

Minutes LC/LU workshop “Land use/land cover products: challenges and opportunities”

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Version	Author	Date	Comments
0.1	D. Laurent	22/11/2017	Initial notes
1.0	D. Laurent	07/12/2017	Comments taken into account

These minutes aim to complement the presentations by providing short summary and the discussion topics.

1. Participants

List of participants is available on:

<http://www.eurogeographics.org/event/land-useland-cover-products-challenges-and-opportunities>

Presentations are also available there.

2. Introduction

○ Workshop welcome and introduction

Dominique Laurent reminds the audience of the context and objectives of the LC/LU workshop and its relation with the CLC+ User Consultation workshop the following day. As expected, most of the attendants of the LC/LU workshop will also participate to the CLC+ User Consultation workshop.

○ Reminder on LC/LU INSPIRE data specifications

Lean Hallin-Pihlatie presents the main characteristics of the INSPIRE data specifications for the themes Land Cover and Land Use.

○ The Copernicus land monitoring service

Hans Dufourmont presents the various products of the portfolio of the Copernicus Land Monitoring Service. The trend is to produce not only high spatial resolution data (such as CLC and High Resolution Layers) but also very high spatial resolution data (such as Urban Atlas and Riparian Areas) and to exploit the multi-temporal images provided by the Sentinels.

3. European examples

- EAGLE: concepts and implementation (Geoff Smith)

According to the EAGLE principles, LC, LU and additional surface characteristics should be specified separately using an object-oriented description (from which a conventional label “classification” might be derived if required). The EAGLE matrix is not proposing a new classification system but aims at enabling semantic translation of classifications and the rich attribution of landscape objects.

Discussion:

- The EAGLE concepts are of great interest. What about their propagation outside Europe?

There are some discussions on-going, whether the idea behind the EAGLE-concept and certain details within it can be used as contribution to standards like ISO TC 211 or also OGC.

- LUCAS: the current product and its evolutions (Alessandra Palmieri)

LUCAS is a survey on LC/LU conducted by Eurostat on sample points. There is a separate classification for LC and LU. Main use cases are related to agriculture, biodiversity and climate change. Regarding the evolutions, they mainly aim to increase the efficiency of the production process.

Discussion:

- There have been changes in the specifications. Are the data still comparable?

Yes, for the changes that occurred since 2009.

- Semantic modelling of EU CAP agricultural areas with LCML (Pavel Milenov)

Eligibility of land in the context of EU Common Agriculture Policy (EU CAP) is a central issue handled through complex relation between LC and LU data and related concepts. There are stringent requirements with respect to the correctness of the agricultural area, due to the associated high monetary value. Earth Observations mostly enable to capture the “top-view” aspect of land **cover** whereas 3D information on the various strata would be required. A promising approach consists in the use of TEGON (horizontally homogeneous physical 3D object with distinct characteristics on each stratum) and of the Land Cover Metadata Language.

- Experiences from ELF implementation (Åsa Sehlstedt)

The ELF project has designed a specific LC code list based both on the EAGLE concepts and on the INSPIRE PLCC (Pure Land Cover Classification) and has described it according to ISO 19144-2 (LCML); national data has then been matched to this code list. Whereas the work is

easy at conceptual level, its practical implementation in XML is raising issues as there is not a .XSD schema (namespace) in LCML to be re-used in INSPIRE.

4. National experiences

- The French standard on large scale LC/LU and its implementation as core data (Dominique Laurent)

According to this national standard, a polygon may be described by four attributes: LC, LU, morphology and characteristics, the LU classification being based on HILUCS. IGN France is proposing large scale data based on a simplified version of the standard (only LC and LU, less levels).

Discussion:

- What is the minimum width?

5 meters.

- Is it possible to compare planned Land Use with existing Land Use?

In theory, yes as we also have a national standard for planned Land Use that is close to INSPIRE. However, I am not aware that the exercise has already been done. In practice, this might be more difficult.

- The evolution of LU/LC data in the German cadaster (Christian Lucas)

The German cadaster has defined a new model with separate layers for LC and LU and carried out the exercise of decomposing their classification (for transport use) into the EAGLE matrix. This exercise enables improvements in the new classification and to assess the feasibility of migration between old and new data. The migration rate is around 95% for backward transformation.

Discussion:

- When will the final decision about this new product be taken?

Next September

- Why do you have different polygons for LC and LU? What are the implications?

