

GIS – Achievements and Challenges

**Monika SESTER,
Institute of Cartography and Geoinformatics,
University of Hanover, Germany**

Key words: Automation of spatial data handling: interpretation, integration, generalization.

SUMMARY

The presentation will reflect the achievements of Geographic Information Science and sketch the challenges to be faced today. Whereas a growing awareness of the relevance and importance of GIS for nearly all processes and actions even of everyday life can be seen, the real implementation of these implications is still not given in the way it should; the breakthrough is still ahead of us.

In the presentation there will be a focus on the technological aspects of GIS, which will be investigated along the well known IMAP – structure, i.e. the input, management, analysis and presentation of spatial data, and the automation thereof.

On the modeling and management side, the integration of spatial data into standard databases is getting self-evident, as database companies are providing spatial extensions or spatial data blades to introduce both the simple features of OGC to give the possibility to store spatial data, and some basic functionality for data manipulation (e.g. topologic and geometric operations). The challenges in this aspect lie in the extension of the dimensionality into the third dimension. With the increasing availability of techniques for 3D-data capture, and upcoming 3D-applications, there is a growing demand for also storing such data efficiently. Thus, there is a demand for extended data modeling, but also extended the functionality of current GIS, especially in terms of higher dimensional geometric analysis operations.

Whereas today's GIS primarily provide analysis functions for an interactive manipulation of geobjects, the challenges here lie in the automation of these interpretation and analysis procedures: basic techniques and tools have to be developed. On the one hand this relates to mechanisms for data interpretation (i.e. the identification of implicit information in the data), on the other hand it also involves the development of knowledge based systems that allow for an automatic solution of complex spatial analysis problems, e.g. the automatic site planning.

The growing availability of geodata worldwide leads to the principal possibility of data integration; however, there are still many barriers, that oppose to an open use of data. The achievements of OGC have lead to standards in describing and accessing spatial data. This opens the way that different GIS can "understand and talk to" each other. The new challenge lies in an increased possibility of data exchange not only on the geometry level, but also on the theme-level: developing "semantic translators" will allow in the future, that different data sets can be integrated – even if one data set deals with "Straßen" and the other deals with

“traffic”. Introducing the semantics and making explicit use of it will allow a new dimension of spatial data, including a re-use of existing data sets.

Concerning the presentation, current GIS still can not come up with the aesthetics of traditional maps – there are still many deficiencies of automatically produced maps. However, the presentation functionalities of current GIS is steadily improving. An important prerequisite for it is the upcoming availability of automatic generalization procedures.

A major challenge today is posed by the small mobile displays that demand for a new, appropriate kind of cartography. The important requirement is the readability, which implies the possibility of zooming functionalities in order to be able to present both overview of a situation as well as the details.

In the presentation these challenges and possible solutions are described in detail and illustrated with examples of on-going research work at the Institute for Cartography and Geoinformatics at the University of Hannover, Germany.

CONTACT

Prof. Dr.-Ing. habil. Monika Sester
Institute of Cartography and Geoinformatics
University of Hannover
Appelstraße 9a
30167 Hannover
GERMANY
Tel. + 49 511 762 3588
Fax + 49 511 762 2780
Email: monika.sester@ikg.uni-hannover.de
Web site: www.ikg.uni-hannover.de