



Cardinal Points

Fiscal Year 1998 Annual Report
Minnesota Governor's Council on Geographic Information

June 30, 1998

The Governor's Council on Geographic Information was created in 1991 by Governor Arne H. Carlson to provide leadership in the development, management and use of geographic information and related technology. With assistance from Minnesota Planning, the council provides policy advice to all levels of government and makes recommendations regarding investments, management practices, institutional arrangements, education, stewardship and standards.

Minnesota Planning is charged with developing a long-range plan for the state, stimulating public participation in Minnesota's future and coordinating activities with state agencies, the Legislature and other units of government.

Upon request, *Cardinal Points: Fiscal Year 1998 Annual Report of the Minnesota Governor's Council on Geographic Information* will be made available in alternate format, such as Braille, large print or audio tape. For TTY, contact Minnesota Relay Service at 800-627-3529 and ask for Minnesota Planning.

June 1998

For additional information or copies of *Cardinal Points*, contact the council staff coordinator at 651-296-1208 or gc@mnplan.state.mn.us. An electronic copy of this report can be found on the Governor's Council on Geographic Information's Internet home page at www.lmic.state.mn.us/gc/gc.htm.

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Cardinal Points

Fiscal Year 1998 Annual Report Minnesota Governor's Council on Geographic Information

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Summary



DETAILED AND ACCURATE information about our surroundings is vital to the daily decisions that affect our lives. Through technology, new ways have been developed to code, store and display spatial information, allowing the visualization of the complex interrelationships of natural, social and economic variables. Visual representation of real-world phenomena, for example, can reveal the effects of decisions before they are made. Geographic information systems provide a powerful way to use spatial data for conducting analysis, planning and modeling in a form that can be kept current, understandable and accessible.

Governor Arne H. Carlson created the Governor's Council on Geographic Information in August 1991 to provide leadership in the development, management and use of geographic information in Minnesota. The council identifies critical issues and makes recommendations for policies, institutional arrangements, education, stewardship and standards for geographic information and technology. During fiscal year 1998, the 18-member council continued to work toward its goals in six key areas:

- Monitoring developments in the geographic information industry
- Sharing information about those developments
- Focusing attention on critical issues
- Influencing public policy on the development of geographic information
- Encouraging wise data management through the use of data standards
- Working toward a common vision among users of spatial data

The council stays abreast of activities and developments within and beyond Minnesota's borders. Rapid technological growth has extended the many ways in which geographic information can be used for display and analysis. Through tracking efforts within the state, monitoring work beyond Minnesota and working closely with federal map-

ping agencies, the council strives to provide knowledgeable leadership for Minnesota's users of geographic information.

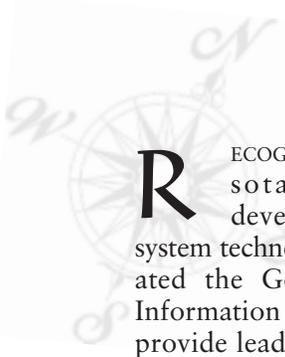
Communicating with spatial data users is essential to keeping the public informed of trends that can benefit Minnesota. Through its web site on the Internet, printed publications and other communication vehicles, the council works to keep spatial data users aware of its actions and other important developments that affect how spatial data is used.

Each year, council members prioritize issues and agree to concentrate on those that they feel have far-reaching effects on Minnesota's spatial data users. These priorities provide the basis for committee action. In fiscal year 1998, the council worked on issues related to data standards, data accessibility, statewide hydrology mapping, funding for statewide land records management, and geographic information systems education and training.

Working to influence public use of geographic information and promoting helpful data standards are ways in which the council encourages effective management of spatial information. The council has reviewed and responded to federal initiatives to ensure that the perspectives of Minnesota's spatial data users are considered. By being aware of activities related to standards across the country, recommending standards and helping shape new standards, the council endeavors to promote concepts that support wise data use and extend the potential for data sharing and integration.

Many people and perspectives contribute to the work of the council. In addition to the members of the council, who represent state, federal and local governments, the private sector and higher education, numerous other professionals in the state volunteer their time and effort to help the council achieve its mission through its committee activities. The council communicates regularly with organizations that represent constituencies affected by council recommendations and, acting as a catalyst, supports initiatives of other agencies that benefit spatial data users. In this way, the council's efforts affect those whose daily work is enhanced by using geographic information and technology.

Introduction



RECOGNIZING THE NEED to oversee Minnesota's growing investment in and development of geographic information system technology, Governor Arne H. Carlson created the Governor's Council on Geographic Information in 1991. The council was formed to provide leadership and coordination for users of geographic information technology statewide.

