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Planning and development of new data model for urban scales, the BTU

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Abstract

This is a small outline about the processes (steps, meetings, agreements, analysis, etc.) which are necessary to elaborate a new data model designed and developed to satisfy the needs of Spanish Local Administrations and Public Authorities. This new data model is designed to consider printable entities at urban scales, complementing the existent data model for smaller scales, the BTA, which have been developed recently. The data model is under development, so the future tasks which are planned might change a little bit but not too much because the goal is very clear: to produce a data model highly interoperable and compatible for big scales.

Keywords: BTU; data model; cartography; urban; planning; phenomena; catalogue; specifications; SDI.

1. Introduction

Along this paper we are going to talk about the Topographic Urban Database (BTU), which is a data model for scales between 1:500 and 1:1.000.

Nowadays, this data model is under development by the Specialized Committee of Cartographic Norms, constituting a workgroup, formed by experts from autonomic entities responsible of creation and management of such cartographic datasets.

The attached image (Fig. 1a) shows a schematic overview of the involved organisms.

These experts discuss about technical issues and propose improvements to the model at meetings.

2. New requirements for cartographic datasets

The new capabilities of the computers and the improvements in telecommunications facilitate the exchange of large amounts of data. Such technical advances besides new demands of the society changed the usual way followed by the producers, which is obsolete.

Now it is usual to access to cartographical datasets stored in different servers and show them as a unique and continuous cartographical composition on the Internet or by using specialized software, like happens it is in the

Spanish Spatial Data Infrastructure [1].

This is because those cartographic datasets have been unified and homogenized, following the same data model, and the map layout has been done once for all layers.

This is only one of multiple advantages. Following this example it could happen that the user visualize a map automatically composed by the map server from two datasets provided by different sources, both of them considered the same layer structure and fields, but created with different quality components and controls.

The final user might notice some topological mistakes, like polyline endings mismatching, boundary polygons overlapping or "sliver" polygons [2] (like in the figure 1b) due to those no-consistent quality procedures.

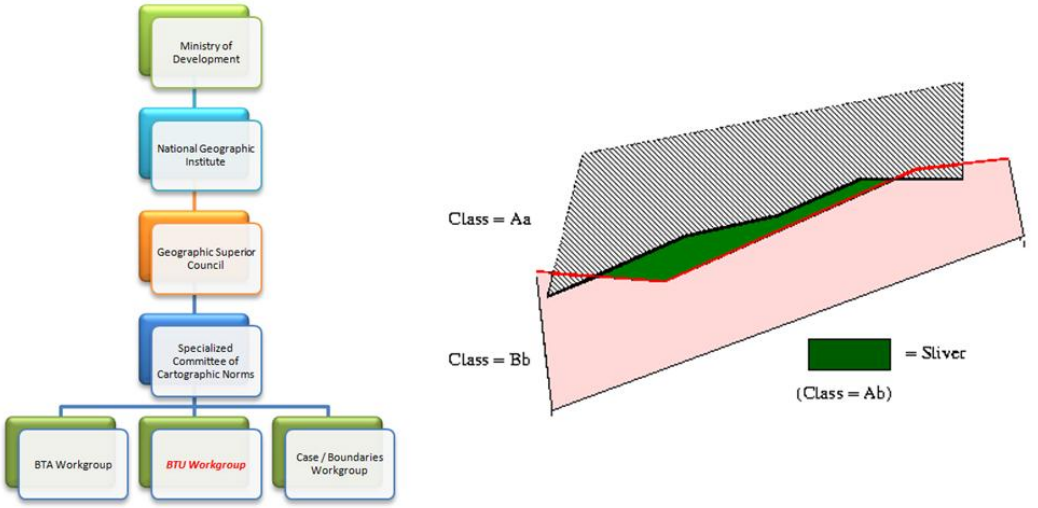

Fig. 1. (a) Scheme of involved organisms for the elaboration of the BTU; (b) Example of "sliver" polygons between geometries with bad boundary definition. Courtesy of G.X. Ritter and M.S.Schmalz.

In order to avoid this situation, to increase the productivity and the interoperability within producers and to get an homogeneous cartographic dataset for all the national territory in terms of internal organization and quality, the Geographic Superior Council through the Specialized Committee of Cartographic Norms has developed the BTA [3]. This BTA is another data model, already released but not finished, developed specifically for cartographic datasets but for scales between 1:5.000 and 1:10.000.

3. Actual situation

The BTA is the first real effort to adapt a realistic and wide-application data model to the actual paradigm of cartographic production. The BTA, already in its beginnings, collected important achievements in those fields.

This new data models BTA and BTU have the support of national administration and this gives confidence and helps the users to adapt their own data models to those news. There are many papers and researches about this, like the correspondences between Valencian Cartographic Institute data model for cartography at 1:5.000 scale and the BTA [4] and [5].

