Abstracts

Core Spatial Data

Seminar on the occasion of the 25th Jubilee of Tjeu (Mathias) Lemmens at TU Delft

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Feasibility of multi-scale information model and one key register topography

Jantien Stoter

For efficiency reasons within NMCAs (National Mapping and Cadastral Agencies), but also driven by INSPIRE, NMCAs have started to look for possibilities to collect topographical data once, and use it many times. In the Netherlands this is supported by the establishment of 'key registers'. Legally established key registers contain authentic data and their use is mandatory for all public organizations. For topography two key registers have been identified, both covering the whole of the Netherlands:
1. *Basisregistratie Topografie (BRT)*, 'key register topography', established since 2008, currently consisting of topographical data at scale 1:10k; from 2010 the smaller scales will be added to this register.
2. *Basisregistratie Grootschalige Topografie (BGT*), 'key register large-scale topography', expected to be a key register within three years.
Two information models, with different backgrounds and different stakeholders, support these two registers: TOP10NL for BRT (established in 2002, is currently being extended to smaller scales) and IMGeo for BGT (established in 2007). An IMGeo-compliant data set is not yet available. The main source for IMGeo will be the object oriented version of the Large-scale Base Map of The Netherlands (GBKN, *Grootschalige Basiskaart Nederland*).

Driven by the main motivation for key registers (collect once, use many times), the most optimal situation would be to have one key register topography containing most detailed information from which the topographical data sets at smaller scales are derived automatically when required. This should be supported by one information model for multi-scale topography, specifying data content at the largest scale and describing how object classes change at scale transitions. The presentation will address the feasibility of this idea by addressing two main questions.
The first question is how feasible one 'sector model topography', as derivation from NEN3610 (Basis model Geo-information), is using both the requirements of such a model as well as the two sector models TOP10NL and IMGeo as starting point. Similarities and differences between the two information models will be analysed to show what is needed to define one multi-scale information model topography. Also results from a study to establish one multi-scale information model covering scale 1:10k and smaller, called IMTOP (Information Model TOPography), will be used to answer this question.
Secondly the presentation will question how feasible it is to maintain one key register topography at the largest scale, from which topographical data sets at each predefined smaller scale can be derived. This covers both generalization possibilities to derive TOP10NL-data from GBKN as well as to derive 1:50k, 1:100k, 1:250k etc from TOP10NL-data. IMGeo (test)data will be compared to TOP10NL data and several studies on generalization of topographical data will be summarized to answer this second question.
It will be concluded that two key registers topography (one for large scale data and one for data at scale 1:10k and smaller) most probably will remain for the short to medium term future. This is not necessarily contradicting with the paradigm 'collect once, use many times'. Therefore recommendations will be given how the information models IMGeo and TOP10NL can be integrated as well as how GBKN, TOP10NL-data and data sets at smaller scales can be maintained in order to collect the data once, and maintain it at several key registers covering different scales to use it many times.

AHN in perspective
The (im)possibilities of Digital Elevation Data as Core Spatial Data

Ing. Stefan J. Flos MSc MMI
SJF projects & support

The NCG paper "*Core Spatial Data 2010*" provides an overview of current rapid technical developments of spatial data collection and use over the past 10 years. On the user side a rapid conversion from 2D to 3D is noted. The nationwide Elevation Data of the Netherlands (AHN: Actueel Hoogtebestand Nederland) provides most of the digital height data and is seen as a potential Core Spatial Data set. The NCG sub-commission recommends to '*include the original elevation data un-interpreted in de core spatial data set*'.

To be able to review the potential for the AHN as a core spatial dataset it is important to see the AHN in perspective of technical (supply), usage (demand) and organisational (institutionalisation) dimensions. The central argument presented here is that because of current rapid technical developments a definition of digital elevation data in terms of un-interpreted data is not sustainable. Moreover, it will not balance the governments own geo-information business case. The demand (and value) within professional use is specific and will result in demand for well defined, interpreted and sustainably maintained elevation data products.

An example of classic demand for a standard interpreted height model is use of elevation data in hydrological modelling. Characteristically also invisible infrastructure such as divers, water depths and bathymetry are to be included in the end product. Scanning of the raw elevation data is the easy part, making is suitable for use in a hydrological model is where the effort is. This will demand a suitable organisational objective and context.

Technical developments are outside the governments field of influence. One instrument that can be put in place is the institutional context in which professional core spatial data use will develop. Linking core spatial data with core spatial data use is vital for developing sustainable geo-information datasets. In order to provide value to the professional (government) end users, standard interpreted elevation datasets should be defined which are not linked to a certain technique or scanner brand. This will result in standard products that can be maintained regardless of developments in technique.

The un-interpreted raw data can be seen as spin-off and will provide a basic dataset for a wide range of users. More importantly, the raw data offers a unique digital elevation archive, an invaluable resource for analysis in the future. We should take good care of it.

The research agenda of the NCG Subcommission 'Core Spatial Data'

George Vosselman

The Subcommission Core Spatial Data of the Netherlands Geodetic Commission has the goal to improve the availability and stimulate the use of core spatial data by

- coordinating research in the fields of acquisition, representation and use of this data
- document and distribute relevant knowledge in this field by means of publications and workshops
- advisory reports to the Netherlands Geodetic Commission or other relevant organisations
- initiating PhD research in this field
- maintenance of international and national scientific contacts

The eight members of the Subcommission work in the field of geo-information at universities, government agencies and companies. The Dutch representatives to the EuroSDR (European Spatial Data Research) are member of the Subcommission. In the past year, the Subcommission developed her research plan covering the issues

- User requirements
- The use of raw data (like imagery or point clouds) as core data
- Massive data management
- Interpretation of raw data to derive geo-information
- Harmonisation of concepts and data models
- Integration of interpreted data
- Multi-scale issues
- Time and history
- 3D geo-information
- Shared mapping

At the first workshop of the Subcommission Core Spatial Data on 18 December 2008, the Subcommission will present her research plan.