Since then, the use of spatial data and associated technologies has proliferated. Numerous state agencies now routinely use geographic information systems, as do growing numbers of counties and cities. Courses in geographic information technology can now be found at nearly every major university and many community colleges in Minnesota. Private consulting firms have sprung up by the dozens to provide advice and data processing services to organizations wanting to visually represent data that is grounded in real-world coordinates. As costs decrease and uses increase, the continued growth of geographic information systems and related technologies is inevitable.

As interest in geographic information has grown, the need for technical guidance and coordination also has expanded. The Governor's council makes recommendations on the management and stewardship of geographic information in Minnesota, promotes sound and efficient investments in spatial data tech-

nologies and provides policy-level advice to a wide range of users. By bringing together professionals involved in varied facets of geographic science and technological development, the council provides a forum in which knowledge and expertise in geographic information can be exchanged and evaluated.

Over the past several years, the council has advanced policies and procedures among state agencies and encouraged sound practices by local governments, fostering an environment of coordinated statewide growth and development of geographic information. It has recruited experienced volunteers from a wide range of GIS fields to help examine and resolve the issues that arise as technology advances. The council also has responded to the needs of spatial data users by producing helpful publications, sponsoring workshops and making presentations on a variety of important GIS issues, including data standards, documentation and access. In addition, it has represented Minnesota's point of view in the national arena, helping to confirm the state's stature as a leader in the GIS field.

Cardinal Points details the work of the Governor's Council on Geographic Information during fiscal year 1998, which included continuing some efforts begun in previous years, undertaking new initiatives and keeping an eye on future challenges.

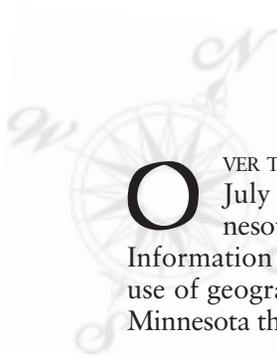
Mission and seven guiding principles of the council

The mission of the council is to promote efficient and effective use of resources by providing leadership and direction in the development, management and use of geographic information in Minnesota. The council makes recommendations in areas including, but not limited to, policies, institutional arrangements, standards, education and stewardship.

The council follows seven guiding principles in carrying out its mission:

- Promote efficient investments in geographic information.
 - Promote geographic information as a public resource widely shared with and available to interested parties.
 - Support the establishment and use of geographic data standards and guidelines to better exchange and share information resources.
 - Promote education and training in GIS.
 - Promote the beneficial uses of geographic information in the development of policy and the management of public resources.
 - Provide an effective forum for the discussion and resolution of issues important to Minnesota's GIS community.
-

A year of continued commitment



OVER THE COURSE of fiscal year 1998, covering July 1997 through June 1998, the Minnesota Governor's Council on Geographic Information has continued to foster the effective use of geographic information technology within Minnesota through its work in several key areas:

- Monitoring industry developments and trends
- Sharing information
- Attending to critical issues
- Influencing public policy
- Promoting data standards
- Working toward a common vision

Monitoring industry developments and trends

GIS is a dynamic technology characterized by rapid, often dramatic changes that can have far-reaching effects on public investments. The council tracks changes in the GIS industry and informs Minnesotans of those trends and their importance. Since the worldwide GIS industry has been valued at close to \$30 billion a year, about double the size of the biotech industry, monitoring the industry not only benefits Minnesota's GIS users, but also is important to Minnesota's economic health.

During fiscal year 1998, the council:

- Served as Minnesota's liaison to the Federal Geographic Data Committee, which comprises all federal mapping agencies and is chaired by Secretary of the Interior Bruce Babbitt. Minnesota's

views on various issues were presented by a council representative at the federal group's semiannual Steering Committee meetings.

- Monitored federal and state efforts to develop geographic data clearinghouses. Following recommendations of the Governor's council, Minnesota has begun work on a state clearinghouse that will help Minnesota users of geographic data find the data they need.

- Followed efforts in other states to provide funding to local governments for GIS, paying particular attention to documented benefits. The council focused on the Wisconsin Land Information Program, which funds county programs that meet basic state standards, as a possible model for Minnesota.

