GEOSPATIAL LINE OF BUSINESS

OMB CIRCULAR A–16 SUPPLEMENTAL GUIDANCE

ENDORSEMENT FINAL

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Contents

1. Introduction

This OMB Circular A–16 supplemental guidance provides the foundation for a portfolio management approach to nationally significant[1] geospatial data themes and associated datasets under the auspices of Office of Management and Budget (OMB) Circular A–16. This guidance is directed to Federal agencies designated by OMB as theme leads who work with their partners to develop, maintain, and manage these nationally significant geospatial data themes and associated datasets. This guidance clarifies roles, responsibilities, and management processes to help lead agencies more systematically and effectively implement their responsibilities as set out in OMB Circular A–16. It sets the framework for a lifecycle-based portfolio management and reporting process intended to increase the transparency of the development and maintenance of nationally significant datasets. It provides a standard lexicon for use in this process. It offers a decision process for adding, modifying, or deleting specific themes or datasets from appendix E of OMB Circular A–16 based on alignment with long-term national strategies or goals, specific business requirements, benefits, and costs.

For the purposes of this guidance, the portfolio consists of the available geospatial assets that can be brought to bear to address a business need. These assets include data, funding, infrastructure, hardware and software applications, personnel, services, and products. Geospatial portfolio management is the process of tracking, maintaining, expanding, and aligning or realigning these assets to address the business needs of an enterprise. To understand what assets exist, and to ensure their quality and usability, geospatial data must be—

- Reliable – coordinated by a recognized national steward
- Consistent – supported by defined and understood content definitions to ensure their integrity
- Current and applicable – maintained regularly and adaptable to current needs
- Resourced – established and recognized as an enterprise investment

[1] "Nationally significant" definition is found in Appendix B: Lexicon of Geospatial Terminology (ID NDT-1)

While geospatial portfolio management is broader and more detailed than just these four data conditions, they comprise the foundation upon which geospatial portfolio management is based. This supplemental guidance focuses on the geospatial data aspects of geospatial portfolio management, and specifically applies to the geospatial data themes that fall under OMB Circular A–16.

Sections 2 through 5 of this supplemental guidance describe the basic framework needed for OMB Circular A–16 geospatial portfolio management—a framework that will also serve as the basis for separate guidance on reporting to the OMB. The information covered in these sections includes the following:

- **Roles and responsibilities** related to OMB Circular A–16 are defined for Federal agencies involved in geospatial activities (section 2). This section clarifies leadership and stewardship roles to minimize or eliminate confusion, facilitate communications and partnering between Federal agencies and other stakeholders, and enhance portfolio management accountability and transparency. Appendix A - Geospatial Roles and Responsibilities provides a high-level matrix that identifies the Federal agencies and bureaus that participate in geospatial data management and the entities with which each is associated.
- **A lexicon of geospatial terminology**, which is included in full in appendix B, promotes consistent use of a standard geospatial nomenclature across the Federal Government to facilitate communication and increase operational consistency (section 3). The Lexicon of Geospatial Terminology is a living document intended for widespread use; it will be posted on the Federal Geographic Data Committee (FGDC) Web site (www.fgdc.gov) and will evolve over time. A separate glossary containing the acronyms used in this supplemental guidance is included as appendix D.
- **Geospatial data lifecycle stages** are described consistent with the approach for Federal agency information asset management improvement incorporated in OMB Circular A–130 (section 4). The approach lays the groundwork for what will evolve into lifecycle-based guidance for interagency geospatial portfolio management of nationally significant datasets. Key stages of the data lifecycle are defined, and decision points and processes that occur within each data lifecycle stage are identified and described.
- **National Spatial Data Infrastructure (NSDI) geospatial data theme principles** define the characteristics of geospatial data themes and serve as guidelines for their inclusion as a theme in OMB Circular A–16, appendix E (section 5). These principles are a precursor to establishing a predictable and repeatable process for designation and management of geospatial themes under the

auspices of OMB Circular A–16 and listed in Circular A–16 appendix E. Appendix C of this supplemental guidance provides additional background information.

This supplemental guidance does not alter OMB Circular A–16. It was developed as a supporting document by the FGDC Steering Committee under authority granted to the committee by Executive Order 12906 and OMB Circular A–16. The document has received broad Federal, stakeholder, and OMB review. All members of the FGDC are expected to comply with this supplemental guidance.

