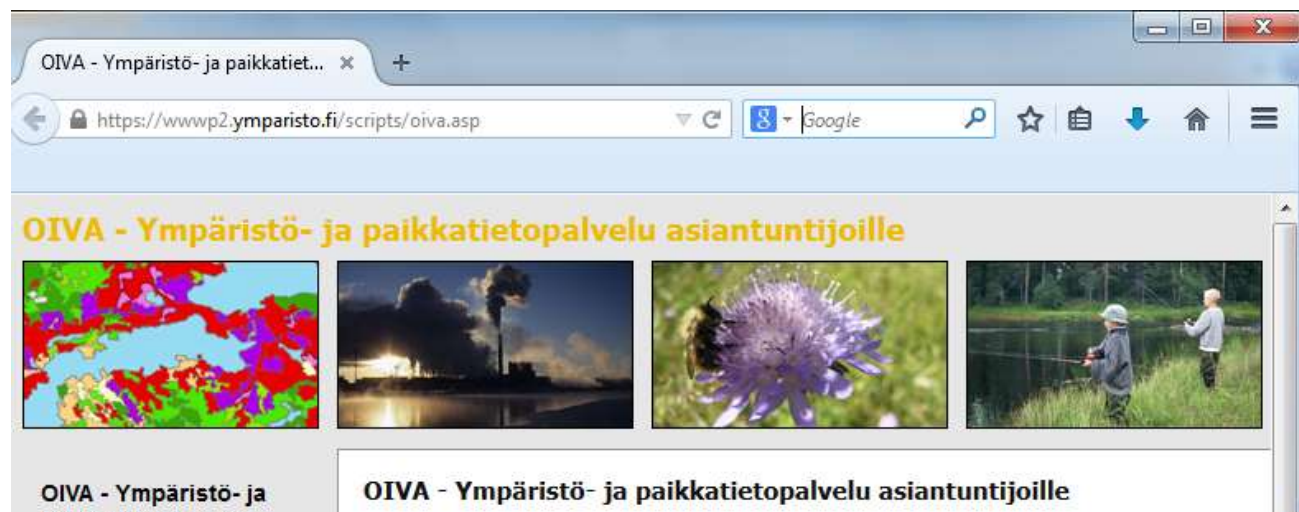


Figure: The Finnish HRCLC (left) versus EU CLC (right) in SYKE's Land Cover both using the 3-level CLC nomenclature.

Delivery today: download services

- Data delivered through the Oiva service www.ymparisto.fi/Oiva
 - Download services:
 - Lapiro tool: according user-defined area
 - Pre-defined Zip packages covering the whole of Finland
 - Atom feed pointing at the same zip packages covering the whole of Finland – **BUT** only for datasets reported as INSPIRE datasets
- <http://wwwd3.ymparisto.fi/d3/atom/inspireatom.xml>



Atom feed

SYKE:n INSPIRE-tiedostopalvelu

Tiedostopalvelusyöte, jonka kautta on saatavilla Suomen ympäristökeskuksen tiedostoina ladattavat INSPIRE-paikkatietoaineistot

[Valuma-aluejako](#)

24. syyskuuta 2013 12:00

Tuotesyöte valuma-aluejaosta.

[Uomaverkosto](#)

26. toukokuuta 2015 12:00

Tuotesyöte uomaverkostosta.

[Luonnonsuojelu- ja erämaa-alueet](#)

26. toukokuuta 2015 12:00

Tuotesyöte luonnonsuojelu- ja erämaa-alueista.

[Natura 2000](#)

24. syyskuuta 2013 12:00

Tuotesyöte Natura 2000:sta.

[Image2000 mosaikki](#)

25. marraskuuta 2014 11:00

Tuotesyöte Image2000 mosaikista.

[Image2006 mosaikki](#)

25. marraskuuta 2014 11:00

Tuotesyöte Image2006 mosaikista.