CycloMedia's aerial and ground-based image databases

Frank van den Heuvel

Driven by the motto "an image says more than a thousand words" CycloMedia is building large-scale image databases with both aerial and ground-based imagery. The high-resolution aerial images are taken with a photogrammetric camera while ground-based images – so-called Cycloramas – are taken with a panoramic camera. Both types of images have a number of common characteristics that make them suitable for a wide range of applications such as supporting property taxation, or the implementation of the BAG (Basisregistratie Adressen en Gebouwen). The common characteristic that transforms these images into geoinformation is the fact that the location of each image is known in the national coordinate system. Furthermore, both types of images are suitable for photogrammetry because the images are overlapping and the geometry is know down to the subpixel level.

Aerial imaging is contracted out by CycloMedia to a photogrammetric company that applies state-of-the-art technology. For the ground-based imagery the situation is different: CycloMedia has developed several generations of panoramic camera systems in-house. With the latest system 360-degree imagery free of parallax is taken from a driving car. With the standard distance between images of 5 meter the maximum speed of the car is 80 km/hr. Currently, a large number of systems is being built, and of course calibrated. These systems facilitate the regular updating of the photography of The Netherlands and CycloMedia's expansion to other countries in Europe and the Middle East.

Many millions of high-resolution images have already been acquired and hundred thousands are added every week. These represent a large amount of geo-data that can only be accessed when efficiently stored and advanced tools are available for querying this visual database. A seamless integration with available GIS-systems is essential for applications such as management of open space and urban planning. In these traditional viewing applications image content is of primary importance, geometry is secondary. However, the high quality of the georeferencing and the geometry of Cycloramas pave the road for new applications, especially when Cycloramas are combined with aerial images. In the first place we think of maintenance of large-scale base maps like the GBKN. Cycloramas offer the perspective of the surveyor which has a positive effect on the quality of the (photogrammetric) mapping and will reduce field work. Furthermore, research is conducted for the analysis of image content for an application as *road asset management*, and Cycloramas are suitable for the production and photorealistic texturing of 3D city models. Because of the large amounts of data, research aims at fully automatic processing in all applications. Many challenges are awaiting us, but the required base (image) material is available!

Cadastral Information: More than base data

Jaap Zevenbergen

When seeing the term ‘cadastral information’ most of us will have an immediate idea about which data we are talking about. Nevertheless the term ‘cadastre’ (as well as the (slightly) wider ‘land administration’) has many non-identical definitions, and it can include data on a variety of aspects, useable for a multiple of applications. An overview will be given.

The actual implementations between countries are also highly varied. Work on designing an (international) data model that captures the core of the cadastre has been ongoing since the FIG Congress in 2002 (van Oosterom 2002). First under the name Core Cadastral Domain Model (CCMD) and more recently as Land Administration Domain Model (LADM) which has been submitted in 2008 to ISO for consideration to be developed into a standard. The model includes five packages, which also represent the different disciplines related to land administration:

- parties (people and organizations);
- spatial units (parcels);
- rights, responsibilities, and restrictions (property rights);
- spatial sources (surveying);
- spatial representations (geometry and topology).

For many applications it is not one of these packages, but the combination that makes the information especially useable, either on its own, or in combination with other (geo) data. This also holds for the primary functions of land administration, being real estate transactions (land registration), real estate taxes and land use control, although even there the focus can differ. The packages will be introduced with some of the issues that have been discussed in the process so far.

Cadastral information also clearly plays a role in the geo-information infrastructure (SDI), for which one list of core layers mentions: topographic (elevation), cadastral data, geodetic control, and government/administrative boundaries (Onsrud 1998). In the Dutch context the cadastral information has been legally mandated as one of the key registers (new law which became effective at the start of 2008). This means that the cadastral information, as far as a data element has been declared authentic, has to be used by the public sector in their applications. Earlier this was determined for some topics in specific laws (e.g. one to pay the real estate tax, to be expropriated). The possible consequences of a full implementation of the ‘authentic data’ notion seem to be far reaching, although the (limited) legal status of the cadastral information under private law (in relation to real estate transactions) is not changed (for the time being). The ‘key register cadastre’ is discussed, with reference to the earlier situation and the (continuing) situation in the private law sphere.

It is clear that cadastral information is useable for many applications, on its own and as part of a combination with other data. The fact that it is primarily data on socio-economic realities, limits it usability for many physical phenomena, and also has consequences for the way the data has to be collected.

"Laissez-faire in the air, a real nightmare"

Robert Kroon, CEO Geodelta

The impact of an unforeseen failure onboard an airborne vehicle often results in one big bang and a stairway to heaven.
It is then immediately clear that something has not worked as it should have been functioned. The impact of an unforeseen failure during the airborne acquisition and processing of high resolution geo-data never leads to a sudden big bang. Instead it might affect the quality of the data to a certain degree. The amount of the degradation is often unclear and can only be checked by experts with appropriate hardware and/or software tools. In a time where governments discuss and implement a system of authentic or base registrations ("acquire once, use many times") the quality of these registrations must fulfill defined specifications. This also holds for the quality of airborne geo-data like e.g. aerial images and laseraltimetry data, often called raw or uninterpreted core data.
The presentation discusses technical and organizational aspects of uninterpreted core data, a stairway to a actual, precise and reliable description of topographic features on earth.