

**THE 1994 PLAN  
FOR THE NATIONAL SPATIAL DATA  
INFRASTRUCTURE**

**Building the Foundation of an Information Based Society**

**MARCH 1994**

Federal Geographic Data Committee  
590 National Center  
Reston, Virginia 22092  
Internet: [gdc@usgs.gov](mailto:gdc@usgs.gov)  
Phone: (703) 648-5514  
FAX: (703) 648-5755

**THE 1994 PLAN  
FOR THE NATIONAL SPATIAL DATA INFRASTRUCTURE:  
Building the Foundation of an Information Based Society**

**VISION**

**Current and accurate geospatial data will be readily available  
to contribute locally, nationally, and globally  
to economic growth, environmental quality and stability,  
and social progress.**

**EXECUTIVE SUMMARY**

The National Spatial Data Infrastructure (NSDI) is conceived to be an umbrella of policies, standards, and procedures under which organizations and technologies interact to foster more efficient use, management, and production of geospatial data. The NSDI requires and will facilitate cooperation and interaction among various levels of government, the private sector, and academia. The major components of the NSDI currently under development include a basic framework of digital geospatial data to act as a foundation for numerous other data collection activities; known quality thematic data sets of critical national importance; standards to facilitate data collection, documentation, access, and transfer, and the means to search, query, find, access, and use geospatial data. Strategies to build the NSDI include establishing forums for communication, facilitating access to data, building framework and thematic data sets, developing educational and training programs, and fostering partnerships for data sharing. Key actions underway are developing and implementing standards for framework and thematic data; producing framework and thematic data; implementing standards for geospatial data documentation and transfer; establishing procedures to use electronic networks to search for, access, and use geospatial data; and cooperating in the development of state and regional councils and private sector agreements to accomplish these actions. The Clinton Administration has tasked the Federal Geographic Data Committee (FGDC) to provide the federal leadership for evolving the NSDI in cooperation with state and local governments and the private sector. The success of the NSDI will hinge upon the ability to build and maintain partnerships among these entities to carry out the actions of this plan.

## BACKGROUND

### *Evolution of technology*

Information technology is rapidly changing the way that governments and the private sector conduct business. A growing reliance on the use of computers for processing information is dramatically increasing demands for electronic data. In no area is this more true than in the use of technology to collect, analyze, manage, and disseminate geographic information. Geospatial data, or data tied to a location on the earth, are critical to solving today's complex environmental, economic, and social problems. The use of geographic information system (GIS) technologies for digitally analyzing spatial problems has become pervasive and in the process, created a demand for vast amounts of digital geospatial data

Increasingly complex analytical needs are resulting in requirements for digital geospatial data that define the characteristics of geographic space, are current, and are of known quality. These data must be easily accessible and have the ability to be integrated, generalized, and manipulated with known or predictable results. Meeting all of these requirements is not possible today. The intent of the National Spatial Data Infrastructure is to create the environment to respond to today's requirements for geospatial data.

Concurrent with the evolution of GIS technologies has been a revolution in communications and electronic networking. Increasingly, individuals are using electronic networks to communicate with others both within and outside of their own organizations. Computing capability has evolved from primarily centralized mainframe processing, to within-agency distributed processing, to a current state of multi-nation, multi-organization "virtual" processing. The evolution of networking capabilities is changing forms of communication and the nature of working relationships. These changes are likely to have profound effects on current organizational structures.

Discussion lists involving a few to thousands of individuals are rapidly developing to share ideas and information on topics of common interest. The community of geospatial data users has established several communication forums on the global Internet network, including discussion lists such as GIS-L and MAPS-L. The continued development of the National Information Infrastructure will provide the backbone and capacity for communicating among millions of individuals, interacting with multiple distributed data sets, and electronically transferring vast amounts of data. Many organizations anticipate using the network to distribute digital geospatial data.