- Monitored proposals submitted to the Legislative Commission on Minnesota Resources that involved geographic information technology and assisted, as needed, in evaluating proposals

- Reviewed related technology activities within the state, including the Base Map Enhancement Project at the Minnesota Department of Transportation, the activities of the Minnesota Office of Technology, new mapping rules proposed by the Public Utilities Commission and the work of MetroGIS

Sharing information

Using various communications vehicles, the council informs professionals about technology and policy

How to contact the council

The Governor's Council on Geographic Information welcomes and encourages participation in and discussion of its activities and efforts. The council can be reached in several ways:

- Telephone: 651-296-1208
 - Fax: 651-296-1212
 - E-mail: gc@mnplan.state.mn.us
 - Internet: www.lmic.state.mn.us/gc/gc.htm
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Minnesota's spatial data clearinghouse aims to help users find needed data

In the 1991 executive order that created the Governor's Council on Geographic Information, Governor Carlson noted, "There is a need to initiate a geographic information clearinghouse in order to consolidate data into libraries, integrate data into common formats and distribute data to users."

Given the wealth of geographic information in Minnesota, a clearinghouse would allow significant resources to be saved through standardized sharing and integration of new and existing data.

Within its first year, the council began to study Minnesota's data needs as a prelude to defining a clearinghouse structure. In 1995, it formed a committee to research issues related to data access and develop a clearinghouse model. This committee's report, *Laying the Foundation for a Geographic Data Clearinghouse*, outlined a framework for a clearinghouse with three main components:

- Access to all data documentation through a single entry point
- Identification, preservation and archiving of important data
- User-responsive search-and-retrieval system that uses the Internet, along with noncomputerized access

The report recommended that the clearinghouse be designed using an architecture in which data would be held and maintained by participating organizations, and based on recognized technical standards for data documentation and communication.

To implement and guide the effort, the report also recommended creating a technical working group, an advisory committee to evaluate progress toward goals and an access policy committee to develop positions on such issues as privacy and security. The Land Management Information Center at Minnesota Planning, with its history of data management and coordination services, was identified as the most appropriate agency to lead this effort.

Work has already begun on the technical aspects of the Minnesota Geographic Data Clearinghouse, and a prototype is up and running. Formed during the past year, a Clearinghouse Advisory Steering Committee composed of data developers, users and information specialists advises LMIC on policy and design issues. Development of the clearinghouse is being coordinated with other data access projects underway at MetroGIS and the Department of Natural Resources.

The Minnesota Geographic Data Clearinghouse is designed to be compatible with the National Spatial Data Clearinghouse. To ensure compatibility with other clearinghouses being developed as part a national network, the Minnesota clearinghouse relies on standardized data documentation, data search-and-retrieval tools and communications protocols. This strategy leverages investments made elsewhere and promises to minimize the long-term maintenance costs for the state's clearinghouse.

To encourage standardized documentation of information on data in the clearinghouse, the Land Management Information Center is distributing a metadata collection software called DataLogr free to public entities. The software is available to private data developers at a modest cost.

Minnesota's clearinghouse can be accessed through LMIC's Internet site at www.lmic.state.mn.us. Information is provided on the content, quality, history and other characteristics of a growing number of data sets from a variety of organizations. Many of these data sets can be downloaded for free. For more information, contact Christopher Cialek at 651-297-2488 or chris.cialek@mnplan.state.mn.us.

issues and helps clarify the needs of Minnesota's spatial data users. These activities are considered essential for achieving the council's goals.

During fiscal year 1998, the council:

- Expanded its commitment to communicating with spatial data users through the Minnesota GIS/LIS Consortium newsletter, the primary vehicle in the state for reaching this group. The newsletter is published three times a year and delivered to more than 2,400 individuals interested in the use and management of geographic information technology.

- Used the annual GIS/LIS Consortium conference to communicate with more than 500 attendees. The council jointly staffed a booth with the Federal Geographic Data Committee and organized several workshops and panel discussions focusing on such important topics as data documentation, data standards and the status of digital soil data statewide.

