Minutes INSPIRE KEN workshop on schema transformation for coverage themes OI and EL

File name:	Workshop "Schema transformation for themes OI and EL"		
Version	Author	Date	Comments
0.1	DL	13/10/2015	Initial notes
0.2	JE	21/10/2015	Revision and enrichment
0.3	DL	21/10/2015	Comments from CUZK and ICGC taken into account.
1	DL	27/10/2015	Discussion about rangeParameters solved

1. Participants

Dominique Laurent (IGNF), Jordi Escriu (ICGC), Dolors Barrot (ICGC), Joel Plana (ICGC), Florence Couvreur (IGNB), Saulius Urbanas (EuroGeographics), , Julian Delgado Hernandez (IGN Spain), Arvid Ozols (Latvian Geospatial Information Agency), Veronika Kusova (CUZK), Markus Seifert (SDI Bavaria), Jeroen Hogeboom (Kadaster), Per-Arvid Jakobsen (Norwegian Hydrographic service), Marc Roesbeke (Flemish Hydrography – Belgium), Peter Prešeren (Surveying and Mapping Authority ot the Republic of Slovenia), Morten Borrebaek (Norwegian Mapping authority), Fanny Lecuy (SHOM - French Hydrographic Office), Tervo Roope (Finnish Meteorological Institute), Tommy Hellström (National Land Survey of Sweden), Fredrik Wiksten (National Land Survey of Sweden), Timo Sallinen (National Land Survey of Finland), Lena Hallin-Pihlatie (Finnish Environment Institute), Sören Dupke (con terra), Alex Mircea Dumitru (Jacobs University – Germany).

2. Training session (Alex Dumitru)

- Coverages

  Alex Dumitru presents the motivation for coverages and WCS and the principles of coverage and coverage encoding. See PowerPoint presentation.

Discussion:

- Standardization - What are the dependencies between ISO and OGC?

  ISO is more abstract, there may be multiple implementations. OGC aims to make it concrete. OGC standards are often "de facto" standards used in the industry. Hence, they

are tested and mostly focused on implementation level. Usually, standards become first OGC standards and afterwards they are adopted by ISO.

There should be a new, unique standard in 2016. This is CIS v1.1, which is now in draft version and submitted for comments. It is based in GMLCOV (GML Application Schema Coverages), but tries to make it simpler.

- Do the metadata (metadata hook) in coverage application schema concern the whole coverage or individual pixels?

  They concern to the whole coverage. Open questions and items:

  1) If it is intended for a specific purpose (e.g. get specific coverages metadata information faster than reading it from the regular metadata file of the coverage dataset or external file header).
  2) There should be more guidelines on for what to use this metadata hook and which items should be informed in it. Duplication of metadata should be avoided in order to maintain consistency and make it simple.

- Where are the coverage values?

  There are different options for encoding coverages in INSPIRE:

  1) Inline encoding (All the content is included in the GML file, including the coverage values).
  2) Multipart representation (GML file where the coverage values are included in an external file, e.g. GeoTIFF, and referenced from the GML). This is the most used at the moment, for efficiency reasons.
  3) External encoding (external file including GML fragments in it).

  See this link for more details:

  https://themes.jrc.ec.europa.eu/discussion/view/2843/experiences-on-encoding-of-elevation-and-orthoimagery-coverages

- Where are the metadata? In the GML file or in the GeoTIFF encoding?

  There is some metadata in the GeoTIFF file header (pixel size, origin, CRS, etc.). The GML coverage file contains also metadata information in the rangeType component and may also provide it in the metadata hook.

- Which GML component of the rangeSet shall be used to reference the coverage values when using multipart representation? Current applicable standards (OGC 07-036 GML / OGC 09-146r2 GML Application Schema Coverages) do not clarify:

  a) According to OGC 09-146r2 GMLCOV, it is valid to use the gml:rangeParameters component of gml:File.
  b) According to OGC 09-146r2 GMLCOV, rangeType is used to document the parameters of the rangeSet.
  c) According to OGC 07-036 GML, the coverage values shall be provided through the external file referenced by the gml:fileReference property, whereas the rangeParameters component is intended for defining further semantics on the structure of the underlying data.

A common approach or guidance should be provided for ensuring interoperability.