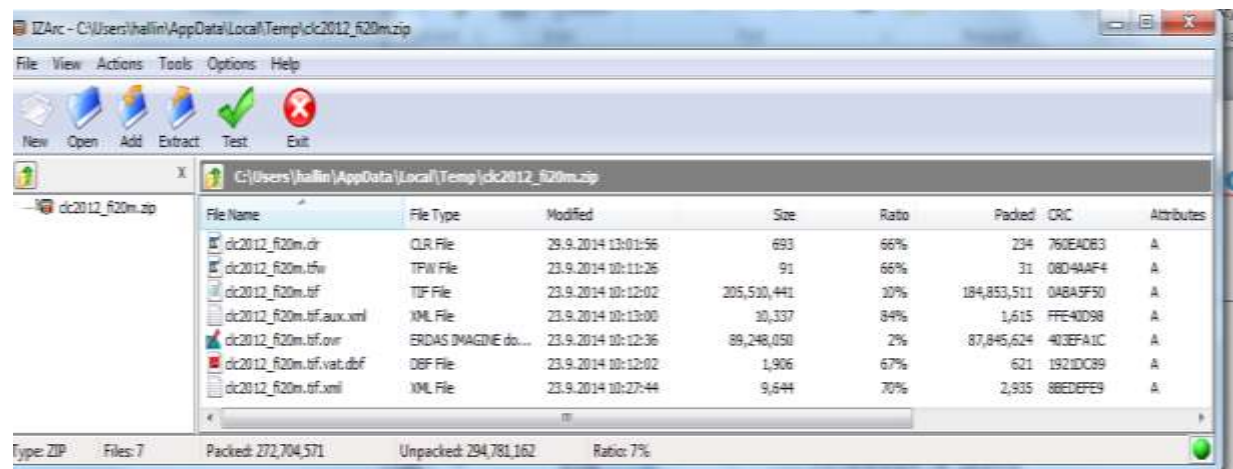
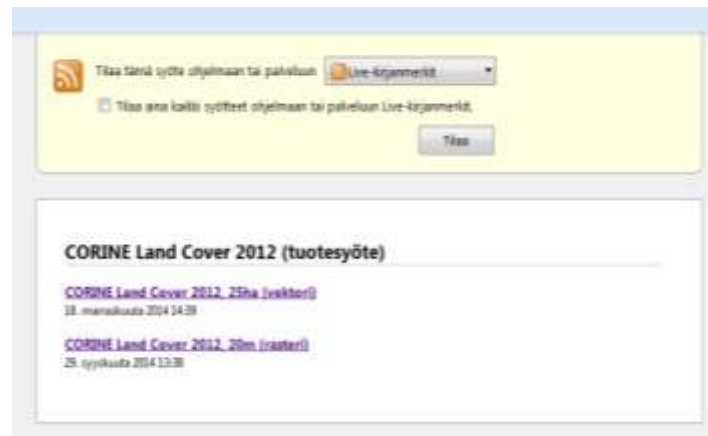
[Image2012 mosaikki](#)

25. marraskuuta 2014 11:00

Tuotesyöte Image2012 mosaikista.

[CORINE Land Cover 2000](#)

26. marraskuuta 2013 11:00



Zipped GeoTIFF delivered

- The atom feed is pointing at a GeoTIFFs produced by ArcGIS
 - TIF not according to standards and to LC requirements and recommendations of INSPIRE

 clc2012_fi20m.clr	29.9.2014 13:01	CLR File	1 KB
 clc2012_fi20m.tfw	23.9.2014 10:11	TFW File	1 KB
 clc2012_fi20m.tif	23.9.2014 10:12	TIF File	200 694 KB
 clc2012_fi20m.tif.aux.xml	23.9.2014 10:13	XML File	11 KB
 clc2012_fi20m.tif.ovr	23.9.2014 10:12	ERDAS IMAGINE document	87 157 KB
 clc2012_fi20m.tif.vat.dbf	23.9.2014 10:12	DBF File	2 KB
 clc2012_fi20m.tif.xml	23.9.2014 10:27	XML File	10 KB

- How to produce INSPIRE LC/LU compliant raster data and related feature download service in a resource-efficient way?

Cross-thematic issue: raster encoding

- The Annex E in OI is corresponding to Annex J in Land Cover
 - No Annex in Land Use
 - Typos in the Introduction of Annex J (LC)
- The Annexes should preferably be taken completely outside the theme-specific Technical Guidelines
 - “Further details and examples will be included in a future version of the Guidelines for the encoding of spatial data [DS-D2.7].”
- Cooperation and alignment between the clusters/themes needed
- Example encoding for each theme
 - To bridge the gap between reality and INSPIRE requirements

Introduction

This annex specifies how to use the TIFF or JPEG 2000 file formats for encoding the range set of grid coverages. Because pixel payload is not sufficient to construct a readable standalone image, additional descriptive information has to be packaged together in the same file, even if it is already provided somewhere else in GML. For this purpose, this part establishes schema conversion rules for all the coverage components of INSPIRE Application Schemas that have a corresponding element in the output TIFF or JPEG 2000 data structures. These conversion rules play an essential role in maintaining consistency between the different representations (i.e. GML, TIFF or JPEG 2000) of the same coverage information.

On the other hand, TIFF specifications and JPEG 2000 Standard offer many options and let some variables open for encoding image data. If this flexibility allows covering most applications, it leads, in turn, to a situation where disparate implementation platforms exist while being potentially incompatible. As a result, interoperability is often unlikely. In order to fill in this gap and to enable a controlled exchange of data across Europe, this annex draws up an implementation profile of TIFF and JPEG 2000 to constrain their usage within the scope of INSPIRE. It amounts to impose external formal-dependent restrictions to the applicable values of the properties described in the INSPIRE application schemas. This annex specifies how to use the TIFF or JPEG 2000 file formats for encoding the range set of grid coverages. Because pixel payload is not sufficient to construct a readable standalone image, additional descriptive information has to be packaged together in the same file, even if it is already provided somewhere else in GML. For this purpose, this part establishes schema conversion rules for all the coverage components of INSPIRE Application Schemas that have a corresponding element in the output TIFF or JPEG 2000 data structures. These conversion rules play an essential role in maintaining consistency between the different representations (i.e. GML, TIFF or JPEG 2000) of the same coverage information.

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Thank you Dominique and Jordi for arranging this workshop!

