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HARMONIZATION OF SPATIAL DATA RELATED TO FLOOD EVENTS

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ABSTRACT

The present contribution is devoted to the issue of harmonization of spatial information related to flood events. Solution for the above issues offers data models. In view of the draft composition of data model is the attention given to spatial categorization of data. Necessary part in the actual creation of data model represents the area of quality assessment data. Its importance is seen mainly in terms of the suitability of spatial data for the data model.
Integration of GIS in the creation of data model of flood events offers an opportunity for the correct spatial data with focus on the graphical presentation.

Keywords: ***data model, geographical database, spatial data, GIS, flood events,***

1. INTRODUCTION

These Flood events in Slovakia continue to highlight and emphasize the necessity of effective solutions, eliminating their speeches to the lowest rate in relation to the people and their property and the quality of the environment. Currently, in order to identify the area at risk from flooding the emphasis is smoothed from interested government to create maps for their spatial location.

Society has available considerable potential options available to effectively addressing the issue of flood events. In order to fulfil the ideas presented above, it is necessary to find solutions to conceptual links between information technologies and spatial data. The relative integration requires especially proper coordination and harmonization between the spatial data. It is precisely the area of processing, analyzing and presenting spatial data. It is justified argument that information technology through spatial infrastructures are becoming with tools for solving the data for a draft of data models.

In general data model with spatially localized data is presented as a simplified abstraction of the real world around us. On the presentation of data model is used sets of data objects that support various processes such as:

a) display the map,

b) data editing,

c) attribute´s queries,

d) spatial analysis above displayed geobjects and their phenomenas. [1]

The process of creating a data model is a difficult discipline incorporates the design and creation of the data model. Data model shows all geoobjects direct linking with flood events should capture all the necessary elements of modeling and simulation in the course of their very specialized software products. Purpose of creation the data model for the field of solution of flood events should in one system capture three basic components: attributes, links and their behavior. [2]

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2. INPUT DATA FOR DESIGN OF THE DATA MODEL

Design and production of functional data model for addressing the needs of flood events is directly subordinate to numerous scientific disciplines. Processing referred issues require the knowledge of hydrology, hydrodynamics and finally surveying and geographical information systems. Their direct application for flood issues can be fully used in the technical practice.

Proposal for building a data model is trying to capture all the essential facts to accurately reflect the current time and the properties and actions which are associated with flood events.

Is relevant for the basin development are important spatial information documenting geodetic - topographic and geodetic - hydrographic work for watercourses. This work be provided by information about the shape, direction and gradient watercourse on banks, the shape of the valley, the objects in the watercourses and etc. [3]

2. 1 Categorization of spatial information

In terms of the categorization of all input data is necessary to obtain input data such as:

It is necessary to obtain these input data:

- digital terrain model (DTM),
- longitudinal profile and cross section,
- detailed longitudinal profile,
- channel geometry and objects of watercourse,
- cadastre map,
- flow values (Q20, Q50, Q100)
- Manning´s roughness coefficient,
- data form historical maps.

The most common way of obtaining spatial data characterizing the geometry of the watercourse are:

- Geodetic measurements.
- Geodetic - Hydro passport of watercourse.
- Satellite images.

In terms of creation digital terrain models plays a dominant role coordinates of lines:

- watercourse,
- heel of channel,
- elevation points of surrounding terrain. [4]

The correct choice of use of geodetic methods has a direct impact on the accuracy and quality of the spatial data. Following the technological methods and procedures for collecting spatial data are applied in practice terrestrial measurements and measurement on based global navigation and satellite systems (GNSS measurements). [5]

Schematic overview of obtaining input data for the design and creation of the data model showed fig.1.

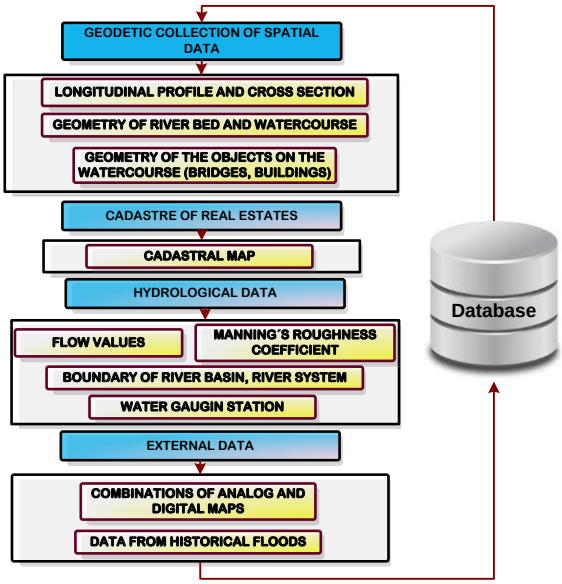

Figure 1: Database design process diagram of input data.

2.2 Quality evaluation of spatial data

To evaluate the qualitative and quantitative parameters suitability of spatial data for creating data model is necessary to define the quality. The actual definition of of spatial data quality is generally very difficult process. It is necessary to assess their suitability for use for the intended use. Quality of spatial data in its content substantially affects reality and its modeling. Currently the quality of spatial data described in STN EN ISO 19101:2005, which relates mainly to geographical

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information. Process for the creation of a database which is the initial basis for the subsequent design of a data model for the processing needs of flood events, it is an integral part. Process creations a spatial database for assessing the quality of spatial information in detail work also dedicate. [6]

Quality of spatial data may also be described by the following attributes [13]:

- origin of the spatial data - a description of the sources and methods of derivation,
- positional accuracy (horizontal and vertical) - depends on experience in the measurement methods used and the choice of map projections,
- attribute precision - change the phenomenon, precision measuring instrument and measurement,
- completeness - a description of the relationships between objects,
- logical consistency - loyalty relationships encoded in the data structure of the digital spatial data,
- schematic precision - the importance of geographical objects in real,
- time information - date of observation, the type of update, the record period of validity of spatial data.