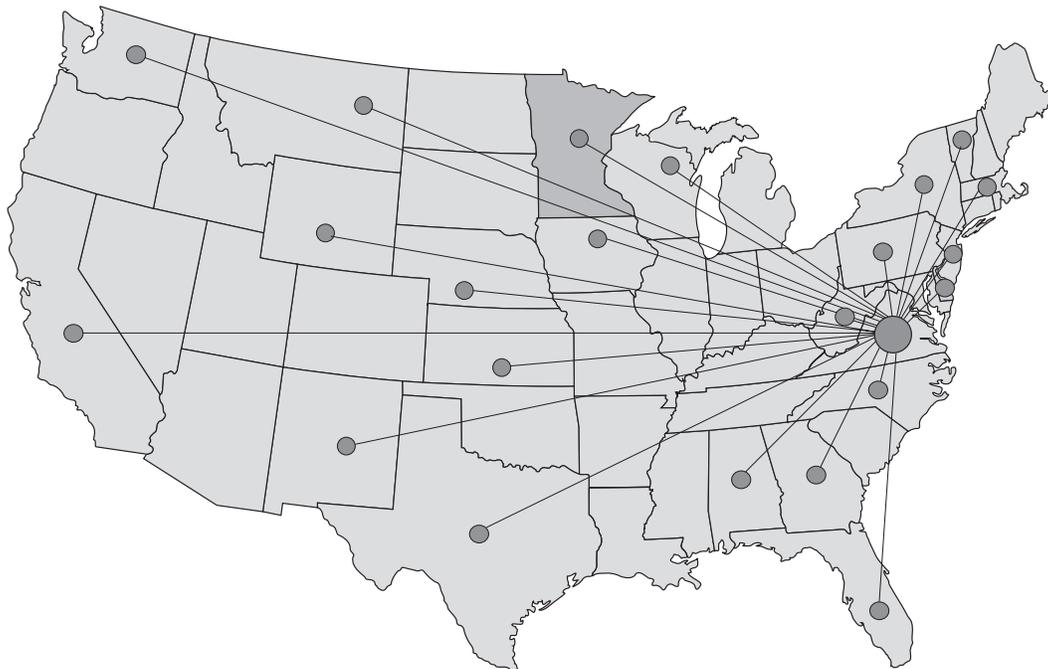
- Undertook a major effort to redesign its web site on the Internet. With help from Minnesota Planning, the council's web site is now more navigable and informative.

- Used the Internet to enhance distribution of council publications. More than 1,000 copies of council publications were downloaded from the web site.

- Presented the council's proposal for a statewide land records modernization program to several groups, including the Association of Minnesota Counties, the League of Minnesota Cities, the Professional Real Estate Liaison Group and the MetroGIS policy board

- Helped Minnesota participate in a nationally broadcast videoconference entitled "A Practical Guide to Metadata Implementation for GIS Professionals." The interactive program featured Minnesota as a successful proponent of standardized data documentation and emphasized the important role that the council has played in this effort. More than 2,000 people across the country participated in the videoconference. Fourteen council-sponsored downlink sites were arranged within Minnesota to ensure broad access to this presentation. A tape of the videoconference is available from the Land Management Information Center.

Minnesota is part of a nationwide clearinghouse network



■ Made regular mailings throughout the year about the council's activities to more than 350 people. Additional mailings supported the work of each of the council's committees.

Attending to critical issues

Each year, the council identifies issues that it expects will have the most far-reaching effects in

Minnesota and organizes committees to research them and recommend appropriate action. The council works proactively, anticipating and responding to challenges early so that recommendations can be developed, thus helping organizations avoid costly mistakes. These issues are often technical, but many have significant institutional, organizational or policy components as well. Council members have a wide range of technical and organizational backgrounds, which ensures that the council takes a comprehensive

Investing in soil data yields worthwhile returns

Information about soil conditions around Minnesota is vital for effective economic and natural resource planning. Data on soil characteristics can be used to predict crop potential and susceptibility to runoff and erosion; it is essential in assessing agricultural and forest productivity and evaluating the environmental impacts of land use changes. Soil data also is used in transportation, and residential and commercial development planning.

The Legislative Commission on Minnesota Resources understands the value of soil information and over the past two decades has supported the mapping of modern soil surveys. While many paper versions of soil surveys exist, the need to convert these to digital form is great.

Digital soils information was the top data need cited by respondents to a 1994 survey by the Governor's Council on Geographic Information. The survey results suggested that digital soils data should be developed as a statewide resource for local and state planning efforts. As a result of the survey, the Governor's council created a Soils Data Committee in 1995 to investigate digital soil data mapping issues statewide.

The committee found great inconsistency among soil surveys across the state. Much of the soil data gathered during the first part of this century is outdated. Soil classifications have changed, and some surveys cannot be converted to the new categorization scheme. Some counties have accurate digital soil surveys, while their neighbors have little or no soil information, essentially limiting their ability to share or integrate data. The committee recommended that soil data be updated in a standardized fashion to achieve a seamless, accurate statewide digital database that is cost-effective and widely accessible.

