

THE NATIONAL CENTER FOR GEOGRAPHIC INFORMATION AND ANALYSIS

The National Center for Geographic Information and Analysis was founded in 1988, with major funding from NSF beginning December 1st of that year. The Center is formed from a consortium of the University of California, Santa Barbara; the State University of New York at Buffalo; and the University of Maine; and is funded through a five-year cooperative agreement with the University of California. The primary function of the center is to conduct "basic research on geographic analysis utilizing GIS (geographic information systems)." Additionally, the center maintains an active outreach program, and undertakes a series of initiatives aimed at increasing the nation's supply of experts trained in GIS technology. Research, education, and outreach functions are spread over the three sites with Santa Barbara playing the leading role. The center has a director, with associate directors at each of the three sites. A board of directors of 15 members drawn from universities, government agencies, and professional societies reviews all aspects of the center's operations.

The center's research focuses on five areas:

Spatial analysis and spatial statistics, particularly the development of improved methods of analysis, and the use of statistical methods to deal with uncertainty in spatial data

Spatial relationships and database structures, particularly based on comparisons between abstract digital representations of space, and the processes of human cognition and reasoning about geographic information

Artificial intelligence and expert systems, and the application of these techniques to GIS

Visualization of spatial data, and the exploitation of the potential of electronic display to help the user analyze and understand geographic phenomena

Social, economic, and institutional issues, widely believed to be the most significant impediments to the effective use of GIS, but at the same time probably the most difficult to resolve.

The center's research plan, published in the *International Journal of Geographical Information Systems* (1989, vol. 3, no. 2, pp. 117-136) found significant research issues in each of these areas, and proposed to tackle them using a standard format, the Research Initiative. Four or five initiatives run at any one time, and focus the attention of center researchers on specific topics in a multidisciplinary, multi-investigator framework. Initiatives all follow the same basic structure, beginning with a Specialist Meeting which brings 30 or 40 people together from all parts of the GIS community to discuss and lay out an appropriate research agenda. The center uses a variety of strategies to coordinate its research with that going on in other groups and institutions, and the specialist meeting has been used as a way of building a community-wide consensus and research network in each area. After one to two years of research, the results of the initiative are presented at a major conference.

Sixteen initiatives had been approved by September 1991 and are listed below with the dates of their specialist meetings.

1. Accuracy of Spatial Databases (December 1988–November 1990)
2. Languages of Spatial Relations (January 1989–July 1990)

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3. Multiple Representations (February 1989–August 1990)
4. Use and Value of Geographic Information (May 1989)
5. Design and Implementation of Very Large Spatial Databases (July 1989)
6. Spatial Decision Support Systems (March 1990)
7. Visualizing the Quality of Spatial Information (June 1991)
8. Formalizing Cartographic Knowledge (1992)
9. Institutions Sharing Spatial Information (February 1992)
10. Temporal and Spatial Reasoning in GIS (1993)
11. Space–Time Statistical Models in GIS (1992)
12. Remote Sensing and GIS (December 1990)
13. User Interface Design (June 1991)
14. Spatial Analysis and GIS (April 1992)
15. Multiple Roles for GIS in Global Change Research (1992)
16. Legal Issues (1993)

More information on all of these research activities is available in the NCGIA newsletter "Update," published twice a year, in the publications of the center's Technical Papers series, and in numerous articles and books. Annual reports listing all center publications are also available.

The center's major effort in education in the first three years of operation was the development of a comprehensive set of teaching materials for a one-year sequence of courses in GIS at the senior undergraduate level. The results of this Core Curriculum Project were released in July 1990 and by September 1991 had been distributed to more than 700 locations worldwide. An international program has been instituted whereby the center sponsors translation and distribution from a central site in each country. A number of user group meetings and workshops have been held at national and international meetings, and an electronic discussion list has been started.

The results of two further education projects were released in September 1991. One deals with lab exercises, and with the need to provide practical, challenging hands-on experience to students to supplement the instructional material of the Core Curriculum. "Volume Four" consists of a directory to available lab materials, and also includes labs developed at the center for use in conjunction with the Core Curriculum. The directory includes references to materials made available by other institutions, and also materials developed for practical university education programs by GIS vendors. The second is a series of documented case studies of the establishment of GIS teaching laboratories, including details of hardware and software, maintenance, fundraising and usage.

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