Coordination of Geographic Information and Related Spatial Data Activities

Office of Management and Budget • Circular A-16 revised

The National Spatial Data Infrastructure

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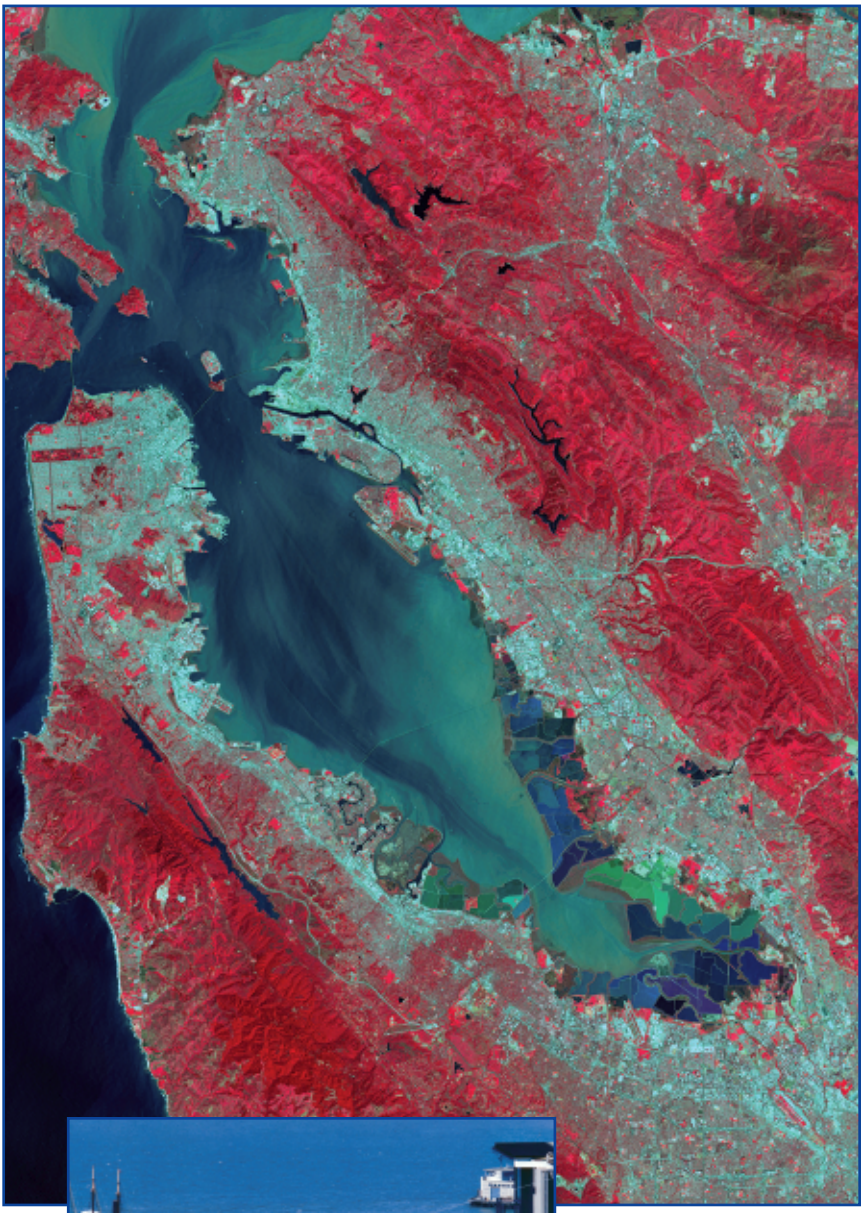
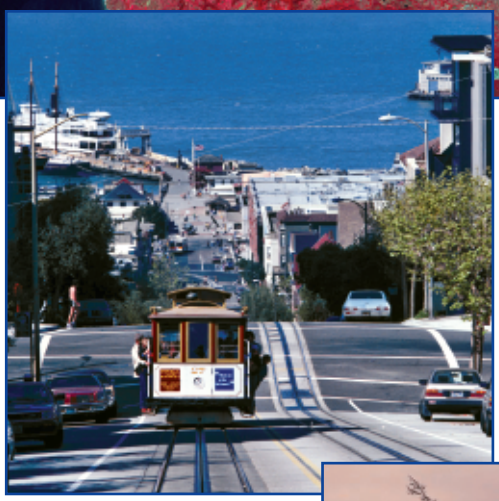
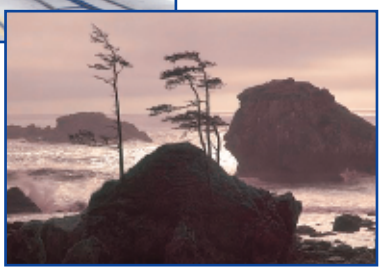
SUBJECT: Coordination of Geographic Information and Related Spatial Data Activities

This Circular provides direction for federal agencies that produce, maintain or use spatial data either directly or indirectly in the fulfillment of their mission. This Circular establishes a coordinated approach to electronically develop the National Spatial Data Infrastructure and establishes the Federal Geographic Data Committee (FGDC).