In 1996, the Soils Data Committee released its findings, including an inventory of current county soil surveys and a set of technical options for each soil survey category within the state, in *County Soil Surveys: Guidelines for Digitizing*. The committee helped the Minnesota Board of Water and Soil Resources obtain a grant for the 1998-1999 biennium from the Legislature, recommended by the Legislative Commission on Minnesota Resources, to research techniques for turning 42 counties' soil data into accurate, digital data.

Completing digital soil maps for the rest of the state will take considerable more time and resources. The Board of Water and Soil Resources is seeking funds to continue this modernization effort, and the legislative commission has forwarded this request for the first of a four-biennium effort to the Minnesota Legislature for funding. Meanwhile, the soils committee is advising the board on the modernization project, and progress continues, as the accompanying map shows.

- Initiated work on a statewide study of skills and salaries for geographic information professionals

- Strengthened its relationship with the Minnesota GIS/LIS Consortium to ensure more direct communication on issues identified by consortium and council members

Influencing public policy

The council is one of the few organizations in Minnesota with the express mission of promoting and coordinating the use of geographic information throughout the state. It strives to fulfill this mission by working to shape public policy and management practices.

During fiscal year 1998, the council:

- Reviewed and developed a formal written response to a milestone report on the nation's mapping programs prepared for the National Academy of Public Administrators. The report recommended dramatic changes in the nation's approach to meeting its mapping needs and had significant implications for Minnesota.

- Successfully petitioned the Federal Geographic Data Committee to become an active participant on the subcommittee charged with refining a standard for spatial data accuracy that would replace a standard widely used since the 1940s. This direct role ensured that the standard would be developed with input from Minnesota geographic data professionals.

- Worked with the Minnesota Office of Technology to revise and reinstate Minnesota's data standard endorsement process through the state's Information Policy Council

- Considered state and federal grant proposals and offered cooperating support to those found to have statewide benefit

- Actively encouraged efforts to increase data usability and sharing by promoting data documentation. The council has endeavored to foster wise data management through broad distribution of metadata guidelines, software development, presentations and workshops.

- Provided an opportunity for various groups to share ideas about accessing and providing data through a clearinghouse in an effort to prevent duplication and foster cooperation

Promoting data standards

Data development is often the most costly part of building a robust geographic information system. Data standards help provide a structure for databases that, if used consistently, allows data sets to be joined, shared or integrated more easily. Standardized data leverages investments. Standardized data documentation ensures that spatial data users can understand data and its applicability, augmenting the value of existing data and reducing waste and redundancy.

The council monitors standards development in all sectors of the industry, helps to shape developing standards to reflect the needs of Minnesota's data users and works to identify which standards are the most helpful and how they can be applied. The council recognizes the need for useful data standards that are not burdensome to incorporate into existing information systems.

During fiscal year 1998, the council:

- Endorsed a standardized specification for geographic coordinates to be used by state agencies. Although local governments are not required to follow the standard, it provides a useful guideline for developing data in Minnesota.

- Began negotiations for a nationally recognized expert to conduct a state workshop on the implementation of the federal cadastral standard, endorsed for federal agency land record systems

- Reviewed, on behalf of Minnesota, standards proposed by the Federal Geographic Data Committee

- Expanded its web site to include links to organizations involved in developing and implementing standards, with special emphasis on geographic information standards

- Began work on a handbook explaining the new federal standard for spatial data accuracy and how it can be implemented. Council-affiliated organizations

are testing the standard on existing data to provide practical examples to be included in the handbook.

■ Continued to advise the Land Management Information Center on refining the DataLogr metadata collection software that uses council-developed guidelines to enable easy, consistent data documentation

■ Sponsored a hands-on workshop at the GIS/LIS Consortium conference to introduce DataLogr

Working toward a common vision

The needs and uses for geographic information vary widely. While some organizations might use

Collaborative effort makes high-accuracy statewide GPS data feasible

Using satellites, very precise clocks and a receiving device, the global positioning system provides locational information for aviation navigating, soil testing and emergency vehicle routing, among hundreds of other applications. This information can be integrated into geographic information systems for display and analysis. Raw GPS data, however, is accurate to within only 100 meters and must be manipulated for use in numerous applications that require more precision.

Developing statewide access to high-accuracy GPS data became the goal of a multiorganizational task force, led by the departments of Health and Transportation, that was created in 1992. After investigating the feasibility of delivering this kind of geographic data statewide, the task force issued a report in 1994, *State of MN GPS Base Station Task Force*, that detailed prospective plans and potential problems involved in the development of a statewide system.