See related discussion here:

https://themes.jrc.ec.europa.eu/discussion/view/42326/need-more-guidance-for-elevation-encoding-and-correct-example-for-elevationgridcoverage-on-the-basis-of-gmlcov-schema

WCS2.0 Clients won't use the rangeSet parameters provided under range set, but use information provided under rangeType.

- Are there validation tools?

  Any XML validator can be used. For this purpose, the appropriate schemas have to be included within the schemaLocation element, in the header of the GML file (e.g. gmlcovAll.xsd). However, clients don't always accept schemas, even if validated.

- WCS

  Alex Dumitru presents the functionalities of WCS Core and WCS extension and provides several examples. See PowerPoint presentation.

  WCS Core offers basic functionality to request for the capabilities of the service (GetCapabilities), a description of a coverage (DescribeCoverage) and getting the coverage data set (GetCoverage). It also allows performing format conversions on the fly and getting subsets of a coverage (namely subsetting, either trimming or slicing).

  Additional functionality depends on the extensions implemented and supported by the service. Look at the WCS Suite diagram in the presentation.

Discussion:

- Where to find examples?

  http://schemas.opengis.net/wcs/2.0/examples/

  http://earthlook.org/demo/geo-service/wcs.php

3. National experiences about transformation of themes EL and OI

- IGN France

  Transformation test was run on theme EL, using tiles as predefined data sets, using mainly GDAL tools. Main issues are about volume of data (e.g. for lidar data) and choice of vertical CRS. See PowerPoint presentation. They use 1 x 1 Km tiles.

  Overview page available here:

  https://themes.jrc.ec.europa.eu/pages/view/49042/experience-from-ign-france

Discussion:

- Lidar data is out of the EL scope but there has been an informal request to include it (not published through the Thematic Clusters platform). This potential extension of the TG scope should be discussed in the Thematic Cluster.

- ICGC (Catalonia)

At the moment the testing was run on theme EL, but OI theme is also included in the testing plan. Coverage standards are new for ICGC, so it has been necessary to analyse them (OGC 07-036 GML / OGC 09-146r2 GML Application Schema Coverages). See PowerPoint presentation. An Elevation coverage encoding example is available.

Overview page available here:

https://themes.jrc.ec.europa.eu/pages/view/49043/experience-from-icgc-catalunya-spain

Discussion:

- Which realization of the vertical CRS (EVRS) is used for INSPIRE? Are you using EVRF 2007, as recommended by INSPIRE?

  ICGC uses EVRF 2000, as IGN France, for the same reasons: lack of data to compute the transformation from national system to EVRF 2007. Several countries have also complained about this issue in the Thematic Cluster forum.

  Note that EVRF 2000 is also accepted by INSPIRE, although EVRF 2007 is recommended.

- CUZK

  Transformation has been run both on EL and OI, using HALE (Humboldt Alignment Editor) for GML creation. See PowerPoint presentation.

  Overview page available here:

  https://themes.jrc.ec.europa.eu/pages/view/49047/experience-from-czech-republic

Discussion:

- Which resampling method have you used?

  Bilinear.

- Con terra

  Con terra has performed transformation on EL and OI themes for Saxon Lander, using FME. Download is currently done using tiles (2 x 2 Km) and ATOM feeds. See PowerPoint presentation.

  Overview page available here:

  https://themes.jrc.ec.europa.eu/pages/view/49054/experience-from-the-state-of-saxony-germany

Discussion:

- Size of data sets is a challenge. Using multiple rangeSets instead of tiling may be better solution.
- Have you published the templates prepared for rangeType, domainSet, … on the Thematic Cluster forum?

  No, we are not confident enough.

- For the inspireID, you have chosen a solution very similar to IGN F and CUZK ; the inspireID is based on a tile coding system.
- This experience will be published in the Thematic Clusters collaboration platform as a ‘Recommended Best Practice’.

- IGN Spain

  IGN Spain has transformed both EL and OI, using FME. For encoding, the second option (values in external file) has been chosen. Size of tiles (especially in TIFF format) is an issue. See PowerPoint presentation. Both, Elevation and Orthoimagery coverage encoding example is available.

  Overview page available here:

  https://themes.jrc.ec.europa.eu/pages/view/49058/experience-from-ign-spain

Discussion:

- Is there interest for a common pan-European grid?