The Circular has been revised from the 1990 version to reflect changes in technology, further describe the components of the National Spatial Data Infrastructure (NSDI), and assign agency roles and responsibilities for development of the NSDI. The revised Circular names the Deputy Director for Management of OMB as Vice-Chair of the Federal Geographic Data Committee.







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BACKGROUND

1. What is the purpose of this Circular?

This revised Circular provides for improvements in coordination and use of spatial data. Spatial data refers to information about places or geography, and has traditionally been shown on maps. This Circular describes the effective and economical use and management of spatial data assets in the digital environment for the benefit of the government and the nation. The Circular affirms and describes the National Spatial Data Infrastructure (NSDI) as the technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data. The Circular describes the management and reporting requirements of Federal agencies in the acquisition, maintenance, distribution, use, and preservation of spatial data by the Federal Government. The Circular establishes the FGDC as the interagency coordinating body for NSDI-related activities, chaired by the Secretary of the Interior with the Deputy Director for Management, Office of Management and Budget (OMB) as Vice-Chair.

This revised Circular supersedes Circular No. A-l6 dated October 19, 1990, and incorporates Executive Order 12906. It will remain in effect until replaced pursuant to section 8.e.(j) of this Circular. A basic list of authorities is included in Appendix A.

2. What is the National Spatial Data Infrastructure (NSDI)?

a. What is the vision for the NSDI?

The NSDI assures that spatial data from multiple sources (federal, state, local, and tribal governments, academia, and the private sector) are available and easily integrated to enhance the understanding of our physical and cultural world. The NSDI honors several key public values:

- Privacy and security of citizens' personal data and accuracy of statistical information on people, both in raw form and in derived information products.
- Access for all citizens to spatial data, information, and interpretive products, in accordance with OMB Circular A-130.
- Protection of proprietary interests related to licensed information and data.
- Interoperability of federal information systems to enable the drawing of resources from multiple federal agencies and their partners.

The NSDI supports and advances the building of a Global Spatial Data Infrastructure, consistent with national security, national defense, national intelligence, and international trade requirements. International compatibility is an important aspect of the NSDI. Federal agencies will develop their international spatial data in

compliance with international voluntary consensus standards, as defined by Circular A-119.

b. What are the components of the NSDI?

The components of the NSDI are data themes, metadata, the National Spatial Data Clearinghouse, standards, and partnerships.

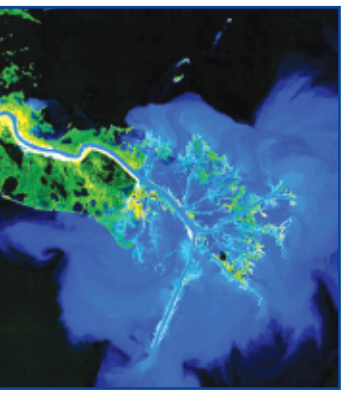
(1) What are data themes?

Data themes are electronic records and coordinates for a topic or subject, such as elevation or vegetation. This Circular requires the development, maintenance, and dissemination of a standard core set of digital spatial information for the Nation that will serve as a foundation for users of geographic information. This set of data consists of themes of national significance (see Appendix E). Themes providing the core, most commonly used set of base data are known as framework data, specifically geodetic control, orthoimagery, elevation and bathymetry, transportation, hydrography, cadastral, and governmental units. Other themes of national significance are also an important part of the NSDI, and must be available to share with others. Additional data themes may be added with the approval of the FGDC.

NSDI data themes developed with appropriate metadata, using FGDC standards and served through the Clearinghouse, facilitate interoperability and information exchange across administrative boundaries.

(2) What are metadata?

Metadata are information about data and/or geospatial services, such as content, source, vintage, spatial scale, accuracy, projection, responsible party, contact phone number, method of collection, and other descriptions. Metadata are critical to document, preserve and protect agencies' spatial data assets. Reliable metadata, structured in a standardized manner, are essential to ensuring that geospatial data are used appropriately, and that any resulting analysis is credible. Metadata also can be used to facilitate the search and access of data sets or geospatial services within a Clearinghouse or data library. All spatial data collected or derived directly or indirectly using federal funds will have FGDC metadata.



(3) What is the National Spatial Data Clearinghouse?

The National Spatial Data Clearinghouse is an electronic service providing access to documented spatial data and metadata from distributed data sources. These sources include a network of data producers, managers, and users, linked through the Internet and other communications means, and accessible through a common interface. All spatial data collected by federal agencies or their

agents, as described in section 5, will be made available through the Clearinghouse. Spatial data users will have access to the NSDI through the National Spatial Data Clearinghouse.

(4) What are standards?

Standards are common and repeated rules, conditions, guidelines or characteristics for data, and related processes, technology and organization. To broaden the global use of federal data and services, international standards and protocols must be used. NSDI is made possible by the universal use of standards and protocols for data development, documentation, exchange, and geospatial services.

(5) How are NSDI standards developed?

NSDI standards are developed and promulgated by the FGDC in accordance with OMB Circular A-119 using an established process determined by the FGDC with input from a broad range of data users and providers. Specifically, the FGDC adopts national and international standards in lieu of federal standards whenever possible and will restrict its standards development activities to areas of spatial data standardization not covered by other voluntary standards consensus bodies, as defined by OMB Circular A-119. Through active participation in voluntary consensus standards bodies, the FGDC works to link its standardization activities to the work of those standards bodies and thereby create an integrated suite of standards for the NSDI. No federal funds will be used directly or indirectly for the development of spatial data not complying with NSDI standards, as specified by FGDC.

