QUALITY AND LEADING INNOVATION II.

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QaLI

The conference continues the long standing tradition of Slovakia in the field of quality of work, production and life and previously organized conferences on this subject. The conference will take place also in Virtual Conference Environment.

Mission

The mission of this conference is to enable the participants obtain factographic and general knowledge for quality improvement and topics for leading innovations in the conditions of Slovakia and European Union.
The aim of the conference is to establish a forum where participants will be able to share views and ideas on the problems and trends in the field of quality of work, production and life, innovative improvement and open innovation.

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CONTENT

QUALITY EVALUATION OF FREELY AVAILABLE THE SPATIAL DATA

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Introduction

The quality of input data can significantly influence decision-making at different levels of governance. Poor quality input material often unnecessarily expensive creation and increase the return on investment time. The company is supersaturated amount of data and information, often of unknown origin. This phenomenon is particularly noticeable in the case of digital data, where data are lacking on the origin, so the user can make a mistake in using them. These errors are gradually multiplied until the entire project from the outset doomed. At the beginning you need to set goals and define precisely the input data in terms of their quality and accuracy.

Quality of spatial data

The term "spatial data" and "spatial object" is defined in the Act. 3/2010 Coll. National infrastructure for spatial information (Law on NISI), which entered into force on 1.2.2010. [1]
The spatial object is an *abstract representation of information about real-world objects related to a specific location or geographical area in geodetic system*.
Spatial data is *any indication of spatial objects with a direct or indirect reference to a specific location or geographical area*.

The spatial object (geoobject) can be characterized by:
- spatial position and shape = geometry
- positional relationship to other objects = topology
- thematic characteristics = attributes
- temporal changes = dynamics.

Quality geographic information in standard EN ISO 19101: 2005 - Geographic information - Reference model [2] defined as:
"Quality is a summary of product characteristics that affect its ability to satisfy stated or implied needs."

When creating geodatabases follow the policy design and creation of information systems and databases. First, we select objects of interest (objects and phenomena in reality), then create a data model in which we choose only the essential properties of objects, then design and create data structures and ultimately create the actual data file.

An important factor in building a geodatabase and further processing of spatial data quality of input data. Spatial data by source recognize primary and secondary. The primary sources of data are obtained by direct measurement and quality performance shall be deemed the most appropriate resources, particularly for locating objects in space. Secondary data sources achieve, at best, the quality of the data from which they were derived. In most cases it is much lower than the quality requested. The problem is caused by the multiplication of errors at the beginning of the use of poor quality input data.

Quality parameters of spatial data

Given that the geodatabase is a collection of smaller (larger) files, you need to look at the quality of each of the geodatabase. The resulting geodatabase quality value may be determined as a summary subtotal.

Quality parameters can be divided into quantitatively (Fig. 1) and non-quantitative (Fig. 2).

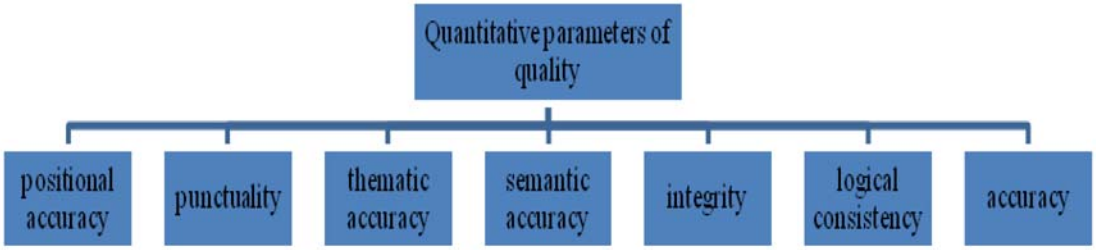

Fig. 1 Quantitative parameters of quality.

Positional accuracy - the most appropriate way to get accurate information is the focus of planimetric and elevation. In geodetic practice it is currently used technology of satellite navigation and positioning systems. These systems allow you to determine very precisely the position of an object in 3D space and perform navigation in any weather, at anytime and anywhere on the Earth's surface [3]. GNSS systems in the selection of the appropriate methods allow to take into account the basic requirements for the measurement and accuracy [4], [11].

Determine the spatial position with GNSS technology is based on the measurement of the distance between the satellites and the object, ie the time required to travel that distance. Accuracy of a single point of service is guaranteed by SK POS to 2 cm in position and 4 cm in height [5].

Accuracy of field performance and the resulting coordinates of detailed points is determined by the characteristics of accuracy and precision criteria. Precision surveying work is established by Decree 461 of the Geodesy, Cartography and Cadastre Authority of the Slovak Republic on 28 October 2009 [6].
In case of using other technologies such as laser scanning accuracy is also defined [10].