They are independent layers with different update frequency.

- Spanish approach (Parametric Object Oriented Land Cover data models) – Julian Delgado

IGN Spain has produced a complete coverage of LC polygons, using the EAGLE components. The envisaged evolutions aim to get higher spatial resolution (better than 5K), to include cadastral data as reference (parcel delineation) and to change the production process to automatic processing of big data.

Discussion:

- Automatic delineation might be more reproducible?

The integration of cadastral reference data will also be automatic.

- The LISA extension to LC/LU data model: the Austrian example (Gebhard Banko)

The INSPIRE data model has been extended mainly to take into account the seasonal changes of land cover, e.g. from bare soil to herbaceous.

Discussion:

- Could it be used to distinguish intensive and extensive agriculture?

In Austria, there is some issue with overestimating the eligible areas. There is a big project in CAP. This experience might help.

- Restructuration of Finnish data, with focus on LC/ LU (Ulla Pyysalo)

A user requirement survey has been conducted, pointing out the need for whole coverage of LC/LU data and of DSM. The new production process envisages dealing with multi-source input data and with different methods but is it going to ensure data consistency?

- Experiences from Swedish LC-LU implementation (Åsa Sehlstedt)

The Svensk geoprocess aims to define a basis for data exchange between local authorities. The INSPIRE data models for LC and LU have been adapted to suit with the Swedish context: adding point and line geometries as an alternative to surface geometry. Point geometries use the same code lists as surfaces, but line geometries have other attributes and are using another code list.

Comment: The question how to use and link to the INSPIRE code list register was answered during the coffee break. The answer is to use the Re3gistry software provided by JRC for setting up and linking national code lists to the corresponding code list of the INSPIRE code list register.

5. Discussion session

- How is INSPIRE influencing the European products?

Copernicus: we use the INSPIRE metadata; we have INSPIRE compliant WMS services for the products of our portfolio. There is some discussion on-going about the benefits of INSPIRE for Copernicus, to see what has to be improved.

Member States are pushing us to use INSPIRE but it is not always relevant; for instance, regarding Copernicus Services on Climate or on Atmosphere, data producers have their own standards.

But for Copernicus Land services, let us see how to implement INSPIRE specifications, where it makes sense.

LPIS: it is not a pan-European product, but dataset owned and managed by Member States. A technical framework for data interoperability has been developed by JRC as part of the LPIS Quality Assurance (QA) Framework. Tools were also developed to help MSs to report their LPIS QA data, following the principles of INSPIRE (mainly linked to LC). The main issue relates to data access (data privacy, data sensibility, data security).

LUCAS: the classification makes distinction between LC and LU; data is documented by metadata close to INSPIRE rules and is provided through web services.

- Why such a different approach between LC (no common code list) and LU (common codelist)?

Would we do it differently now? Was it relevant to have 2 themes in 2 different annexes? What to change in future? We have CLC with its outdated nomenclature and MMU but requirements and challenges are changing. LPIS might also provide further requirements. LPIS has been operational for more than 15 years. It is very important to keep LC and LU concepts separated. Whether it should be in 1 or 2 distinct data specifications and application schemas is another story.

For the very complex issue of LC, INSPIRE data specifications is quite flexible with its non-mandatory recommendations on the use of a land cover classification, and there are certain degrees of freedom, which do not oblige every data provider to fulfil the proposed PLCC (Pure Land Cover Classification). As there is no requirement for data providers to follow the recommendations of the data specifications, comparability cannot be guaranteed; there is need to move forward.

What was the rationale for such low level agreement? For LC, there are already many classifications for specific purposes. At the time of drafting the data specifications, the EAGLE concepts was not yet considered mature enough, TWG not courageous enough to impose a mandatory classification; as a compromise there were the optional PLCCs.

In many existing products, polygons had been designed to suit to CLC nomenclature; it would have been impossible to match with a new classification. It was impossible to demand that.

INSPIRE is just a first good step towards interoperability but real data harmonisation is still to be done. Anyway, it looks impossible to have a universal classification fit for all applications. Therefore, a paradigm shift from classification to characterization can be a way to support comparability between systems and datasets and be the basis for newly capture information to be more flexible towards different kinds of application of that data. LU is a well-established concept (since antiquity) whereas LC is newer concept that emerged from the introduction of remote sensing; although it represents an essential characteristic of Earth surface, its concept was driven by the technology and mapping community. We are still missing tools to deal with it. HILUCS is mainly statistical classification, there is a logical order. However, boundaries are changing; with higher resolution images, LU may also be seen by satellite (at least partly).

