TOWARDS THE NATIONAL SPATIAL INFORMATION INFRASTRUCTURE IN POLAND

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Abstract: One the most important component of the National Spatial Information Infrastructure are data. The first reference data set covering whole country – General Geographic Database is discussed. Its integrating role for many of the official registers and databases has been presented. The Database plays also a role of an official reference source for development of new and updating of the existing thematic databases. The place of the General Geographic Database in the Polish Spatial Information Infrastructure. The last one conceptual framework works has been presented in the second part of the paper.

The discussion on the National Spatial Information Infrastructure started in Poland in the middle of 1990'. It was time when creation of some geographic data sets has been initiated but in very dispersed manner. The standardisation of the topographic maps was not implemented so there were available numerous series of maps, quite often not complete. It was a real challenge for architects of the thematic databases. They often selected diverse reference materials, so many of initiated then data sets are not compatible.

The strong demand for standardised reference data sets was articulated in many professional communities. At the end of 1990s some decisions were taken towards establishing basis for the National Spatial Information Infrastructure. One of them was focused on the reference data sets covering whole country and giving to originators of thematic databases a good basis for development of new data sets and updating of existing ones.

The development of the National Spatial Information Infrastructure databases in Poland started with the establishing of the General Geographic Database (GGDB), which is an official spatial database with details corresponding to the map at scale 1 : 250 000 and smaller. The development of that database has been initiated by the Surveyor General of Poland in the end of 1990s. The main goal of its establishing was to provide basic data for referencing spatial objects and phenomena at the national (central) and sub-national levels.

The main target group of the Database consists of central and regional authorities and all entities dealing with development and use of spatial databases of that level of detail. It will be recommended as a source and reference data for all newly developed official databases at national and regional level. Hence, all those databases will be geometrically compatible and will be presented at the background of the same origin.

The Database aims at integrating other national registers containing the spatial reference. The process of registers' integration has started during database creation. Several links to existing and being under development national registers has been established. That process will be continued in parallel to emerging new departmental and regional databases. Today's structure of the General Geographic Database (GGDB) will be also subject of modification caused by the form and content of new branch databases. Those of new databases, which will be significant for considerable group of users will be integrated with the GGDB in the future.

The assumption accepted at the beginning of the GGDB project said that the database will provide the basic data with limited scope of thematic characteristics. More developed description of objects and phenomena has been left to the professionally specialised institutions and agencies. The most important for designers of the GGDB was provision of the authorised information on the position and shape of objects as well as their proper identification, relevant to the official registers/databases.

The thematic structure of the General Geographic Database comprise of the following groups of layers:

- administration units,
- settlements and anthropogenic objects,
- hydrography,
- relief,

- transportation,
- land cover / land use,
- designated areas,
- geographic names.

Each of the group consisted of several data layers with the separate arrangement of items describing objects and phenomena. All together 20 data layers compose the General Geographic Database.

Several sources of information has been examined and then used in the process of the GGDB development. One of them was VMap level 1 database elaborated by the Geographic Authority of Polish Army. The geometry of some types of objects has been checked and corrected against the Landsat ETM+ images. Another important source of data was CORINE Land Cover database which was integrated with topographic data and compared with new satellite images. Characteristics of the most of the objects and phenomena stored in the GGDB has been collected from the recently updated independent data sources. Some of them were available in the digital form and an additional effort has been taken in order to correlate separate data sets.

In order to accomplish the integration role of the General Geographic Database some of existing public registers has been connected to the selected data layers. Establishing comparability between objects of the GGDB and the relevant registers was one of the challenge for the Database developers. The majority of those registers has been functioning in the form of databases which were subject of analysis and possible transposition to the GGDB entities. Prior to that, the segmentation of linear features had to be applied in the way enabling geo-coding of particular object differentiable at the scale of 1 : 250 000. The applied codes and identifiers were certainly derived from the registers.