Punctuality - term temporal variability characterizes the dynamics of spatial objects. Such changes may relate to geometry, topology as well as thematic description. Dynamic processes play an important role in all the geosciences, but with a significant difference in the time-resolution (temporal resolution).
Thematic accuracy - is the quality of descriptive data.
Semantic accuracy - is the quality of object definitions with respect to specification of areas of interest.
Completeness - complete models and data.
Logical consistency - the degree of compliance with the logical relationships and sequences in the database.
Accuracy - the accuracy of abstraction of reality.

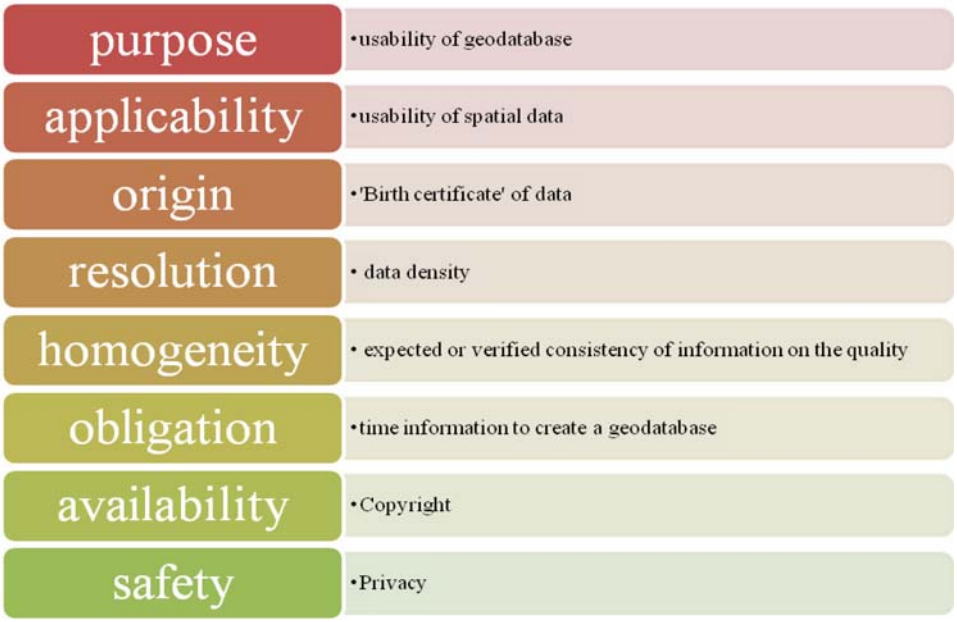

Fig. 2 non-quantitative quality parameters

According to EN ISO 19114: 2005 Geographic information - Methods for quality assessment can be divided into:

- direct (automatic or manual) - based on an assessment of the elements in the database.
  - internal - eg. Checking the topological relationships of geometric data,
  - external - eg. completeness check of geographical names, which requires a comparison table of names of geographical database with a catalog of geographical names.
- indirect - based on an assessment of the elements in the database, which is based on external expertise. Indirect method returns mostly descriptive quality parameters of spatial data.

Map backgrounds

In the case of map data to be taken into account and assess the quality of the work. The basic parameters can be included

1. Evaluation of geometrical precision of maps
   - to assess the impact of cartographic distortion.
   - evaluate of planimetric accuracy.
   - to assess the accuracy of altimetry,
2. evaluation of the content of displayed maps

Geometric accuracy means the level of position respectively. high-rise overall topological and geometric fidelity graphic representation of objects and phenomena on the map compared with reality. This is a characteristic which can be measured by objective methods, and can be expressed by the value of cartographic distortion and the size of different types of errors. It is heavily dependent on the scale of the map [7].

It is necessary to check up to date maps. Check the conformity of its content with the fact, creation date or date of updating.

Digital data

In Slovakia, the possibilities of using ZBGIS. (Fig. 3) is a set of information that describe groups of objects managed in the geodatabase ISGCC. It also stipulates the methods of collection, type of geometry and their properties (attributes). This data base is part of the information system of cadastre. BBGIS purpose is to create spatial information of the Slovak Republic. BBGIS It was made up of data and metadata on the spatial objects, their attributes and their mutual connection [8].

