GIS for the next century

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Computers have introduced digital maps, digital cartography and geographic information systems (GIS) in surveying and cartography. Modern GIS systems should not give only digital forms of maps, but they should provide powerful information systems for retrieval and analyses of spatial data. In this paper, we would like to show the impact of the current modern computer technologies, such as object-oriented design, computer networks, object-oriented database management systems and multimedia on future GIS systems and outline our view of advanced GIS systems for the 21st century.

At present, we can see the first efforts to shift the view of GIS systems from traditional common systems for the manipulation vector or raster data to user-oriented information systems. Modern GIS systems should address user needs more clearly and provide tools for easier adoption of extensions to achieve user goals. Future GIS systems should also support new methods of data organization and data access which enable users to maintain their data in the same way independently of their graphical representation and location in computer networks.

Sophisticated GIS systems will provide an open object-oriented environment for the development of GIS applications and information system for geographical data processing within distributed heterogeneous computer networks. New object-oriented data organization will enable users to access their data in more user-oriented way. Advanced GIS systems will allow to combine vector and raster data and handle these data in combined analyses. A quite new kind of user interface will make full use of the object-oriented system features truly possible. Powerful visual programming languages will give users the possibility to adjust the system to their needs.

Future data organization will shift from traditional view based on geometrical objects and layers to user-oriented view based on thematic objects, geographical blocks, spatial catalogues and hypermaps. Thematic objects encapsulate a complete entity, which contains information attributes, executable methods as well as set of spatially referenced geometrical elements in both vector and raster form. Encapsulated pictures, sound and video clips introduce new media to form sophisticated multimedia GIS systems. Spatial catalogues provide users easier access to large data sources based on their spatial locations. Links between thematic objects, geographical blocks and spatial catalogues create unique notion of hypermap environment which will make future access to necessary details of information easier and more extensive.