One of those registers is the National Register of Territorial Division, called TERYT and maintained by the Central Office of Statistics. It contains description of the administrative subdivision of the country, hierarchical identifiers of units and identifiers of settlements. The administrative division layer as well as settlements one contain the adequate codes of over 3000 administration units and over 45000 settlements. Additionally, the nomenclature of territorial units based on the European NUTS coding system has been applied. It enables use of the GGDB with data collected in Poland on request of the Eurostat.

The next public register is maintained by the Institute of Meteorology and Water Management and is called the Hydrographical Database. It exists in the form of GIS database containing hydrological description of streams, lakes and water catchments. Each of stream segment and lake has an identifier which has been transposed to the hydrography layer of the General Geographic Database.

The third public register comes from the Ministry of Infrastructure and is called Central Database of the National Roads and Motorways. It is also maintained in form of GIS database with the precision of feature position relevant to the scale of 1 : 50 000. Each segment of the national roads and motorways at the GGDB have been coded with the same identifier as at the Central Database of National Roads and Motorways. Additionally, transportation group of layers has been enriched by unique codes for all railway stations delivered by the Polish National Railways.

The last public register linked with the GGDB is maintained by the Ministry of Environment, Department of Nature Protection. It consist of data about location and characteristics of the legally protected designation areas of the country. It also contains identifiers relevant to the European coding system maintained by the Nature and Biodiversity European Topic Centre of the European Environment Agency.

Users of the GGDB can extend the field of its application by combining it with the linked registers and then perform suitable GIS processing oriented to the specific information stored in the registers. As mentioned above, the GGDB uses the identifiers of distinguished objects being applied at other official registers, but more specialised characteristics of those objects were not transferred to the GGDB.

External databases of the described registers are updated in the cycle relevant to the nature of particular groups of objects. As already mentioned, that updating process will be performed independently of the revision of the GGDB. The GGDB itself is not overloaded by thematic data and the updating process is carried out at the site where the thematic data are produced. Therefore, the mechanism of mutual exchange of data has been supported by bilateral agreements of the Surveyor General signed with the corresponding authority, responsible for the particular register.

The General Geographic Database (GGDB) of Poland consists actually of four levels of detail, i.e. adequate to the scales 1 : 250 000, 1 : 500 000, 1 : 1 000 000 and 1 : 4 000 000. Last three are derived from the first one and constitute its generalised versions.

The data from the General Geographic Database are available in three distribution forms. The first consists of the GIS data in the relevant software format (e.g. ArcInfo export files). It can be imported to the user computing environment and used for further spatial analyses and cartographic display. The second has been prepared in form of ready map subdivided to over 100 layers and stored in the form of vector graphic file (EPS). User can freely select and combine those layers as well as change the graphic appearance of particular objects or group of objects. This form can be useful for those who are going to elaborate high quality maps on the ready background, which can be edited.

The last form is derived from the second one and is stored in the raster form (JPG). So it is compound of set of maps, which are not editable but can serve as a background of some thematic maps. One of the possible use of this form is Internet mapping. Therefore the large format raster maps have been subdivided to clusters of 800 by 600 pixels and can be combined by user merging such modules to larger parts.

The distribution policy of the GGDB is under elaboration. However some principles are already accepted and some forms of data already available. In order to proliferate the geographic data, the raster form of GGDB has been published in Internet and can be freely used. The dedicated service has been prepared for users, which can browse the Database at all levels of detail, provided by the GGDB.

The GIS data of the GGDB are also available in Internet by use of the map server. The data can be displayed in user-defined manner in form of maps. The selected by user scale switches the server between data sets of four original scales of the GGDB, so the displayed image is more relevant to the graphical capacity of the screen.

A number of possible applications of the GGDB are now under examination. The case studies of these data use will serve decision makers at the central and sub-national levels as a basis for further development of their registers and decision support systems. There is also a broad scope of potential in using the GGDB by general public. The reference role of the Database can be used in national tourism information system. The GGDB could be also a good source of information for education programmes, including GIS school and university courses.

The GGDB will serve also as a basis for next updating of the EuroGlobalMap database (scale 1 : 1 000 000), which has been recently released for most of the European countries. Another EuroGeographics initiative – EuroRegionalMap (1 : 250 000) – is very relevant to the scale and scope of the GGDB. It is planned to use the last one as a national input to the EuroRegionalMap database.