(6) What is the importance of collaborative partnerships?

Building an effective NSDI will require a well-coordinated effort among federal, tribal, state, local government, and academic institutions, as well as a broad array of private sector geographic, statistical, demographic, and other business information providers and users. Involving these stakeholders in the development of the NSDI will aid in meeting the needs of end-users.

Federal agencies will promote and fully utilize partnerships that promote cost-effective data collection, documentation, maintenance, distribution, and preservation strategies, and that leverage federal and other resources. New collaborative efforts and partnerships are encouraged.

(7) What are the federal activities and technology that support the NSDI?

Federal agencies and the FGDC carry out the activities required to implement their responsibilities as described in section 8 of this Circular. Agencies will provide or develop the required technology and services required to enable and provide access to NSDI data and information. The OMB will work with affected budget offices to provide appropriate resources in support of these activities.

3. What are the benefits of the NSDI?

Spatial data is a national capital asset. The NSDI facilitates efficient collection, sharing, and dissemination of spatial data among all levels of government institutions, as well as the public and private sectors, to address issues affecting the Nation's physical, economic, and social well-being. A coordinated approach for developing spatial data standards that apply to collecting, maintaining, distributing, using, and preservation of data will improve the quality of federal spatial data and reduce the cost of derivative products created by federal and non-federal users. Applications using spatial data that adhere to FGDC standards enable cost effective public and private policy development, management, and operations.

Implementation of this Circular is essential to help federal agencies eliminate duplication, avoid redundant expenditures, reduce resources spent on unfunded mandates, accelerate the development of electronic government to meet the needs and expectations of citizens and agency programmatic mandates, and improve the efficiency and effectiveness of public management.

Many applications are dependent upon accurate spatial data. The benefits of the NSDI for these applications include creating a more secure Nation. Some examples include the analysis and management of utility infrastructures, transportation, energy, emergency management and response, natural resource management, weather and climate analysis, disaster recovery, homeland defense, law enforcement, protection planning, public health and other civilian or military strategic issues. The seamless spatial information needed for these applications can range from highly detailed local data, such as the nature of specific hazardous material stored in a particular room of a single building, to the various data needed for real-time projection of the probable effects of natural disasters.

4. What is the Federal Geographic Data Committee (FGDC)?

The FGDC is an interagency committee responsible for facilitating Circular A-l6 related activities and implementation of the NSDI.

a. What is the FGDC structure and membership?

The FGDC is chaired by the Secretary of the Department of the Interior, with the Deputy Director for Management, OMB, serving as Vice-Chair. Chair and Vice-Chair may designate an individual to act in their stead. All agencies responsible for spatial data themes are required to be members of the FGDC. Departments or agencies that are members of the FGDC as of the date of this revision will continue as members and are listed in Appendix B. Departments or agencies that are not members of the FGDC and that have activities in geographic information or spatial data collection or use will become members by requesting membership in writing to the Chair of the FGDC.

b. What are the FGDC procedures?

The FGDC will establish procedures and committee structures as are necessary and sufficient to carry out interagency coordination and the implementation of the NSDI, in accordance with existing law, statute, and policy. Departments may elect or be assigned the lead responsibility for certain subcommittees, working groups or other committees, consistent with each Department's or agency's existing authority as described in its mission (e.g., statutory authority or Public Law), or implied as part of its program responsibilities. The current FGDC governing structure and bylaws are carried forward and remain in force under this Circular, and may be modified according to existing procedures. The Department of the Interior will provide administrative support to the FGDC.

POLICY

5. Does this Circular apply to my agency?

This Circular applies to your agency if it collects, produces, acquires, maintains, distributes, uses, or preserves analog (e.g., paper maps) or digital spatial data to fulfill your mission, either directly or through a relationship with other organizations. Such organizations include, but are not limited to, State and local governments, tribes, academia, federal government business partners and contractors, and citizens.

6. What types of data activities does the Circular apply to?

a. All spatial data and geographic information systems activities — financed directly or indirectly, in whole or in part, by federal funds.

b. As examples, this Circular applies to, but is not limited to: The National Mapping Program, the National Spatial Reference System, the National Geologic Mapping Program, the National Wetlands Inventory, the National Cooperative Soil Survey Program, the National Public Land Survey System, Geographic Coordinate Database, the National Oceanic and Atmospheric Administration (NOAA) nautical charting and nautical data collection and information programs, the U.S. Army Corps of Engineers (USACE) inland waterway charting program, the Offshore Minerals Program, the NASA's Earth Science Enterprise, FEMA's Flood Plain Mapping program and other federal activities that involve national surveying, mapping, remote sensing, spatially referenced statistical data, and Global Positioning System (GPS). Additional spatial data programs may be added to this list at any time.

c. Any activities that result in the geospatial representation of international boundaries other than those of the United States

with Canada or Mexico, which are governed by international boundary commissions.

d. Any future federal spatial data programs or activities that may be established, except as noted in section 7 below.