### *Organizations and Personnel*

The technology revolution is enabling many organizations to collect and integrate digital geospatial data independently, rather than relying on single or centralized data producers. These organizations also have the ability to broadly disseminate data rapidly and at low cost. Thousands of organizations are now creating, using, disseminating, and sharing digital geospatial data. A recent Office of Management and Budget data call estimates that federal agencies alone are spending \$3 billion annually to collect and manage domestic geospatial data, and an additional \$1 billion annually on global geospatial data activities. However, few agencies have the mission or necessary resources to collect all data required to support GIS

activities. Many data collectors and technology users have little knowledge about geospatial data or about standards for data collection. Often times new data are generated with little understanding of accuracy or attribution requirements.

Mechanisms, procedures, and technologies that stimulate sharing high-quality digital geospatial data have become essential. In the federal government, the Office of Management and Budget (OMB) has created the Federal Geographic Data Committee (FGDC) through Circular A-16 and charged the FGDC with the responsibility to coordinate various surveying, mapping, and spatial data activities of federal agencies to meet the needs of the Nation. Major objectives of Circular A-16 are to avoid duplication and minimize costs in mapping and spatial data activities, which involves establishing standards and providing wider access to geospatial data. The FGDC also has been charged with coordinating geospatial data related activities with other levels of government and other sectors.

The rapid evolution from paper maps to digital analysis of geospatial data for solving complex spatial problems has created a knowledge void. Many public and private sector agencies are discovering they do not have skilled workers who understand how to use the technology or what data may be required for analyses. The pace of technology implementation in many organizations is constrained by a lack of trained personnel.

## **THE NATIONAL SPATIAL DATA INFRASTRUCTURE**

The Mapping Science Committee (MSC) of the National Research Council has defined the NSDI as the "means to assemble geographic information that describes the arrangement and attributes of features and phenomena on the Earth. The infrastructure includes the materials, technology, and people necessary to acquire, process, store, and distribute such information to meet a wide variety of needs." <sup>1</sup>

The FGDC has described the NSDI as an umbrella under which organizations and technology interact to foster more efficient use, management, and production of geospatial data. The NSDI consists of policies, standards, agreements, and partnerships among a variety of sectors and disciplines that will promote more cost-efficient production, ready availability, and greater use of high quality geospatial data. The NSDI also consists of a framework of basic digital geospatial data required for registering and analyzing most other geospatial data, as well as thematic digital geospatial data sets of national interest.

The major objective of the NSDI is to foster enhanced use of geospatial data through better management of existing geospatial data and through more efficient collection and production of new geospatial data in ways that maximize data usefulness for multiple data users. The NSDI will promote development and maintenance of and access to data sets that are needed for national, regional, state, and local analyses.

The NSDI currently exists in an ad hoc way, with standards and partnerships in various stages of development, large volumes of analog geospatial data (paper maps), and numerous collections of non-standardized, incomplete, often out-of-date digital geospatial data.

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<sup>1</sup> "Toward a Coordinated Spatial Data Infrastructure for the Nation", 1993. National Research Council, Mapping Science Committee, National Academy Press.

Recently, the Clinton Administration identified creation of the NSDI as one of the initiatives necessary to "reinvent government." Within Vice President Gore's National Performance Review report, the development of the NSDI, based on partnerships with non-federal sectors, was recognized as key to minimizing redundancy in the creation of geospatial data and facilitating means of access to these data for solving critical problems. The FGDC was recognized as the federal entity responsible for helping to guide development of the NSDI. The President is expected to sign an Executive Order to help further efforts to develop the NSDI in the near future. This plan addresses a variety of activities that must be carried out by the FGDC, by federal, state, and local government agencies, and by members of the non-public sectors to fully develop the NSDI.

## RECOMMENDATIONS

To achieve the vision of efficient production, easy access, and shared use of vast stores of accurate geospatial data requires coordinated action on the part of organizations, associations, companies, and individuals.