As it was already mentioned, the GGDB is the first step to the practical implementation of the National Spatial Information Infrastructure in Poland. The experience gained during creation and implementation of the GGDB – especially in the field of registers' integration – will be utilised in the process of constructing data sets at the larger scales. It is planned to update the GGDB on the basis of the topographic database at the scale of 1 : 50 000. The last one is in final stage of creation and will be a second more detail reference data set for creation and updating of thematic databases at the medium scales.

The databases are very important components of the National Spatial Information Infrastructure but they must be established and utilised in the organised and well structured environment. Therefore recently an effort to define the National Spatial Information Infrastructure in Poland has been undertaken. It resulted in a feasibility study titled *The Foundation of the Polish Spatial Information Infrastructure* (Baranowski, Gaździcki, 2004). The Study described the components of the Infrastructure and the schedule of its implementation in the very strong orientation to the European Spatial Information Infrastructure being under defining by the INSPIRE initiative and its directive, which is in final stage of elaboration.

The Polish SII will comprise of:

- legal and technical regulations, harmonised with the INSPIRE directive,
- integrated and coordinated databases and metadata of the high quality contents,
- information and geoinformation technologies, using international standards,
- organisational structures,
- economic mechanisms,
- geoinformation providers and users communities.

The particular tasks oriented to the implementation of the Polish Spatial Information Infrastructure (PSII) have been programmed and the relevant time schedule has been defined. The tasks have been grouped in the following way:

- organisational arrangements (memorandums of understanding, National Board for PSII, operating unit supporting PSII,
- analysis of ongoing initiatives on the establishing structures and data sets in various branches,
- analysis of value of existing reference and thematic data sets with the recommendations for their modernisation and development,
- elaboration of the general strategy of PSII implementation and development,
- programming of the works in the framework of the dedicated project, assuming application of Implementing Rules, developed under INSPIRE initiative,
- establishment and implementing Polish Geoportal and technical infrastructure,
- implementing standardisation and harmonisation of:
    - reference data and metadata,
    - thematic data and metadata,

The time schedule of implementing the above tasks cover a period of 2005 – 2008. The process of implementation is supported by the working group on PSII, which is composed by representatives of the most of ministries and government agencies as well as local governments and experts on GIS. The group discusses the plans of implementation of the PSII and also is informed about existing initiatives in order to promote the coordinated development of the spatial data and technology use in their organisations.

Author expects that the important trigger for acceleration of the process of establishing Polish Spatial Information Infrastructure will be passing of the INSPIRE directive in the European Parliament and further elaboration of its Implementing Rules.

References

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Born in 1951. He graduated as a master of geography at the Warsaw University in 1973. He received PhD degree at the Institute of Geodesy and Cartography in 1980. His research carrier started at the Institute of Geodesy and Cartography and was continued at the Geodetic and Cartographic Data Processing Centre where he was a research worker and later scientific director. In 1988 he came back to the Institute of Geodesy and Cartography, where he established Spatial Information Systems Department and served as its head till 1997. In 1991 he was nominated as a director of the UNEP/GRID-Warsaw Centre – an unit specialised in environmental information and operating within the UN system as a collaborating centre. In the period 1982 – 1994 he was also lecturer of the computer assisted cartography at the Warsaw Technical University, Faculty of Geodesy and Cartography. Since 1993 he is lecturer of GIS at the Warsaw University, Faculty of Environmental Protection.

His main fields of professional interest comprise of geographic information systems (originator and author of the first GIS package developed in Poland – SINUS, 1989), digital cartography, cartographic visualisation, land use / land cover inventory and mapping (team leader of CORINE Land Cover project in Poland, 1992 – 1996) and environmental information systems. In period 1992 – 2004 he was a member of the National Committee for Global Change. Since 1992 he is a member of National Committee for Man and Biosphere Programme. He is member of the Cartographic Section of the Polish Geographic Society (vice chairman 1990 – 1999). Since 1989 he is a vice president of the Polish Association for Spatial Information.

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