Now, with the BTA data model consolidated and the Workgroup studying the second version of this model for medium scales, it is the moment to develop the data model for big scales, the BTU.

This data model should follow the same philosophy, and will base its specifications in the developed BTA and also applying INSPIRE [6] in some particular elements, like buildings or networks.

4. Workgroup proceedings

4.1. Organization

To enhance the development of the data models Regional Governments give support with their experts.

Those experts constitute nine sub-workgroups [7], headed by the Cartographic institute of Catalonia [8]. Some of them have worked (and are still working) on the BTA data model Project, so it makes the connection between such data models easier.

Once the Workgroup is constituted, they establish a calendar of meetings to fulfill the elaboration process.

Moreover, in order to optimize the time and reduce costs, it is becoming more frequent to attend these meetings through videoconference system.

It has proved to be a good an easy way to meet without interfering too much in the members usual tasks. So it does not change the schedule nor reduce the development length.

4.2. Undertaken tasks

At present, we are debating about the phenomena catalogue.

A phenomenon is whatever entity susceptible to be considered and represented as a feature inside the data model.

Hence, we are creating the families and elements which will be represented in the cartographic datasets for the state. Defining its properties, like possible geometric representation for the feature (this data model considers multiple representation for a single element, like roads, buildings etc) or the additional alphanumeric attributes to store interesting properties of the feature.

We have to keep in mind that at urban scales (1:500 ~ 1:1.000 approximately) one real entity could be represented by a polygon or a polyline, even a point, depending on the size, the shape or other qualities, for instance the representation of a fountain.

In 1:25.000 scale cartography this fountain should be represented as a point, but at urban scales, this phenomenon must be represented at least as a polygon and polyline.

To control the cartographic representation of such phenomena, the map layouts, and to model hidden elements or virtual lines it is usual to require lineal representation (1D) for elements that should have polygonal representation (2D) due to scale. Check references for further information in this topic.

It is important to keep in mind that the main difference between those models (BTU and BTA) are just the scale of the datasets, because they share the same philosophy, and as consequence, the main differences will appear in the catalogue.

We expect a larger catalogue in BTU because due to bigger scale more real world entities should be represented. But almost every feature already considered inside the BTA will be considered in the BTU.

Every sub-workgroup has sent their proposal for features. The head has sent us a template and we fulfill it after analyzing our own cartography.

This has sense because there is a very big amount of cartographic information already available in other data models, usually particular and different between regions. So the new data model should be easy to transfer information from the source model (like Catalonian or Valencian data model) to the target data model (BTU).

Therefore, there will be nine proposals for feature catalogue attending to the particular demands for their cartography. Then we will select those phenomena which are common for everyone and discuss about the others, discuss about if they need a new phenomenon or they fit into an existent BTA phenomenon. For instance “platform”, which some regions proposed a new phenomenon and some other argue that it fit inside “built element”.

Besides, some regions proposed expand the considered families.

If we consider more phenomena families we will break the connection and the full compatibility with the BTA, and nowadays, we are in this step of the process, evaluating if it is real requirement to develop the urban data model.

Actually we have eight families, and the workgroup is thinking about four more.

Furthermore, in the template, there is a row for analyze the matching, direct match, light differences and no relevancy to check the compatibility within BTU phenomena and regional data models.

4.3. Future tasks

In a nearby future, when the feature catalogue will be finished, the remaining task will be to fulfill the technical specifications, so it will not take too much time because it should be similar to the actual BTA.

The main considerations are that transports and hydrograph should configure a continuous network, how to manage the hiding model of boundaries and surfaces, the hierarchic levels of features (this is missing in the actual BTA) and outlines about reference system and exchange formats.

Also we have to consider a revision of quality controls, specific for new phenomena and some updates to the existent already considered in BTA. Taking into account also which metadata should be added or removed in order to maintain a good description about the geoinformation.

5. Conclusion

It is very important to sum up some ideas about those data models.

The BTA data model is already released and has proved a good level of interoperability. After the success of this data model it should be easy to develop a derived data model specific for big scales, to manage cartography of urban areas due to the difficulty to model elements at this scale for the BTA and the low levels of interoperability in the existent regional data models.

The main point is to decide in a right way a feature dictionary (in our case phenomena catalogue) that considers almost every phenomenon that should be represented in urban environment.

All this without forgetting storing organized, extra information about the data, using domains to avoid heterogeneity and mistaken values inside such datasets.

We expect to establish standard protocols to check the integrity of such data and guarantee the quality of those datasets which are produced with this data model.

Also we expect to create a metadata scheme particular for the BTU data model, because it is one of the anchors of the quality components.

Finally, we point out that applying this data model in Local Administrations will facilitate the exchange between reference systems (required by law in Spain nowadays), and the publishing on the Internet the cartographic information in geoportals to make it more public and accessible to the potential public.

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