7. What types of data activities are exempt from this Circular?

The following spatial data activities may be exempt from provisions within this Circular, as determined by the appropriate official(s) noted below:

(1) Spatial data activities of tribal governments not paid for by federal funds, as specifically determined by the tribal governments.

(2) Classified national security-related spatial data activities of the Department of Defense, unless declassified by Executive Order 12951, as specifically determined by the Secretary of Defense; also those activities of the Department of Energy, as specifically determined by the Secretary of Energy.

(3) Intelligence spatial data activities, as specifically determined by the Director of the Central Intelligence Agency.

AGENCY RESPONSIBILITIES AND REPORTING REQUIREMENTS

8. What are the federal responsibilities?

a. What are the general federal agency responsibilities?

In order to use federal resources wisely, and to build the NSDI, all agencies that collect, use, or disseminate geographic information and/or carry out related spatial data activities will, both internally and through their activities involving partners, grants, and contracts:

(1) Prepare, maintain, publish, and implement a strategy for advancing geographic information and related spatial data activities appropriate to their mission, in support of the NSDI Strategy. Annually report to OMB on your achievements relative to your strategies, and include spatial data assets within Exhibit 300 submissions (see OMB Circular A-11, sec. 300).

(2) Collect, maintain, disseminate, and preserve spatial information such that the resulting data, information, or products can be readily shared with other federal agencies and non-federal users, and promote data integration between all sources. Ensure that data information products and other records created in spatial data activities are included on agency record schedules that have been approved by the National Archives and Records Administration. These activities will adhere to appropriate standards and be conducted in accordance with existing regulations.

(3) Allocate agency resources to fulfill the responsibilities of effective spatial data collection, production, and stewardship.

(4) Use FGDC data standards, FGDC Content Standards for Digital Geospatial Metadata, and other appropriate standards, documenting spatial data with the relevant metadata, and making metadata available online through a registered NSDI-compatible Clearinghouse node.

(5) Coordinate and work in partnership with federal, state, tribal and local government agencies, academia and the private sector to efficiently and cost-effectively collect, integrate, maintain, disseminate, and preserve spatial data, building upon local data wherever possible.

(6) Use spatial information to enhance electronic government initiatives, to make federal spatial information and services more useful to citizens, to enhance operations, to support decisionmaking, and to enhance reporting to the public and to the Congress.

(7) Protect personal privacy and maintain confidentiality fully consistent with federal policy and law.

(8) Support emergency response activities requiring spatial data in accordance with provisions of the Stafford Act and other governing legislation.

(9) Participate in determining, when applicable, whether data declassified pursuant to Executive Order 12951 can contribute to and become a part of the NSDI.

(10) Search all sources, including the National Spatial Data Clearinghouse, to determine if existing federal, state, local or private data meets agency needs before expending funds for data collection.

(11) Appoint a contact to coordinate with lead agencies for collection, acquisition, maintenance, or dissemination of the spatial data themes used by their organization.

b. How does my agency report spatial data assets within the budget and performance review process?

Before the obligation of funds, ensure that all expenditures for spatial data and related systems activities financed directly or indirectly, in whole or in part, by federal funds are compliant with the standards and provisions of the FGDC. All Information Technology systems which process spatial data should identify planned investments for spatial data and compliance with FGDC standards within the Exhibit 300 capital asset and business plan submission (see OMB Circular A-11, sec. 300).

c. What are the lead federal agencies for the NSDI data themes?

Certain federal agencies have lead responsibilities for coordinating the national coverage and stewardship of specific spatial data themes. The data themes in the NSDI, their description, and the responsible lead for each theme are listed in Appendix E. Lead agency responsibilities and new data themes may be added or altered by recommendation of the FGDC and concurrence by the OMB.

d. What are the responsibilities of lead federal agencies for the NSDI data themes?

(1) Provide leadership and facilitate the development and implementation of needed FGDC standards, especially a data content standard for each data theme. Agencies will assess existing standards, identify anticipated or needed data standards, and develop a plan to originate and implement needed standards with relevant community and international practices in accordance with OMB Circular A-119, consistent with or included in the plan described in section 8.d.(2) below.

(2) Provide leadership and facilitate the development and implementation of a plan for nationwide population of each data theme. Plans will include the development of partnership programs with States, Tribes, academia, the private sector, other federal agencies, and localities that meet the needs of users, address human and financial resource needs, identify needs for standards, metadata, and the Clearinghouse, and advance a timetable for the development of NSDI data themes.

(3) Under section 8.a of this Circular, will prepare goals that support the NSDI strategy and, as needed, collect and analyze information from users about their needs for spatial data, including these in strategies related to their theme responsibilities.

(4) Administratively:

(a) Designate a point of contact within the lead agency who will be responsible for development, maintenance, coordination, and dissemination of data using the National Spatial Data Clearinghouse;

(b) Provide a performance report, at least annually, that documents data theme activities and implementation status, including progress toward goals identified in 8.d.(1), 8.d.(2) and 8.d.(3) above.