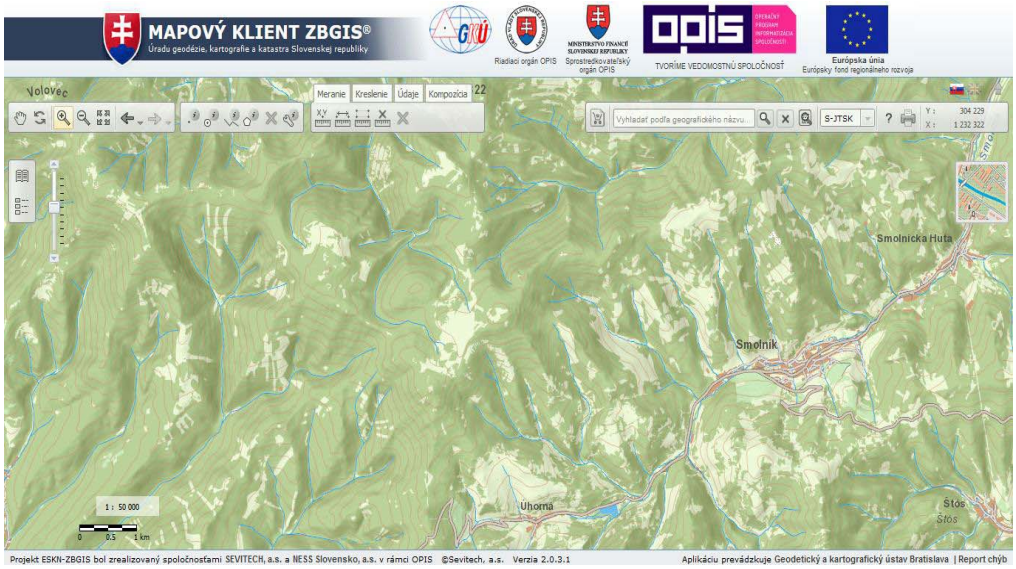

Fig. 3 Map client ZBGIS [8]

Reference data ZBGIS consist of:

- spatial data catalog defined object classes,
- orthophotos
- digital elevation model.

If the vector is planimetric extent of the classes defined in the catalog object classes. For each object provides the accuracy as well as horizontal and vertical. Recommended video detail is in the range of scales 1:7000 to 1:20000.
Digital terrain model (DTM 3.5) was created vectorization elevation mostly from topographic maps at a scale of 1:10 000 from the generated vector data is then generated grid with the specifications of 10 x 10 m, 25 x 25 m, 50 x 50 m, 100 x 100 m.

In the framework of the INSPIRE Geoportal it was created in which the Member States contribute digital data (Fig. 4).

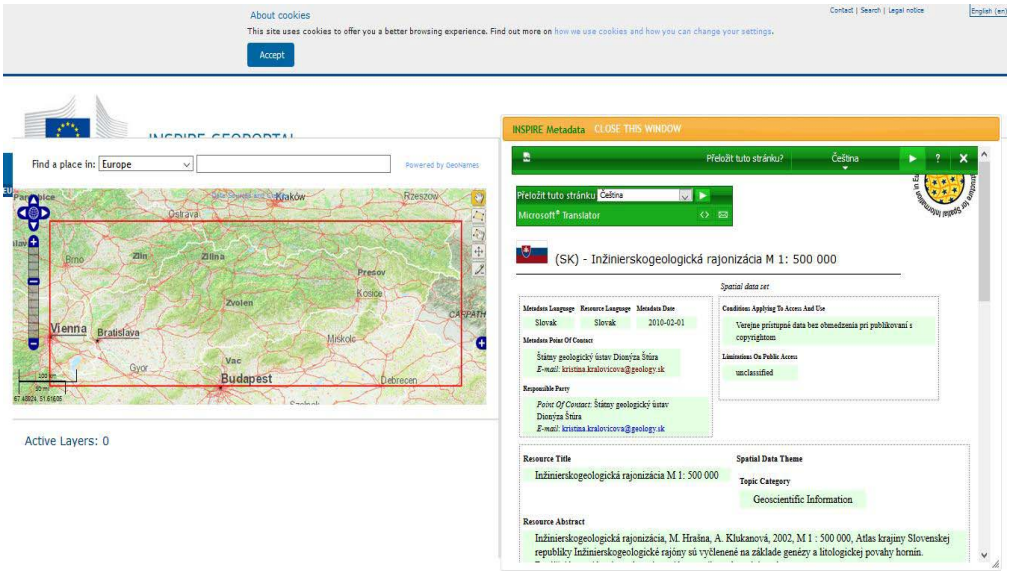

Fig. 4 INSPIRE Geoportal [9]

Conclusion

Spatial data must be assessed and evaluated also in terms of their quality. Most often judge the quality of spatial data acquisition, which is primarily the domain of geodesy. But no need to omit other parameters such as quality of descriptive components for the subsequent analysis of the data obtained has a major influence on the result of the analysis and for future decisions. Within the geographical information currently ongoing standardization that unify data and to its future use..

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Summary

Currently, the GIS, as such systems become part of the private and public sectors. It becomes part of the decision support system. Good decisions are the basic quality of data entering process. In the age of computers and the Internet are primarily data in digital form. However, even in this form the data can be of poor quality, outdated (outdated) and the required decision inappropriate. Obtaining quality data it is often also associated with higher economic costs. This article deals with the evaluation method of spatial data, which could come as source data into a geographic information system and become part of the system for decision support. We focus on the data that can be characterized as freely available data.

Key words:
GIS, spatial data, spatial data quality, decision support systems

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