- A. Identify, establish, and/or utilize various forums to facilitate discussions, interactions, and actions necessary to evolve the NSDI.**  
 Forums for communication may be formally structured activities such as associations, councils, committees, or other organizations; or less formal as in conferences, workshops, and task forces. These forums must provide an environment to debate issues and establish agreed upon procedures, policies, and standards to facilitate geospatial data sharing, production, and use.

<u>ACTION</u>	<u>DATE</u>	<u>RESPONSIBLE PARTY</u>
<b>1. Form or strengthen existing state GIS or geospatial data coordinating councils.</b>	Ongoing	State and local government agencies, National States Geographic Information Council, National Governor's Association, other state and local organizations
<b>2. Establish lines of communication between state councils and the FGDC and identify responsibilities.</b>	Dec 94	State organizations and the FGDC
<b>3. Develop a report outlining options for and costs in the formation of a national council, alliance, or other organization to facilitate NSDI activities. Detail responsibilities.</b>	March 95	FGDC sponsored contract

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| <b>4. Conduct open discussions about NSDI activities at national, state, and local GIS and other spatial data meetings.</b>   | Ongoing | FGDC Secretariat, FGDC Members, Subcommittee and Working Group Chairs, other participants in NSDI activities |
| <b>5. Establish guidelines and criteria for the formation of regional councils (eg. multiple states, ecosystems, watersheds) to encourage communication and data sharing and to promulgate standards. Sanction proposed groups.</b> | June 94 | FGDC Coordination Group, FGDC Steering Committee   |
| <b>6. Establish regional councils according to FGDC guidelines.</b>   | Ongoing | Representatives of federal, state, and local governments and other sectors.                                  |
| <b>7. Establish electronic lists on the Internet to conduct discussions, and sites to provide information access relative to NSDI. (see Appendix C)</b>   | Mar 94  | FGDC Secretariat   |
| <b>8. Plan a May 1995 GeoData Forum to review NSDI development and to highlight NSDI partnership opportunities.</b>   | Ongoing | FGDC, GIS/LIS  |

**B. Ensure effective means for finding, accessing, sharing, and using geospatial data.** The evolving National Information Infrastructure (NII) provides a critical means for sharing information electronically. The geospatial data community will take advantage of the NII to communicate about the availability of geospatial data and to identify potential partners for data development. The NII is based on the concept of a "distributed" approach to information management that relies on data producers and suppliers to document their data and make it available over electronic networks. Organizations not connected electronically to the network will have access to geospatial data through sites such as the Earth Science Information Centers (1-800-USA-MAPS).

**1. Complete work on the Spatial Metadata Standard to provide a consistent approach to documentation of geospatial data.**

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| <b>a. Officially endorse Spatial Metadata Standard</b> | March 94 | FGDC Chairman |
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| <b>b. Develop guides and templates for use of the Spatial Metadata Standard.</b>  | Begin March 94, ongoing | FGDC Secretariat contract for support services |
| <b>c. Conduct training seminars to foster use of Spatial Metadata Standard.</b>   | Ongoing                 | FGDC Secretariat and Contractor(s)             |
| <b>d. Submit the Spatial Metadata Standard to the National Institute of Standards and Technology for potential FIPS approval.</b> | March 94                | FGDC Secretariat                               |

**2. Create a National Geospatial Data Clearinghouse to allow for querying, searching, and accessing geospatial metadata across electronic networks.**

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| <b>a. Evaluate the Clearinghouse prototype and alternative approaches for data access.</b>  | April 94             | Clearinghouse Working Group, prototype participants, other interested parties |
| <b>b. Conduct training and education activities to foster Clearinghouse use.</b>  | Ongoing              | FGDC Secretariat, Contractor  |
| <b>c. Establish Internet access for major geospatial data producing programs to provide access to documentation and/or inventories of geospatial data.</b>                | August 94<br>Ongoing | Federal agencies<br>All   |
| <b>d. Establish procedures and policies to ensure that new data collected are documented using the Spatial Metadata Standard and made available to the Clearinghouse.</b> | August 94            | Federal agencies  |
| <b>e. Implement procedures to begin documenting new data.</b>   | Dec 94               | Federal agencies  |
| <b>f. Establish means for public access to geospatial data through the Clearinghouse.</b>   | Feb 95               | Federal agencies, FGDC  |