(c) Publish maps or comparable graphics online showing the current extent and status of the spatial data themes for which they have the lead, and encourage all other sources of data for those same themes to provide access to their data through the Clearinghouse. Leads will coordinate with those in charge of the Clearinghouse and always use FGDC specified Web mapping conventions; and

(d) Identify and publish proven practices for the use and application of agency data sets.

e. What are the FGDC responsibilities and reporting requirements?

The FGDC leads and supports the NSDI strategy, spatial data policy development, management, and operational decision making. The FGDC also aids geographic information system use, directs and facilitates national implementation of the system of Framework Data and other themes in the NSDI, implements the NSDI Clearinghouse, and advises federal and other spatial data users on their NSDI implementation responsibilities.

The FGDC will:

(a) Prepare and maintain a strategic plan for the development and implementation of the NSDI.

(b) Serve as the lead federal executive body charged with the leadership, development, implementation, and review of spatial data standards, the NSDI Clearinghouse network, and a plan for federal agencies responsible for the NSDI Framework and other data themes to collect and provide broad access to spatial data assets.

(c) Communicate with and foster communication among federal agencies and others concerning spatial data technology development, transfer, and exchange.

(d) Promote and guide cooperation and coordination among federal, state, tribal and local government agencies, academia and the private sector in the collection, production, sharing and use of spatial information, the implementation of the NSDI, and the identification of proven practices.

(e) Coordinate with international organizations having an interest in the National or Global Spatial Data Infrastructures.

(f) Provide and update at least annually:

(i) An online status summary for each data theme authored by the lead agencies, the FGDC, or other subcommittees, working groups, and advisory committees.

(ii) An online collection of periodic technical publications, management articles and reports related to the NSDI.

(iii) An online FGDC membership directory, including current subcommittee and working group memberships.

(g) Ensure consistency of the NSDI with national security, national defense, and emergency preparedness program policies regarding data accessibility.

(h) Support the development of electronic government with spatial data.

(i) Support and promote the infrastructure of networks, systems, services, and standards that provide a digital representation of the Earth to users for many applications.

(j) Through the Chair and Vice Chair, take actions where required to recommend appropriate additions, revisions, or deletions to this Circular.

9. How are differences settled among agencies?

Any major differences among agencies with respect to coordination or conduct of activities covered by this Circular that cannot be resolved by the FGDC leadership will be referred in writing by the head of any agency concerned to the Director of the OMB. Copies of such referrals will be provided to the Chair and Vice Chair of the FGDC and to the heads of those agencies directly involved or affected by the outcome of the decision.

10. How can I check that my agency is compliant with the latest NSDI requirements and standards?

The FGDC website (www.fgdc.gov) will serve as an up-to-date resource for reviewing the latest data standards, the source for spatial data that is already collected, boilerplate procurement language, laws and regulations regarding spatial data and information on the latest geospatial technologies.

Mitchell E. Daniels, Jr.
Director

Appendix A: Authorities

This Circular provides requirements and guidance for the management of data and federal information assets that relate to geographic locations. The revised OMB Circular A-16 incorporates Executive Order 12906. A basic list of authorities is listed below:

- The Paperwork Reduction Act
- The Government Paperwork Elimination Act of 1999
- The Government Performance and Results Act of 1993
- The Federal Records Act
- OMB Circular A-130 (on Management of Federal Information Resources)
- OMB Circular A-119 (Federal Participation in the Development and Use of Voluntary Consensus Standards and In Conformity Assessment Activities)
- The Freedom of Information Act and the Electronic Freedom of Information Act Amendments of 1996
- The Privacy Act
- The Clinger-Cohen Act of 1996
- The Stafford Act
- Federal Acquisition Regulations
- The National Technology Transfer and Advancement Act of 1995
- Executive Order 12906 (Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure)
- Executive Order 12951 (Release of Imagery Acquired by Space-Based National Intelligence Reconnaissance Systems)
- Rehabilitation Act, Sec. 508, Electronic and Information Technology, and other relevant statutes

The OMB may amend this list as new authorities are approved.

Appendix B: FGDC Member Agencies

FGDC Members (July 2004*)

Department of Agriculture
Department of Commerce
Department of Defense
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
Department of Justice
Department of State
Department of Transportation
Environmental Protection Agency
Department of Homeland Security
General Services Administration
Library of Congress
National Archives and Records Administration
National Aeronautics and Space Administration
National Science Foundation
Tennessee Valley Authority

Appendix C: History and Background of Circular A-16

This Circular was originally issued in 1953, revised in 1967, and revised again in 1990. The Bureau of the Budget (now the OMB) issued Circular No. A-16 on January 16, 1953. Appended to this Circular were Exhibits, occasionally revised, that dealt with procedures for programming and coordinating of federal Topographic Mapping Activities, National Atlas, Geodetic Control Surveys and International Boundaries.

The purpose of the 1953 Circular was "to insure (sic) that surveying and mapping activities may be directed toward meeting the needs of federal and state agencies and the general public, and will be performed expeditiously, without duplication of effort." The original Circular references Executive Order No. 9094, dated March 10, 1942. This Executive Order directs the Director of the Bureau of the Budget to coordinate and promote the improvement of surveying and mapping activities of the Government. Furthermore, it passes on functions carried out by the Federal Board of Surveys and Maps, established by Executive Order No. 3206, dated December 30, 1919. Thus, the OMB is directed to make recommendations to agencies and to the President regarding the coordination of all governmental map making and surveying. Executive Order No. 3206 superseded an Executive Order, dated August 10, 1906, that granted advisory power to the United States Geographic Board to review mapping projects to avoid duplication and to facilitate standardized mapping.

