Cartography in the context of the Spatial Information Infrastructure

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Abstract:

The growing pace of changes in the world around, forces more frequent and faster updating of information, while the growing requirements of an ever-wider range of users enforces a sufficiently high quality of this information. Ongoing changes in the law regulations aim to ensure standardized, readable, compiled in accordance with the highest standards, accurate, opened, reliable topographic data following the changes.

In accordance with applicable polish law - the Act of May 17, 1989 - Geodetic and Cartographic Law (Journal of Laws of 2021, item 1990) - standard cartographic studies form two groups: topographic maps (scales: 1:10000, 1:25000, 1:50000, 1:100000) and general geographic maps (scales 1:250000, 1:500000, 1:1000000). Topographic maps are created on the basis of, among others, The Topographic Objects Database (BDOT10k) while general geographic maps – General Geographic Objects Database (BDOO).

The general plan for the development of tools enabling the creation of topographic and general geographic maps based on the latest knowledge and available technologies, in accordance with the legal provisions was drawn (Figure 1).
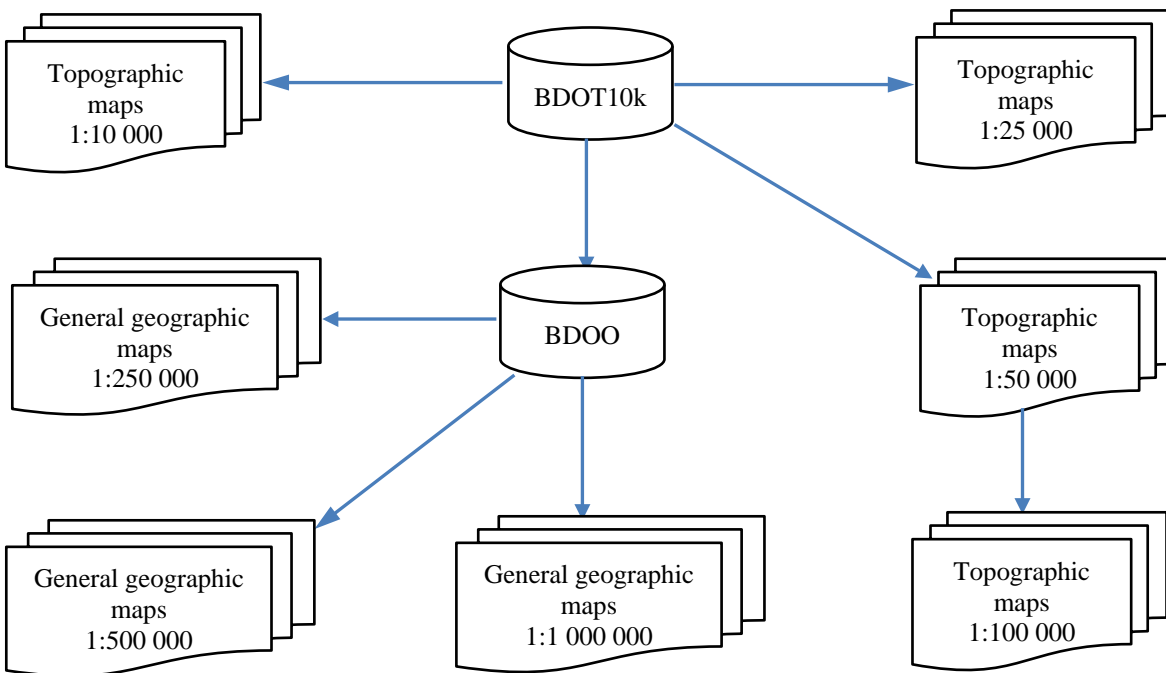
Figure 1. The scope of planned works in the field of preparation of tools for automatic generalization and cartographic editing.

Since the process consists of two crucial steps (generalization of BDOT10k to BDOO; generalization and cartographic redaction of BDOT10k for topographic maps and BDOO for general geographic maps), each of them requires great effort, knowledge and appropriate tools.

Each of the prepared processes is to save the results in the Oracle database in accordance with the data model contained in the Regulation of the Minister of Development, Labor and Technology of July 27, 2021 on the topographic objects database and the general geographic objects database and standard cartographic studies.

This will enable preparation and providing not only traditional maps in the form of services or in paper form, but also in the form of WMS and WMTS services presenting a continuous image of the map content on a national scale.

Ensuring up-to-date, correlated with the up-to-date nature of the source data, available in the services of the www.geoportal.gov.pl portal, of uniform quality studies within the country, along with reduction of map preparation costs and repeatable results of uniform methods of generalization and cartographic editing are the objectives to be met.

The article details the way traveled, the work done so far, the stage we are at and points out the steps ahead. There is no turning back from this road, since users keep looking for up-to-date and reliable spatial information.

Work on automatic generalization of the BDOT10k to BDOO started in 2015. While, the first version of the processes was semi-automatic, in 2021 the first version of the processes allowing for the fully automatic generalization was achieved.

From the very beginning, the FME Desktop software by Safe Software was used, while in subsequent versions - the python - arcpy library by ESRI and ETL (Extraction, Transformation and Loading) software. The built in algorithms allow, among others, the selection based on various criteria, simplification and smoothing of shapes, enlargement of fragments of surface objects, aggregation, removing narrowing of surface objects, taking into account and maintaining topological relationships between different classes of objects at the same time.

Various types of problems were met and solved during work on the construction of generalization processes from BDOT10k to BDOO. To what extent the generalization process should change the source data? How to deal with the generalization of land cover class for built-up areas in terms of separating different types of buildings due to their small areas? Only to mention some.

As a result of the work carried out, in 2021, the first fully automatic process of BDOT10k generalization to BDOO was implemented. It can be run for one or many (up to 16) data sets that cover the area of the voivodship, taking 3 days to complete the area of the country.

BDOO data available for 2015 and 2021 can be downloaded from the website www.geoportal.gov.pl in GML format. It is also published there in WMS and WMTS services using the ESRI - ArcGIS Server tools.

On the BDOO data in GML format, spatial analyzes can be performed with the use of any software that allows for the opening of these data.

The quality of studies will be gradually improved by improving the existing processes. The modular structure of the processes makes it easier. It is also possible to gradually increase the use of artificial intelligence (selecting towns or places) in the built processes but still, increasing the quality of source data seems to be crucial.