LC has a broad range of applications; it is important to know the INSPIRE Universe of Discourse (just for environment and for Europe?).

- What is the status in countries that didn't present their experience today morning?

- Netherlands: Statistical Office has a LU data set. We try to improve our production process to get cheaper data. It is not possible to include data for all details.

- Croatia: Main purpose is better decision making. We are willing to compare planned LU to existing LU to monitor our developments.
- Latvia: In cadaster, we keep LC data with very low update frequency, depending on survey on CP. There is need to change: making distinction between LC and LU, be open to new ideas.
- Poland: We have LC and LU in different databases; we don't have nationwide data; still a lot to be done.
- The situation is different in new countries (such as Balkans) where no data and need to be inventive. However, even in countries with well-established cadastre, it is healthy to rethink, to consider new opportunities (e.g. big data).

6. Context evolution

- o Thematic cluster on LC/LU functioning and feed-back: transforming current data to INSPIRE (Lena Hallin-Pihlatie)

Some of the main issues collected in the LC/LU Thematic Cluster: how to deal with LPIS (should it be reported to LC and/or LU and which are the minimum data and code list requirements?), lack of GML schema for the Land Cover Extension schema, PLCC to be refined, how to deal with embedded description of nomenclature as there is not a ISO LCML schema to re-use. Decision about change proposals to be taken in December 2017.

Discussion:

According to the European Commission, the core reference data stored in LPIS is LC. However, nowadays LPIS is a multi-layer product with also LU information. However, no recommendation exists at European level; MS have instructions.

- o UN-GGIM: Europe core data: objectives and state-of-play on LC/LU (Nuria Valcarcel)

This initiative aims to describe minimum data content for the SDG (Sustainable Development Goals). 14 INSPIRE themes have been selected, including LC and LU. Use cases have been investigating, showing wide range of applications. The trend would be to recommend Master level 1 data (5K – 25 K) but work is under progress with on-going discussions.

- o Update of ISO 19144-2 (Roland Grillmayer)

The main rationale for revision is the lack of .XSD schema and the will to harmonise the LCML and the EAGLE concepts. The EAGLE semantic is more restrictive, less flexible and makes documentation of LC more intuitive: EAGLE offers only vertical pattern, easier to decode than the decision-tree of LCML.

Discussion:

- This work is so important for whole world. Give them the money!

- Semantic harmonization and interoperability is also critical for EU CAP; some work has been done in LPIS on the basis of FAO LCCS and LCML. We also need an assessment method to define the quality of the translation. Failing to adequately translate a particular LC/LU nomenclature cannot be a reliable indicator for the performance of either EAGLE or LCML, for the simple reason that the input classes themselves can be poorly defined (for example, CLC 242 complex cultivation patterns).

7. Research – Potential solutions

- o How to help user to move to INSPIREd products (Dominique Laurent)

Users are reluctant to migrate to new product (OCS GE) that is based on INSPIRE for various reasons: separation between LC/LU considered as difficult, fear to break time series, need for local specificities ... Various actions are on-going to cope with these issues.

Discussion:

- We have similar issue: how to convince users to move to new products

We haven't yet found the solution.

- o EuroSDR current projects contributing to research and innovation on LC/LU (Bénédicte Bucher)

These projects include benchmarking of new sensors (e.g. Sentinel-2), studies on 3D data, studies on historical data that may be of interest to evaluate the long term LC-LU dynamics, information infrastructure & geoweb (make software able to deal with heterogeneity) and the URCLIM (Urban Climate) project that will require detailed LC data.

- o Connecting VGI to LC (Ana-Maria Raymond)

LandSense is a European H2020 project aiming to build a citizen observatory. Principle is to organize guided campaigns to the specific places to be updated.

- o Fotoquest go: a smartphone app to collect LU and LC data (Steffen Fritz)

The application-methodology includes GPS (for location), some questions on LC/LU to be answered and photos to be taken. Tests have been conducted to compare results from this VGI application to the LUCAS survey.

- o Open Land Use Map (Dmitrii Kozuch)

The principle is to make a seamless map using multi-source data (CLC, Urban Atlas, ...). Existing data is transformed into the INSPIRE LU data model. Then, the map is "filled" by using in priority the most detailed data.