*Updated by FGDC Secretariat

A revised Circular A-16 was issued on May 6, 1967. The most significant change in this revision is the addition of a new section on Responsibility for Coordination. This section outlines the responsibilities of three federal departments (Department of the Interior (DOI), Department of Commerce (DOC) and Department of State (DOS)). Both the original and the 1967 revision of the Circular focus on providing a guide for the development of annual programs of the individual agencies and, through the Exhibits, established extensive reporting requirements.

A second revised Circular A-16 was issued on October 19, 1990. This revision expanded the Circular to include not only surveying and mapping, but also the related spatial data activities. Specifically, it included geographically referenced computer-readable (digital) data. In addition, the Exhibits are no longer referenced and a short reporting requirements section is added.

The 2002 updated Circular calls for continued improvements in spatial data coordination and the use of geographical data. Objectives for this revision are to reflect the changes that have taken place in geographic information management and technology, and to clearly define agency and FGDC responsibilities. The proposed revision displays an integrated infrastructure system approach to support multiple government services and electronic government.

Appendix D: Informative Definitions

Analog: Of, relating to, or being a device in which data are represented by variable measurable physical quantities. In this Circular, refers to "paper" maps.

Preserve: The process of saving and storing data or records. May also refer to the place where data or information is kept.

Clearinghouse: A distributed network of data producers, managers, and users linked electronically, such as over the Internet. Through the Clearinghouse, users can use a single interface to search and access metadata and/or data for the themes they seek. The Clearinghouse includes the sites across the country where the metadata and data are stored, usually at the site of the producer or intermediary.

Data: Factual information, especially information organized for analysis or used to reason or make decisions. In Computer Science, numerical or other information represented in a form suitable for processing by computer.

Data Theme: Electronic records and coordinates for a topic or subject, such as elevation, vegetation, or hydrography. In this Circular, data theme refers to a Geographic Information System (GIS), or location-based data theme.

Framework Data: Seven themes of geospatial data that are used by most GIS applications (geodetic control, orthoimagery, elevation and bathymetry, transportation, hydrography, cadastral and governmental units).

These data include an encoding of the geographic extent of the features and a minimal number of attributes needed to identify and describe the features.

Framework: The NSDI framework is an initiative to develop a readily available set of basic geographic data. It includes the information, operational environment, and technology to provide access to these data, and the institutional setting to sustain its development.

Geographic Information: Coordinate and attribute data for location-based features, usually in the categories of point (e.g., a well), line (e.g., a road), polygon (e.g., a forest), cell (e.g., a raster-based "rectangle"), or coordinates (e.g., the latitude-longitude of a point on the ground).

Geographic Information System: A computer system for the input, editing, storage, retrieval, analysis, synthesis, and output of location-based information. GIS may refer to hardware and software, or include data.

Georeference: A set of datums by which the location of each point can be uniquely identified.

Geospatial Data: Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. Statistical data may be included in this definition at the discretion of the collecting agency.

Geospatial Services: A collection of operations, accessible through an interface that allows a user to evoke a behavior of value to the user.

Global Positioning System: A satellite-based system deployed to determine locations on the Earth's surface. It is commonly used for surveying, mapping, and navigation on land and water.

Metadata: Information about data, such as content, source, vintage, accuracy, condition, projection, responsible party, contact phone number, method of collection, and other characteristics or descriptions.

National Spatial Data Infrastructure: The technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data (e.g., information and process discovery, publishing data, publishing symbol libraries, query filtering, data fusing, Earth imaging, photogrammetry, location processing, and spatial analysis).

Proven Practices: Methods and activities that are "tried and true" including, but not limited to "best practice."

Spatial Data: Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. This information may be derived

from remote sensing, mapping, charting, surveying technologies, GPS, or statistical data, among other sources.

Spatial Data Standards: Descriptions of objects, features, or other geographically located items that are collected, automated, or affected by activities or functions of agencies, and may be structured in a model.

Standards: Documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes, or services are fit for their purposes.

Technology: The scientific method and material used to achieve a commercial or industrial objective. Jargon for "software," "hardware," "protocol," or something technical in nature.

Appendix E: NSDI Data Themes, Definitions, and Lead Agencies

The lead federal agencies with responsibilities for NSDI spatial data themes are as follows:

Baseline (Maritime): Co-leaders: DOC, NOAA and DOI, Minerals Management Service (MMS)

Baseline represents the line from which maritime zones and limits are measured. Examples of these limits include the territorial sea, contiguous zone, and exclusive economic zone. The spatial extent of the baseline is defined as "ordinary low water," interpreted as mean lower low water, as depicted on National Ocean Service nautical charts and/or appropriate supplemental information.