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| g. Develop a schedule and plan for documentation of existing data.  | Feb 95  | Federal agencies, FGDC                         |
| h. Establish policies to ensure that the Clearinghouse is searched prior to new data collection activities            | Feb 95  | Federal agencies                               |
| i. Continue expansion of clearinghouse activities and policies to non-federal geospatial data producers and users.    | Ongoing | All  |
| j. Conduct research into optimal approaches to use and indexing of information within the Information Infrastructure. | Ongoing | FGDC Contracts, NSF, NCGIA, Research community |

**3. Establish means to interoperate electronically against multiple format databases in a distributed applications context.**

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| a. Complete a draft specification of a geodata interoperability standard and submit to the FGDC Coordination Group as part of the FGDC Standards Process. | Sept 94 | Open GIS Foundation (OGF)   |
| b. Implement the Geodata Interoperability standard.   | Ongoing | Software vendors, FGDC, OGF |

- C. Through partnerships and based on standards, produce a framework of national digital geospatial data from which other data sets may be derived or to which other data sets can be referenced, both on and off-shore.**  
 These framework data are likely to include digital ortho imagery, geographic and cadastral reference systems, and spatial representations of geographic features such as transportation and hydrologic networks, terrain (elevation), and administrative and sociopolitical boundaries such as counties. These data are required and produced at different levels of accuracy and resolution in different geographic areas.  
 Applications and available budgets affect data collection accuracy and the levels of attribution.



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| 1. Formulate a plan to establish a national network of global positioning system (GPS) differential base stations that agencies at all levels of government will cooperate in maintaining and using.  | June 94  | Federal Geodetic Control Subcommittee         |
| 2. Working with the community of data users and producers, define basic framework content for national and local applications. (see Appendix F)   | Oct 94   | Framework Working Group                       |
| 3. Identify needed standards for producing framework geospatial data sets.  | Oct 94   | Framework Working Group                       |
| 4. Recommend priorities for framework data production.  | Oct 94   | Users, Framework Working Group                |
| 5. Identify responsibilities for and contributions from various sectors for development to national standards of framework data sets.   | Oct 94   | Framework Working Group, major data producers |
| 6. To aid the collection of the 2000 Census, complete the initial production of the transportation, hydrology, and boundary elements of the national digital framework data sets. (Much of this will be based on availability of digital ortho imagery, accurate geographic referencing, and in some instances, elevation data and cadastral reference data.) | Jan 1998 | Data production cooperatives                  |
| 7. Recommend comprehensive schedules for the continuous update and disposition of framework data in the NSDI, including purging data that are no longer current, and retaining, archiving, and ensuring access to all data having continuing value.   | Oct 94   | Framework Working Group                       |

**D. Develop thematic data sets that meet critical national needs.**  
 Although certain geospatial data traditionally are not used to develop other data sets (such as the framework data), they are critical to answering questions of national

significance. Examples include wetlands, soils, geology, land cover, and socioeconomic data.

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| <b>1. Identify requirements for specific themes of data.</b>  | Dec 94  | FGDC Coordination Group, Subcommittees |
| <b>2. Prioritize data collection activities for themes of data.</b>   | Jan 95  | FGDC Subcommittees                     |
| <b>3. Establish standards for collection and production of thematic data.</b>   | Vary    | FGDC Subcommittees                     |
| <b>4. Identify mechanisms for funding thematic data development based on cooperative partnerships and incentives.</b> | Dec 94  | FGDC Coordination Group                |
| <b>5. Produce key thematic data layers for the nation.</b>  | Ongoing | Data production cooperatives.          |

**E. Develop an educational curriculum and training programs that ensure the availability of sufficient trained personnel for geospatial data activities in the future.**

Programs to explain the concepts of geospatial relationships and the use of technology for analyzing and managing data about the Earth will begin in grades K through 12 and continue throughout professional development.