Shortly after the report was published, the issue of high-accuracy GPS data came before the Governor's Council on Geographic Information when the task force, realizing the substantial administrative and policy issues involved in implementing a statewide high-accuracy program, sought the council's guidance and advice. In response, the council created an advisory committee to lend advice and assistance as the project moved forward, and it affirmed the task force's objectives, through formal motion, by supporting initiatives on accuracy levels, multiagency agreements and financing arrangements.

This effort resulted in direct benefits to people in the field. A process was developed for delivering statewide real-time data accurate to within a meter. All public bodies now can subscribe to this service for a modest cost. About 60 state and local government agencies have taken advantage of this service. In addition, hundreds of users outside of public agencies have access through the Internet to the information needed to achieve high-accuracy measurements.

Having completed its original mission, the task force is now known as the State of Minnesota GPS Advisory Group. This group, made up of representatives of state, local and federal governments, higher education and the private sector, is actively involved in GPS planning at the state and federal levels.

The advisory group has demonstrated what can be accomplished when people work collaboratively toward a common goal. Last year, it received a commendation from Governor Carlson for providing "an exceptionally useful product to the citizens of Minnesota." Recommended by the Governor's council and presented by the director of Minnesota Planning at the annual GIS/LIS Consortium Conference, this award recognized the value of diverse agencies working together. Providing a product useful to a broad user base, using the Internet for disseminating information and taking the lead on such a critical state issue were criteria cited by the Governor's council in recommending the advisory group for the award.

spatial data to track land use in conjunction with urban planning, others might be studying land-wind relationships to assess the potential for pollution. Consequently, varying perspectives are vital when considering issues.

The council brings together multiple interests through its members, who are experienced professionals representing public, private and academic spatial data users. Council committees replicate this model.

While the council is a forum in which different interests seek common ground, it cannot carry initiatives alone. Progress depends on council and committee members bringing technical and policy recommendations to life through application. Active involvement in decision-making creates momentum and ownership for participants, encouraging them to carry resolutions back to their “home” organizations. In this way, effective practices developed in concert with the needs of the user spread throughout the state.

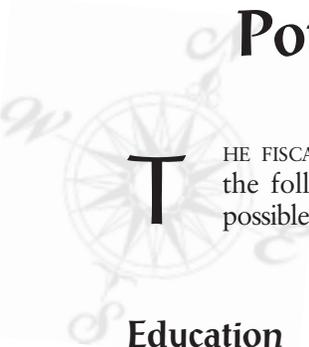
During fiscal year 1998, the council:

- Formed committees to work on priority issues. The council seeks and recruits GIS professionals to share their expertise in these efforts. Committees addressed such issues as GIS education, data standards, hydrographic data management, council communication and the modernization of land records management in Minnesota.
- Presented an award of commendation from Governor Carlson to the statewide GPS Advisory Taskforce. This annual award honors exceptional

projects demonstrating benefits that extend beyond the home agency or organization.

- Continued active involvement with a broad cross-section of policy-makers and geographic information system users. Nearly 70 volunteers from more than 30 organizations representing state agencies, federal and local governments, private industry, nonprofit organizations and planning commissions participated in committee work.
- Prepared to discuss with a joint committee representing the Association of Minnesota Counties and the League of Minnesota Cities the implications of land records management practices for local governments
- Forged a partnership with the Minnesota Office of Technology through providing the agency a permanent ex-officio seat on the council. The chair of the GIS/LIS Consortium, the director of the Land Management Information Center and a representative of the U.S. Geological Survey also held ex-officio positions.
- Recognized the need to maintain communication with the Minnesota Information Policy Council
- Continued to communicate with the Minnesota Department of Administration’s Intergovernmental Information Systems Advisory Council, which is devoted to advancing technological growth and management in state and local governments

Potential initiatives for the 1999 council



THE FISCAL YEAR 1998 council recommends the following initiatives be considered as possible priorities for council action in 1999.

Education

Promote the development and expansion of training in geographic information technologies and their use to create an adequate work force to meet Minnesota's needs.

- Evaluate and document geographic information system training and educational needs and resources

Standards

Evaluate and promote data standards that are helpful to spatial data users.

- Define what standards are needed and identify groups that will benefit from their development
- Promote the development of needed standards by seeking out and supporting champions and supporters
- Shepherd new standards through the sanctioning process of the Minnesota Information Policy Council
- Actively monitor proposed federal spatial data standards as they go through the standards adoption process. Help develop those that have implications for Minnesota by participating on national standards development committees.
- Develop implementation strategies, examples and support materials for new standards to ensure they are well understood and provide value to Minnesota spatial data users

Data investments

Develop proposals to meet the highest priority data needs within Minnesota and document them in a formal report.