Biological Resources: DOI, U.S. Geological Survey (USGS)

This dataset includes data pertaining to or descriptive of (nonhuman) biological resources and their distributions and habitats, including data at the suborganismal (genetics, physiology, anatomy, etc.), organismal (subspecies, species, systematics), and ecological (populations, communities, ecosystems, biomes, etc.) levels.

**Cadastral: DOI, Bureau of Land Management (BLM)*

Cadastral data describe the geographic extent of past, current, and future right, title, and interest in real property, and the framework to support the description of that geographic extent. The geographic extent includes survey and description frameworks such as the Public Land Survey System, as well as parcel-by-parcel surveys and descriptions.

**Cadastral (Offshore): DOI, MMS*

Offshore Cadastre is the land management system used on the Outer Continental Shelf. It extends from the baseline to the extent of United States jurisdiction. Existing coverage is currently limited to the contermi-

*Indicates framework theme

nous United States and portions of Alaska. Maximum extent of United States jurisdiction is not yet mathematically calculated.

Climate: Co-leaders, Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) and DOC, NOAA

Climate data describe the spatial and temporal characteristics of the Earth's atmosphere/hydrosphere/land surface system. These data represent both model-generated and observed (either in situ or remotely sensed) environmental information, which can be summarized to describe surface, near surface and atmospheric conditions over a range of scales.

Cultural and Demographic Statistics: DOC, U.S. Census Bureau (USCB)

These geospatially referenced data describe the characteristics of people, the nature of the structures in which they live and work, the economic and other activities they pursue, the facilities they use to support their health, recreational and other needs, the environmental consequences of their presence, and the boundaries, names and numeric codes of geographic entities used to report the information collected.

Cultural Resources: DOI, National Park Service

The cultural resources theme includes historic places such as districts, sites, buildings, and structures of significance in history, architecture, engineering, or culture. Cultural resources also encompass prehistoric features as well as historic landscapes.

**Digital Ortho Imagery: DOI, USGS*

This dataset contains georeferenced images of the Earth's surface, collected by a sensor in which image object displacement has been removed for sensor distortions and orientation, and terrain relief. For very large surface areas, an Earth curvature correction may be applied. Digital orthoimages encode the optical electromagnetic spectrum as discrete values modeled in an array of georeferenced pixels. Digital orthoimages have the geometric characteristics of a map, and image qualities of a photograph.

Earth Cover: DOI, USGS

The Earth Cover theme uses a hierarchical classification system based on observable form and structure, as opposed to function or use. This system transitions from generalized to more specific and detailed class divisions, and provides a framework within which multiple land cover and land use classification systems can be cross-referenced. This system is applicable everywhere on the surface of the Earth. This theme differs from the Vegetation and Wetlands themes, which provide additional detail.

*Indicates framework theme

**Elevation Bathymetric: Co-leaders: DOC, NOAA (U.S. waters outside channels) and US Army Corps of Engineers (USACE) (inland waterways)*

The bathymetric data for Inland and Intercoastal waterways is highly accurate bathymetric sounding information collected to ensure that federal navigation channels are maintained to their authorized depths. Bathymetric survey activities support the Nation's critical nautical charting program. This data is also used to create Electronic Navigational Charts. The bathymetric sounding data supports the elevation layer of the geospatial data framework.

**Elevation Terrestrial: DOI, USGS*

This data contains georeferenced digital representations of terrestrial surfaces, natural or manmade, which describe vertical position above or below a datum surface. Data may be encapsulated in an evenly spaced grid (raster form) or randomly spaced (triangular irregular network, hypsography, single points). The elevation points can have varying horizontal and vertical resolution and accuracy.

Buildings and Facilities: General Services Administration

The facility theme includes federal sites or entities with a geospatial location deliberately established for designated activities; a facility database might describe a factory, military base, college, hospital, power plant, fishery, national park, office building, space command center, or prison. Facility data is submitted from several agencies, since there is no one party responsible for all the facilities in the Nation, and facilities encompass a broad spectrum of activities. The FGDC promotes standardizing on database structures and schemas to the extent practical.

Federal Land Ownership Status: DOI, BLM

Federal land ownership status includes the establishment and maintenance of a system for the storage and dissemination of information describing all title, estate or interest of the federal government in a parcel of real and mineral property. The ownership status system is the portrayal of title for all such federal estates or interests in land.

Flood Hazards: Federal Emergency Management Agency

National Flood Insurance Program has prepared flood hazard data for approximately 18,000 communities. The primary information prepared for these communities is for the 1 percent annual chance (100-year) flood, and includes documentation of the boundaries and elevations of that flood.

*Indicates framework theme

**Geodetic Control: DOC, NOAA*

Geodetic control provides a common reference system for establishing coordinates for all geographic data. All NSDI framework data and users' applications data require geodetic control to accurately register spatial data. The National Spatial Reference System is the fundamental geodetic control for the United States.

Geographic Names: DOI, USGS

This dataset contains data or information on geographic place names deemed official for federal use by the U.S. Board on Geographic Names as pursuant to Public Law 80-242. Geographic Names information includes both the official place name (current, historical, and aliases) and locative direct (i.e., geographic coordinates) and indirect (i.e., State and County where place is located) geospatial identifiers and categorized as populated places, schools, reservoirs, parks, streams, valleys, and ridges.