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| <b>1. Promote the development of education and training programs on geospatial data concepts and technology for multiple levels of instruction.</b> | Ongoing | Academic Institutions, NCGIA, Federal agencies |
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**F. Identify options for fostering productive partnerships among all sectors for coordination of geospatial data collection, management, and use.**

Many ideas for developing the NSDI have been discussed and offered by experts in all sectors. Much of the discussion has taken place at the meetings of professional associations and in "town meetings." These meetings have been extremely useful in starting dialogue with the broad geospatial data user community. The next steps will involve further collaborative actions to effect and implement partnerships. Opportunities must be explored and acted upon for pooling knowledge, resources, and research capabilities for geospatial data production, management, and use to benefit all sectors.

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| <p><b>1. Explore opportunities for Cooperative Research and Development Agreements (CRADA) and other innovative partnerships with the private sector to develop cost-effective approaches to geospatial data production and maintenance.</b></p>  | <p>Ongoing</p>  | <p>Federal agencies, private sector</p>   |
| <p><b>2. Identify federal assistance programs (grants, cost-sharing, technology transfer, and work-share) related to geospatial data that are available to non-federal agencies. Examine means to coordinate these programs.</b></p>              | <p>Jan 95</p>   | <p>FGDC Contract</p>  |
| <p><b>3. Initiate Competitive Cooperative Agreements Program to foster creative partnerships.</b></p>   | <p>March 94</p> | <p>FGDC Secretariat</p>   |
| <p><b>4. Develop a document outlining strategies for maximizing participation of non-federal sectors in the NSDI.</b></p>   | <p>March 95</p> | <p>FGDC Chairman, FGDC</p>  |
| <p><b>5. Develop a document identifying organizations nationally and internationally with responsibilities and authorities for geospatial and global change data standards. Identify strategies for encouraging coordination as feasible.</b></p> | <p>Sept 94</p>  | <p>FGDC Standards Working Group, Interagency Working Group on Data Management for Global Change</p> |

## SIDE BAR

### CHALLENGES

The global information revolution has created an unprecedented demand for access to digital data. Optimizing the ability to use geospatial data requires action to address the following challenges:

- Digital geospatial data do not exist at needed levels of accuracy or currentness for large areas of the nation and globe.
- Requirements for positional accuracy, information content, and geographic coverage of geospatial data vary significantly among users.
- Geospatial data often are not collected or automated to standards that would make the data useful in multiple applications. Local, national, and international standards are often in conflict.
- New techniques for collecting and technologies for managing digital geospatial data are changing the requirements for and uses of data.
- Existing geospatial data often are difficult to find. Adequate indexes and directories are not available.
- Geospatial data often are documented poorly and inconsistently.
- Where geospatial data sets do exist, they sometimes are difficult to use because of how they are packaged or formatted, and difficult to integrate due to varying extents, positional accuracies, referencing systems, and classifications.
- Processes for updating digital geospatial data sets, for conducting transactions, and for managing historical records are poorly defined or do not exist.
- Demands for digital geospatial data are increasing much faster than budgets for data collection and management.
- In some organizations, digital geospatial data are being treated as a commodity, raising many questions about public access, data fees, copyrights, liability, right-to-know, and appropriate use.
- The number of personnel educated and trained to make use of digital geospatial data is inadequate to meet the demand. Relatively few programs exist to provide appropriate education and training.