  Yes, adopting a common grid is the only way to avoid interoperability problems and misalignments between coverages from different data providers / Member States.

  However, it is not clear that the best solution is the 'Zoned Geographic Grid' (based on geodetic coordinates and a DTED structure) currently recommended by INSPIRE. There is an emerging proposal from Spain to establish a common grid adopting a Mercator projection – to be published soon in the Thematic Clusters collaboration platform.

  What is totally clear is that sharing coverage data using grids based in TMzn projections, is not a good solution to achieve interoperability, because the different zones.

- How to deal with redundancy?

  Some information is duplicated when comparing the necessary items to be provided according the implementation standards (GML / GMLCOV), the additional attributes to this coverage model proposed by INSPIRE, and the metadata in the external files providing the coverage values (e.g. TIFF header).

  Examples: use of gml:boundedBy vs. el-cov:domainExtent, use of metadata hook vs. additional information with the xml metadata files of the coverage dataset.

  These values may overlap in some cases, and there is therefore room for inconsistencies (different values) - To be further discussed through the Thematic Clusters collaboration platform.

- What is the status of annex E of TG on OI? It is a normative annex, but it is referenced in the TG by a recommendation (recommendation 32)?

  In the view of Michael Lutz, this recommendation should be transformed to a requirement – See related discussion:

  https://themes.jrc.ec.europa.eu/discussion/view/32920/inconsistencieserrors-found-in-the-inspire-tgs-on-orthoimagery

- This experience will be published in the Thematic Clusters collaboration platform as a 'Recommended Best Practice', and the EL encoding example proposed to be included in the INSPIRE TG on EL for improving guidance.

4. ELF Project

- State-of-play

  NMCAs are main data producers for themes OI and EL; theme OI is generally considered under Master level 0 or 1 where theme EL is generally considered under Master level 1 or 2. See PowerPoint presentation.

Discussion:

- Which connection between land and sea?

  In general, different measures (height/depth), referenced to different vertical CRS (EVRS or LAT, respectively), are used. The two communities have generally different coastlines.

- EuroDEM30 prototype

  This is a new product prototype covering the area of Germany, Poland and Czech Republic, launched by EuroGeographics in order to improve the current EuroDEM product. It is based on 1 arc second GSD (aprox. 20 m), 3 meters vertical accuracy, 0.1 m vertical resolution and 5 m horizontal accuracy.

  The draft specifications are taking into account the requirements from EuroControl regarding TOD (Terrain Obstacle Data) and were presented to this organization on 23/09/2015, receiving positive feed-back. They should now be tested on ground and in the air; decision to launch or not the product will be taken after this test. The decision is expected by end 2015. Then the specifications will have to be finalized and license agreements to be signed. Sebastian Lass (BKG) is the potential coordinator. See PowerPoint presentation.

- ELF orthoimagery viewing service prototype

  This product was not initially envisaged in the DoW but the inventory showed that OI is a very common theme between NMCAs. The principle is to provide a WMTS harvesting national services. The prototype is covering the territory of Spain, Andorra and France. See PowerPoint presentation.

5. Web Coverage Service

- Flemish Hydrography

  A data portal for bathymetry has been developed in the framework of the EMODNET community; it uses WFS and WCS. See PowerPoint. A demo is presented, showing the various options (geographic extent, CRS, format, resolution …) offered to the user.

Discussion:

- Are there use cases for combining land and sea together?

  The BLAST project was dealing with this topic, but it finished. Keiran Millard is probably the best contact to get information.

  IGN France is co-editing with SHOM (Hydrographic Office) an elevation product on coastal areas (with same CRS, resolution ….)

- How to reuse EMODNET bathymetry data for INSPIRE?

  EMODNET bathymetry data is covering the sea territories for whole Europe, but this is available using data model which is different from the INSPIRE one. The use of a WCPS could be a good idea to transform this data to the INSPIRE GMLCOV data format. Obviously, efficiency of such a potential solution must be considered.

- Experience in ICGC (Catalonia)

  They are using of WCS 1.1, which is an old version of the standard and rather slow. Plan to update the service to WCS 2.0 when the MIWP-7b tasks are finished. New pilot application to generate 3D views, using WCS and threejs. See PowerPoint

Discussion:

- There was need to modify threejs?

  Need to check with the developers.