Geologic: DOI, USGS

The geologic spatial data theme includes all geologic mapping information and related geoscience spatial data (including associated geophysical, geochemical, geochronologic, and paleontologic data) that can contribute to the National Geologic Map Database as pursuant to Public Law 106-148.

**Governmental Units: DOC, USCB*

These data describe, by a consistent set of rules and semantic definitions, the official boundary of federal, state, local, and tribal governments as reported/certified to the U.S. Census Bureau by responsible officials of each government for purposes of reporting the Nation's official statistics.

Housing: Department of Housing and Urban Development (HUD)

HUD's database maintains geographic data on homeownership rates, including many attributes such as HUD revitalization zones, location of various forms of housing assistance, first-time homebuyers, underserved areas, and race. Data standards have not yet been formalized.

**Hydrography: DOI, USGS*

This data theme includes surface water features such as lakes, ponds, streams and rivers, canals, oceans, and coastlines. Each hydrography feature is assigned a permanent feature identification code (Environmental Protection Agency Reach Code) and may also be identified by a feature name. Spatial positions of features are encoded as centerlines and polygons. Also encoded is network connectivity and direction of flow.

*Indicates framework theme

International Boundaries: Department of State

International boundary data include both textual information to describe, and GIS digital cartographic data to depict, both land and maritime international boundaries, other lines of separation, limits, zones, enclaves/exclaves and special areas between States and dependencies.

Law Enforcement Statistics: Department of Justice

Law enforcement statistics describe the occurrence of events (including incidences, offenses and arrests) geospatially located, related to ordinance and statutory violations and the individuals involved in those occurrences. Also included are data related to deployment of law enforcement resources and performance measures.

Marine Boundaries: Co-leaders: DOC, NOAA and DOI, MMS

Marine boundaries depict offshore waters and seabeds over which the United States has sovereignty and jurisdiction.

Offshore Minerals: DOI, MMS

Offshore minerals include minerals occurring in submerged lands. Examples of marine minerals include oil, gas, sulfur, gold, sand and gravel, and manganese.

Outer Continental Shelf Submerged Lands: DOI, MMS

This data includes lands covered by water at any stage of the tide, as distinguished from tidelands, which are attached to the mainland or an island and cover and uncover with the tide. Tidelands presuppose a high-water line as the upper boundary; whereas submerged lands do not.

Public Health: Department of Health and Human Services

Public health themes relate to the protection, improvement and promotion of the health and safety of all people. For example, public health databases include spatial data on mortality and natality events, infectious and notifiable diseases, incident cancer cases, behavioral risk factor and tuberculosis surveillance, hazardous substance releases and health effects, hospital statistics and other similar data.

Public Land Conveyance (patent) Records: DOI, BLM

Public land conveyance data are the records that describe all past, current, and future, right, title, and interest in real property. This is a system of storage, retrieval and dissemination of documents describing the right, title, and interest of a parcel.

Shoreline: DOC, NOAA

Shorelines represent the intersection of the land with the water surface. The shoreline shown on NOAA Charts represents the line of contact between the land and a selected water elevation. In areas affected by tidal fluctuations, this line of contact is the mean high water line.

Soils: USDA, NRCS

Soil data consist of georeferenced digital map data and associated tabular attribute data. The map data describe the spatial distribution of the various soils that cover the Earth's surface. The attribute data describe the proportionate extent of the various soils as well as the physical and chemical characteristics of those soils. The physical and chemical properties are based on observed and measured values, as well as model-generated values. Also included are model-generated assessments of the suitability or limitations of the soils to various land uses.

**Transportation: Department of Transportation, Bureau of Transportation Statistics*

Transportation data are used to model the geographic locations, interconnectedness, and characteristics of the transportation system within the United States. The transportation system includes both physical and non-physical components representing all modes of travel that allow the movement of goods and people between locations.

Transportation (Marine): USACE

The Navigation Channel Framework consists of highly accurate dimensions (geographic coordinates for channel sides, centerlines, wideners, turning basins, and River Mile Markers) for every federal navigation channel maintained by USACE. The Navigation Framework will provide the basis for the marine transportation theme of the geospatial data framework.

Vegetation: USDA, U.S. Forest Service

Vegetation data describe a collection of plants or plant communities with distinguishable characteristics that occupy an area of interest. Existing vegetation covers or is visible at or above the land or water surface and does not include abiotic factors that tend to describe potential vegetation.

Watershed Boundaries: Co-leaders: DOI, USGS and USDA, NRCS

This data theme encodes hydrologic, watershed boundaries into topographically defined sets of drainage areas, organized in a nested hierarchy by size, and based on a standard hydrologic unit coding system.

Wetlands: DOI, Fish and Wildlife Service

The wetlands data layer provides the classification, location, and extent of wetlands and deepwater habitats. There is no attempt to define the proprietary limits or jurisdictional wetland boundaries of any federal, state, or local agencies.

Lead Agency responsibilities and new data themes may be added or altered by recommendation of the FGDC and concurrence by the OMB.

*Indicates framework theme

For more information on the National Spatial Data Infrastructure and the work of the Federal Geographic Data Committee, visit the FGDC Web site at **www.fgdc.gov** .

Federal Geographic Data Committee