## PARTNERSHIPS

Many states have recognized the value of coordinating geospatial data use, production, and management activities within their boundaries. Requirements and resources for developing geospatial data vary significantly across states and among state, local, and federal governments. A recent report<sup>2</sup> by nine national state and local government public interest groups, recommends that each state form a "coordinating council" of state, local, regional, and federal government representatives, as well as academic and private sector interests. These councils, particularly if recognized formally by the governor or state legislature, can address issues of coordinated funding for data development, standards, data sharing policies, and data maintenance responsibilities on a statewide basis. Several of these councils are currently coordinating activities with the FGDC. Some states, such as Wisconsin, are making use of real estate transaction fees to support development and coordination of geospatial data at the local government level. These locally developed data comply with standards and can be aggregated for use regionally or statewide.

There is great diversity in approaches to developing and using geospatial data within local governments. These requirements for data accuracy may vary significantly from state or nationwide needs. Means for funding data activities are a major concern, with many local agencies turning to the sale of data and GIS services to finance system development and maintenance. Some local governments have established strategic partnerships with private companies or utilities to develop basic parcel level data bases.

The state, local, and federal government agencies that form intra- and inter-agency committees and intergovernmental councils and task forces often share an interest in common geography. Other organizations, such as the Intelligent Vehicle Highway System (IVHS) of America, the American Congress on Surveying and Mapping, the American Society of Photogrammetry and Remote Sensing, and the Urban and Regional Information Systems Association have interests in specific data themes, types of analyses, or sectors of users of GIS. Private hardware and software vendors have other concerns related to the availability of data for use their technologies. All of these entities have roles to play in fostering the use of, creating, and disseminating geospatial data. A major challenge is identifying constructive means for building partnerships among these entities to help collect, maintain, and share geospatial data.

The United States also functions as part of a global information infrastructure, and increasingly, because of the need for understanding global processes, activities related to geospatial data must be coordinated in a larger context. Activities of the FGDC and state and local governments must be conducted in consonance with international geospatial data developments to provide data that can be analyzed globally. To this end, organizations such as the International Standards Organization (ISO), the International Cartographic Association, the International Hydrographic Organization, the International Geographical Union, and others must be kept informed of U.S. activities. Conversely, agencies and organizations in this nation must be aware of and consider the need for addressing international standards.

Partnerships to foster cooperative responsibilities for data production, maintenance, integration, and dissemination must be cultivated for the overall good of local and global communities. Agreed upon policies and standards for creating digital data that can be widely used, for protecting privacy, and for providing access to data, are needed within the community to continue to enhance the use of geospatial data for intelligent decision-making. These partnerships, procedures, standards, policies, and the framework and various themes of required digital geospatial data comprise the National Spatial Data Infrastructure.

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<sup>2</sup> "Statement by the Workgroup on State and Local Partnership with the Federal Geographic Data Committee", 1993. Advisory Commission on Intergovernmental Relations.