- Identify and document the highest priority needs for statewide data

- Develop and propose policies, procedures and investments to ensure that an official record of political boundaries can be effectively maintained for the entire state

- Develop and propose policies, procedures and investments to ensure that counties may inventory land use and monitor change and that these inventories may be assembled to provide an annual statewide inventory

- Develop and propose policies, procedures and investments to ensure that data about the state's water resources is standardized and useful to a broad cross-section of users

Data sharing

Promote strategies that enable data sharing and integration within the state.

- Promote the participation of Minnesota organizations in the implementation of a Minnesota geographic data clearinghouse, as being developed by the Land Management Information Center following the 1997 recommendation of the Governor's council
- Provide recommendations on interagency agreements that would advance the potential for data sharing and integration, as well as cooperative projects and activities

Communications

Identify ways in which the council can effectively communicate its mission and duties to spatial data users, policy-makers and the public.

- Develop a communication plan and tools for the council
- Create a transition packet explaining the council and its work for the new Governor and his administration

- Review ongoing council communications (web site, publications and newsletter submissions)
- Design and develop a brochure for wide distribution to promote the council and its activities

Outreach

Identify ways of enhancing communication and information sharing among spatial data users and provide an environment in which issues of concern can be discussed and resolved.

- Identify geographic information activities in Minnesota and establish a means of maintaining an inventory of them
- Promote cooperative relationships among spatial data users and the council, placing special emphasis on coordinating organizations

- Identify and document effective and efficient uses of geographic information technology within Minnesota to improve the delivery of services to the public

Data integration

Identify opportunities for improving the integration of geographic information technology investments made by the state.

- With the participation of county representatives, assess current practices of managing county land records, develop a model modern records system and propose a pilot project to implement and evaluate the model

Resources



THE FOLLOWING DOCUMENTS are available by calling 651-296-1208, sending an e-mail to gc@mnplan.state.mn.us or visiting the council's Internet home page at www.lmic.state.mn.us/gc/gc.htm.

- *Cardinal Points: Fiscal Year 1998 Annual Report of the Minnesota Governor's Council on Geographic Information* (June 1998)
- *Laying the Foundation for a Geographic Information Clearinghouse* (August 1997)
- *Charting Progress: Fiscal Year 1997 Annual Report of the Governor's Council on Geographic Information* (August 1997)
- *Identifying Land Parcels: Is a Statewide Standard Needed?* (July 1997)
- Numeric codes for the identification of counties in Minnesota (July 1997)
- *County Soil Surveys: Guidelines for Digitizing* (June 1997)
- *Minnesota Geographic Metadata Guidelines* (September 1996)
- *Starting Points: Conventions for Geographic Information* (September 1996)

- Resource list for parcel data development (August 1996)
- *Seeking Common Coordinates: Fiscal Year 1996 Annual Report of the Governor's Council on Geographic Information* (June 1996)
- Guidelines for recognizing exceptional GIS projects and programs (May 1996)
- By-laws of the Governor's Council on Geographic Information (March 1996)
- *Standards for GIS* (September 1995)
- *Progressing on Course: Fiscal Year 1995 Annual Report of the Governor's Council on Geographic Information* (June 1995)
- Analysis of the 1994 survey of Minnesota GIS users: Adequacy of the current data and needs for new or improved data (May 1995)
- *Survey of Current GIS Data and Needs: Technical Report* (May 1995)
- *Mapping a Course of Action: Fiscal Year 1994 Annual Report of the Governor's Council on Geographic Information* (June 1994)
- Executive Order 93-17 providing for the establishment of a Governor's Council on Geographic Information (August 1993)

1998 committee members

Communications Committee

David Arbeit, Land Management Information Center at Minnesota Planning
Larry Charboneau, The Lawrence Group
Will Craig, Center for Urban and Regional Affairs, University of Minnesota (chair)
Fred Logman, Minnesota Counties Computer Cooperative
Mary Welfling, Minnesota Department of Transportation
Heidi Welsch, Hennepin County
Judy Winiecki, Minnesota Department of Natural Resources

Education Committee

Robert Bixby, St. Cloud State University (co-chair)
Dick Howe, Alexandria Technical College
Matt Koukol, Minnesota Department of Transportation (co-chair)
Jim Krautkremer, Intergovernmental Information Systems Advisory Council
Dan Ross, St. Cloud State University
Mike Rowekamp, Rowekamp Associates, Inc.
Ron Wencl, U.S. Geological Survey