- Finland meteorological Institute

  There is an open data portal, with different services (WFS, WCS, CSW …). The data transformation for INSPIRE is performed on demand. There is need for harmonized parameters in INSPIRE (not yet the case). See PowerPoint.

Discussion:

- Do you need irregular grids (e.g. more accurate in South than in North)?

  No.

- Which INSPIRE themes are you transforming?

  Themes AC-MF and EF. We have still some issues, e.g. identifiers are missing.

- Are there many users of INSPIRE data?

  No, people request mainly existing data but they are generally not aware of the INSPIRE services.

- National Land Survey of Sweden

  WCs is used since 2015. VRT (Virtual Raster Format) is used to manage pyramid in WCS. Main applications are wrapping Oi on EL and dynamic shading. See PowerPoint.

- WCS in INSPIRE MIWP-7b

  The WG was kicked-off in June 2015; it has to include WCS in the technical guidelines for download services, to make a state-of-play of use of WCS and to demonstrate feasibility. It was agreed to restructure the TG for download services in a general document and one specific document for each specific downloading option. See PowerPoint.

Discussion:

- Will WCS replace predefined data sets?

  Predefined datasets are included in the Implementing Rule and they constitute a practical and efficient solution in many cases. So it will not be removed.

- Does the work of MIWP 7b consists in making a profile of WCS, by choosing the relevant extensions?

Yes, the purpose is to select the standard (WCS 2.0), see which components are important and update all the necessary documents (TG on download services, minor updates of TGs for related INSPIRE data themes, new guidelines on implementation of coverage data inn INSPIRE).

- Can WCS derive slope or exposition to sun from EL data?

  May be but this should be done rather by WCPS.

6. Thematic clusters

- State-of-play in thematic cluster LC-LU

  No active discussion about raster issues, just some links to sample data. Only an editorial issue about encoding: there are recommendations or requirements in annex E for themes EL and OI, in annex J for theme LC and nothing in theme LU. Good solution might be to extract these annexes from data specifications and to put them in the general document about encoding. See PowerPoint.

- State-of-play in thematic cluster EL - OI

  Discussion is active with around 25 members for each theme. JRC has asked facilitators to provide soon request for change of TGs for next MIG-T meeting in Rome (30/11 - 02/12). See PowerPoint.

Discussion:

- Redundancy between domainExtent and boundedBy?

  domainExtent is in EL application schema and boundedBy is a default GML attribute with multiplicity [0..1] => might be forgotten?

  Peter Parslow explained that boundedBy was good GML practice but without explaining the rationale.

  domainExtent provides more information than boundedBy (temporal and vertical extent) and is able to model discontinuous spatial extents . Note that this information can't be given by the footprint (absent in EL at the moment) or by the "no value" pixels (different concept).

  Decision: reopen the issue: 1) ask Peter Parslow why boundedBy is so important; 2) start discussion about footprint in the same thread.

- Redundancy between metadata

  There are metadata at coverage level (optional metadata hook, as proposed in GMLCOV), in the image file (header) and also at data set level (xml metadata file of the data set).

  Metadata at coverage level probably provides easier and quicker access (without having to access any external resource, e.g. TIFF file with the rangeSet values, xml file, etc.). To be checked with Peter Baumann / Alex Dumitru.

- Common GML templates into DS

  The templates for coverage specific topics (rangeType, domainSet, …) are not included in the XSD and everyone develops own template; there is duplication of work and risk of inconsistencies. Why not include them in the .XSD?

  It would be possible to define a generic coverage template, by removing from existing coverage examples the content which is data provider specific, and make a change request to include it in the TGs.

- Need for common European grid

  This may be a good idea as there are (too) many options in the INSPIRE specifications; with download of predefined data sets, user will still get heterogeneous data.

  The common grid should be used in production; if not, there will still be some misalignments at the boundaries.

  Having interoperable EL data looks achievable but for OI, the content will likely remain heterogeneous (different radiometry, different dates for taking the image).

- Interest of WCS

  The best benefits are direct access to the coverage values (contrary to e.g. ATOM feeds, which is accessing to predefined data sets), additional data exploitation capabilities through the own service and the provision of metadata with the coverages/images (more complicated with ATOM feeds). It would simplify provision of data.

  WCS would solve many remaining issues on data harmonisation as several options are allowed by INSPIRE (grid size, CRS, format).