## SIDEBAR

### FGDC STANDARDS PROCESS (Steps 7-10 may be iterative.)

1. Define the need for, scope, and applicability of a standard (FGDC Coordination Group/ Subcommittee/Working Group, or other appropriate organization<sup>3</sup>). Document the applicability, purpose, and scope of the standard.
2. Identify existing related standards and assess their adequacy and shortcomings (FGDC Coordination Group/Subcommittee/ Working Group, or other appropriate organization).
3. Propose adoption of the existing standard, adaptation of an existing standard, or development of a new draft standard, including identification of the organization responsible for maintaining<sup>4</sup> the standard (FGDC Coordination Group/ Subcommittee/ Working Group, or other appropriate organization). Propose the target authorizing body(ies), such as the FGDC, National Institute for Standards and Testing, American National Standards Institute, or International Standards Organization.
4. Submit the proposed draft standard to the FGDC Secretariat for distribution to the FGDC Coordination Group and for discussion at the next Coordination Group meeting (FGDC Coordination Group/Subcommittee/ Working Group, or other appropriate organization).
5. Review the proposed standard and return it to the submitting organization for additional action or submit it to the FGDC Secretariat for announcement (FGDC Coordination Group).
6. Announce intent and a request for comments in the Federal Register, in professional journals, and on the Internet (FGDC Secretariat).
7. Conduct presentations about the standard at public meetings and conferences, including those involving state and local governments, and the private sector (FGDC Coordination Group/Subcommittee/Working Group, Secretariat, or other appropriate organization).
8. Incorporate comments on the standard (FGDC Coordination Group/Subcommittee/ Working Group, or other appropriate organization). Prepare a provisional version of the standard.
9. Test the provisional standard (FGDC Coordination Group/Subcommittee/ Working Group, or other appropriate organization oversee testing process, but the standard should be tested in as many sectors as possible).
10. Revise the standard as needed based on tests and prototypes, prepare a final version, and submit it to the FGDC Secretariat (FGDC Coordination Group/Subcommittee/ Working Group, or other appropriate organization).
11. Submit the final proposed standard to the FGDC Coordination Group for discussion and concurrence (FGDC Secretariat). As appropriate, formally submit the standard to external authorizing bodies.
12. Review the final standard and return it to the submitting organization for additional action or recommend adoption based on a majority vote to the FGDC Steering Committee (FGDC Coordination Group).
13. Submit proposed final standard to the FGDC Steering Committee with a recommendation for adoption (FGDC Secretariat).
14. Approve as an FGDC Standard based on a majority vote of the FGDC Steering Committee, with signature by the FGDC Chair.

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<sup>3</sup> - Needed standards may be suggested to an FGDC component by any member or organization within the spatial data community.

<sup>4</sup> - The organization that becomes the "maintenance authority" promulgates the standard, and provides resources for education, assistance, implementation, and maintenance of the standard, and aligns the standard with existing related standards as appropriate.

**Workshops and Presentations on the  
National Geospatial Data Clearinghouse &  
Content Standards for Spatial Metadata  
as of March 1994**

**9th Annual GRASS GIS User's Conference and Exhibition**

March 16, 1994, 8:30am-12pm and 1:30-5:00pm - Reston, Virginia - Clearinghouse/Metadata Workshops

**Montana GIS Conference**

April 6, 1994, 9:30-11:00am - Kalispell, Montana - NSDI/Clearinghouse Presentation

April 7, 1994, TBD - Kalispell, Montana - Clearinghouse/Metadata Workshop

**Geographical Information Systems for Transportation Symposium '94**

April 11-13, 1994, TBD - Norfolk, Virginia - Clearinghouse Presentation [as part of Ground Transportation Subcommittee Meeting]

**U.S. Hydrographic Conference '94**

April 18, 1994, 1:00-5:00pm - Norfolk, Virginia - Clearinghouse Presentation [as part of Marine GIS Workshop]

**1994 ASPRS/ACSM Annual Convention and Exposition**

April 28, 1994, 8:30-4:00pm - Reno, Nevada - Clearinghouse/Metadata Workshop

**Mid-America GIS Symposium**

May 2, 9:00am -12:00pm - Kansas City, Missouri - Clearinghouse/Metadata Workshop

**14th Annual ESRI User Conference**

May 23-27, 1994, TBD - Palm Springs, California - Clearinghouse/Metadata Workshop

**GIS in Business '94**

June 5-8, 1994, TBD - San Francisco, California - FGDC Exhibit with Clearinghouse Demonstration

**Urban and Regional Information Systems Association (URISA) '94**

August 7-14, 1994, TBD - Milwaukee, Wisconsin - Clearinghouse/Metadata Workshops

**Federal Geographic Technology '94**

September 26-28, 1994, TBD - Washington, D.C. - FGDC Exhibit with Clearinghouse Demonstration

**GIS/LIS '94**

October 23-24, 1994, TBD - Phoenix, Arizona - Clearinghouse/Metadata Workshop