Unified modelling language (UML) is the basis for describing the structure of metadata. Information role UML of in the evaluation of data quality presents fig.2.

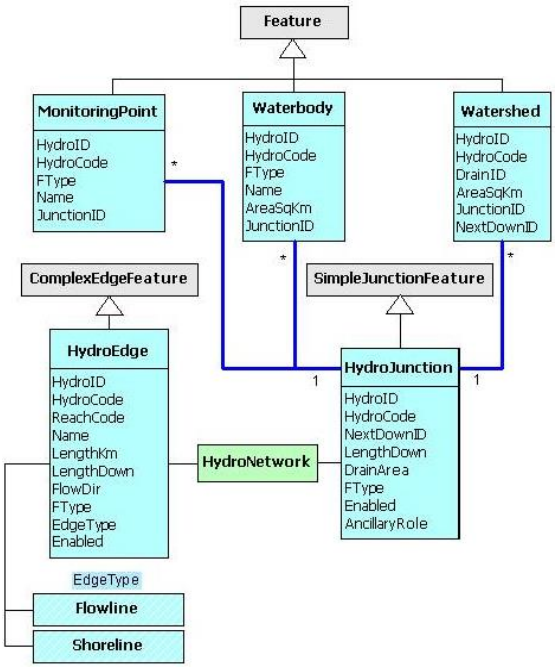

Figure.2: Utilization of UML to design database solutions for flood events by www.1.

3. TOOLS FOR THE SUPPORT OF THE DATA MODEL

Currently occurs becoming more to greater development of systems, which cover part of geographical oriented information systems (GIS). At their level allow or offer a specially developed platform for solutions in water, environment, urban planning, cadastre and etc.

GIS technology is a powerful tool able to handle large data sets, both vector and raster type. Geodata allows you to integrate a wide variety of formats and carry with them the so-called spatial operations. geoprocessing. Today GIS is a sophisticated tool for graphical representation of the most diverse geographic analysis in energy and other sectors. [7]

Holders of the graphical presentation of information in addition are datasets. Geographic Information System comes with new advantages in the creation, management and sharing of spatial data is through geodatabases for different areas of interest. GIS has in recent years become a part of the creation of information systems due to the irreplaceable role of localization of objects and phenomena processed by these systems. Currently the most used GIS is geographical information system software ArcView 9.x presented by ESRI. Available on the Slovak market is updated version

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10.x, which fully provides tools for processing, control, management, analysis and final visualization of spatial data. This software product is fully deployed in different fields government and public authorities of the Slovak Republic for the organization and processing of spatial data. For the design of the data model is a team of authors contribution will focus on the deployment in processing spatial data is relevant for the solution of flood events by proposing a data model.

The actual design and creation of a data model is a capture all system components and describe the various elements of the model creation relations between the elements of the model. As soon as workflows are designed and implemented according to the needs of the purpose of the proposal must be designed and deployed as. In its simplest form, the data model structured way of describing the data required in the workflow. [8]

3.1 Geographical database versus geodatabase

In the general understanding of the concept of geographical database, there may be mentioned a simple definition, it is a database that manages spatial data with emphasis on the graphical presentation. Geographical databases are most commonly created using tools in ArcGIS format object data model. Data models used in GIS environment can be divided into:

- Classical data models.
- Object oriented data models.[9]

In designing a database creation has to be made three levels:

- creation the conceptual model,
- logical model,
- physical model [10].

For the design of geographical databases are applied across three developmental parts (conceptual, logical, physical model) (see fig.3).

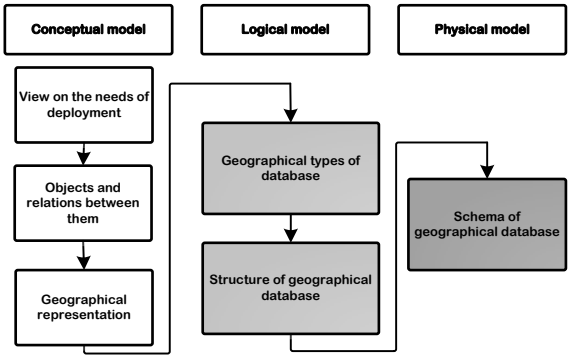

Figure.3: A procedure for the proposal GDB by [11].

ArcGIS allows implementation of two models for spatial data management:

a) system of files,

b) system for managing relational databases.

In terms of processing spatial information in the development of ArcGIS data model supports the following data storage (processing) in the form of exchange formats with graphical presentation. The structure for the data model, it should be noted that the model separates descriptive data about objects processed by graphical layout.

The geodatabase is data model to represent geographic data based on a relational database. Geodatabase allows you to store data in different structures. [12]

Draft of functional geographical database for addressing the issue of flood events should, inter topographic data includes the data in raster format. More detailed data structure is defined in section 2.1.

4. CONCLUSION

GIS provides through integrated tools for harmonization of spatial data any action character. All organizations today emphasize and focus on streamlining their work. This fact also applies to the area of solving flood events for which legally presented spatial information are key components. Processing issues is also important in terms of meeting of the European Parliament and of the Council 2007/60/EC on the assessment and management of flood risks, which is implemented into the legal system of the Slovak Republic through legislative acts.

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One of the options available for dealing with flood events is to integrate data model to the level of the various processes in the protection area and land from flooding. *ArcGIS* environment is designed so that it can link multiple levels of the manufacturing process. This base improves and enhances their application to other fields of use.

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