GIS Standards Committee

Michael Barnes, Minnesota Department of Transportation
Anne Bentley, Minnesota Office of Technology
Chuck Bryant, Minnesota Department of Transportation
Christopher Cialek, Land Management Information Center at Minnesota Planning (chair)
Sherry Coatney, Intergraph Corporation
Rick Gelbmann, Metropolitan Council

Guy Harper, Minnesota Department of Transportation
Mark Kotz, Metropolitan Council (assistant to the chair)
Robert Maki, Minnesota Department of Natural Resources
Robert Patton, Minnesota Department of Agriculture
James Piegat, Hennepin Conservation District
Lynn Rabuse LaMott, Environmental Systems Research Institute
Nancy Rader, Land Management Information Center at Minnesota Planning
Steven Ring, Minnesota Department of Health
Mike Schadauer, Minnesota Department of Transportation
Wayne Simacek, Cooperative Power
Gerald Sjerven, Natural Resources Research Institute
Ron Wencl, U.S. Geological Survey

Land Records Modernization Committee

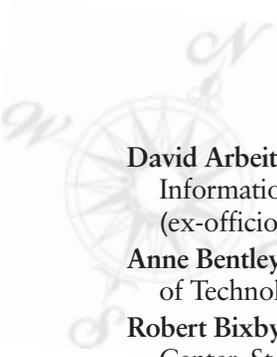
David Arbeit, Land Management Information Center at Minnesota Planning
Luci Botzek, Minnesota Association of County Officers (co-chair)
David Claypool, Ramsey County
Kathy Conlon, Nicollet County
Will Craig, Center for Urban and Regional Affairs, University of Minnesota
John Lunde, Sufficient Systems, Inc.
Fred Logman, Minnesota Counties Computer Cooperative
Gary Stevenson, Dakota County
Richard P. Johnson, Metropolitan Council
Jeffrey Grosso, City of Saint Paul (co-chair)
David Wierens, Association of Minnesota Counties

Hydrography Committee

Ann Bannitt, U.S. Army Corps of Engineers
Carrie Bartz, Minnesota Pollution Control Agency
Robert Bixby, St. Cloud State University
Mark Ebbers, Minnesota Department of Natural Resources
Joe Gibson, Minnesota Department of Natural Resources
Leigh Harrod, Metropolitan Council
Roger Hirschman, Natural Resources Conservation Service
Elizabeth Hobbs, BRW, Inc.
Steve Kloiber, Metropolitan Council
Susanne Maeder, Land Management Information Center at Minnesota Planning (co-chair)
Robert Maki, Minnesota Department of Natural Resources

Les Maki, Minnesota Department of Natural Resources
Thomas Martin, Minnesota Department of Transportation
Tim Ogg, Minnesota Board of Water and Soil Resources
Mark Olsen, Minnesota Pollution Control Agency
James Piegat, Hennepin Conservation District
Glenn Radde, Minnesota Department of Natural Resources
Ken Saffert, City of Mankato
Chris Sanocki, U.S. Geological Survey
Jim Solstad, Minnesota Department of Natural Resources
Kathy Svanda, Minnesota Department of Health (co-chair)
Mark Wald, OSM and Associates
Ron Wencil, U.S. Geological Survey

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David Arbeit, director, Land Management Information Center at Minnesota Planning (ex-officio)
Anne Bentley, planning director, Minnesota Office of Technology (ex-officio)
Robert Bixby, director, Spatial Analysis Research Center, St. Cloud State University
Christopher Cialek, geographic information supervisor, Land Management Information Center at Minnesota Planning
Will Craig, assistant director, Center for Urban and Regional Affairs, University of Minnesota
Kari Craun, assistant chief, Mid-Continent Mapping Center, U.S. Geological Survey, Rolla, Missouri (ex-officio)
Jeffrey Grosso, chief surveyor, City of Saint Paul
Carl Hardzinski, GIS coordinator, Bureau of Indian Affairs
Keith Hamre, community development director, City of Duluth
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Fred Logman, executive director, Minnesota Counties Computer Cooperative (chair)
John Lunde, program manager, Sufficient Systems
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Ken Saffert, engineer, City of Mankato
Gary Stevenson, land information director and surveyor, Dakota County
Kathy Svanda, assistant division director, Environmental Health Division, Minnesota Department of Health
Doug Thomas, water planning coordinator, Minnesota Board of Water and Soil Resources
Gary Tonkin, director, Transportation Planning Division, Arrowhead Regional Development Commission
Mary Welfling, director, Office of Information Policy Management, Minnesota Department of Transportation