Relationship of This Supplemental Guidance to OMB Circular A–16

This document expands upon and seeks to clarify some of the language contained in OMB Circular A–16. Section 8 of OMB Circular A–16 establishes roles and responsibilities that promote coordinated geospatial theme portfolio management. The supplemental guidance complements section 8 and provides further clarification by providing high-level matrices relating to roles and responsibilities. Appendix D of OMB Circular A–16 defines terms used elsewhere in the document. The Lexicon of Geospatial Terminology contained in appendix B of this supplemental guidance increases the number of terms defined to provide a more expansive geospatial vocabulary. The lexicon is not exhaustive and will continue to evolve and expand as more terminology is added to common usage in this field. Consistent with the approach of OMB Circular A–16 to improve the management of Federal agency information assets, the stages of the geospatial data lifecycle are clearly described in the supplemental guidance. These stages are intended to be the underlying set of assumptions by which datasets associated with themes under the purview of OMB Circular A–16 will be developed and managed. Appendix E of OMB Circular A–16 details the lead Federal agencies with responsibilities for NSDI spatial data themes. This supplemental guidance details a process for adjusting, adding or removing geospatial themes under OMB Circular A–16 and provides the overarching goals for each theme.

In addition, appendix A of OMB Circular A–16 includes a list of other authorities that "provide requirements or guidance pertaining to management of data and Federal information assets related to geographic locations."[2]

[2] Language taken directly from OMB Circular A–16 Appendix A (Revised 2002)

2. Roles and Responsibilities Pursuant to OMB Circular A–16, Section 8

2.1 Purpose of Roles and Responsibilities Framework

This section of the guidance defines the roles and responsibilities of Federal agencies and organizations and defines their relationships with the stakeholder community[3] as they implement OMB Circular A–16. Consistent implementation of OMB Circular A-16 will help ensure that the Nation has a rich collection of themes and associated datasets in place and that this information is accessible to Federal agencies and their stakeholders to support business needs and business requirements.

The successful management of the Federal portfolio of OMB Circular A–16 data themes as listed in Circular A-16 Appendix E and associated datasets and requires the coordination of a wide variety of organizations, each of which has specific roles to fulfill. All the entities and individuals both lead and support responsibilities to ensure the successful maintenance and improvement of each theme and associated datasets. Some of these roles and responsibilities involve management across themes that allows for maximizing potential return on investment as well as identifying and reducing any overlap that currently exists. The OMB and OMB Circular A–16 promote geospatial data portfolio management to Federal Enterprise Architecture (FEA) efforts through the Geospatial Line of Business (Geospatial LoB), the Chief Information Officers Council (CIOC), the Architecture Information Committee (AIC) of the CIOC, and agency-specific data architectures. Additionally, OMB and OMB Circular A–16 help measure performance and inform budget dialogues related to NSDI activities.

Implementing this framework will help—

- Facilitate proactive execution of business and implementation strategies for each OMB Circular A–16 theme and associated datasets

[3] The definition for this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-17)

- Help each lead agency for themes identify, develop, quantify, allocate, and sustain the resources necessary to develop its respective themes and datasets

- Enable a range of key people to be involved in every part of the portfolio management process

- Ensure that the people involved in making management decisions about OMB Circular A–16 themes and associated datasets meet OMB Circular A–16 goals, FGDC goals, and user requirements

2.2 Implementation of the Roles and Responsibilities Framework

Detailed descriptions and typical tasks for each organization involved in OMB Circular A–16 portfolio management are listed in Table 2: Key Stakeholder Roles and Responsibilities. These roles are intended to reflect the types of activities needed for geospatial portfolio management; the role descriptions are not meant to suggest that organizations cannot perform multiple functions in the management process. It is important to note that these roles are generic, particularly in the cases of the lead agency[4] and stakeholders. Agencies will customize geospatial data portfolio management approaches for specific themes and associated datasets within the prescribed framework to meet the needs of the specific theme community. To accommodate the planning needs and planning horizons of agencies, FGDC agency Theme Leads[5] or, by extension, National A–16 Dataset Managers[6] shall submit an implementation plan for roles and responsibilities to the chair of the FGDC Coordination Group. The agency plan shall indicate which roles will be operational by what time period and will become a part of annual reporting as required under OMB Circular A–16. All agencies are encouraged to make these roles and responsibilities operational as soon as practical, especially for those agencies that have theme leadership responsibilities

Resources: Staffing and funding needed to accomplish a task, meet a business requirement, or meet a user need.

2.3 Graphic Depicting A–16 Data Production and Management Relationships

Fig. 1 shows the relationship among the major organizations that are A–16 theme stakeholders in both the Federal and non-Federal communities. It also depicts the relationship of these entities to the FGDC and the OMB. Appendix A of this document maps Federal agencies and bureaus to FGDC groups, subcommittees, and working groups and identifies the theme lead agencies and bureaus listed in OMB Circular A–16, appendix E.

[4] The definition for this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-8)
[5] The definition for this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-10)
[6] The definition for this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-11)

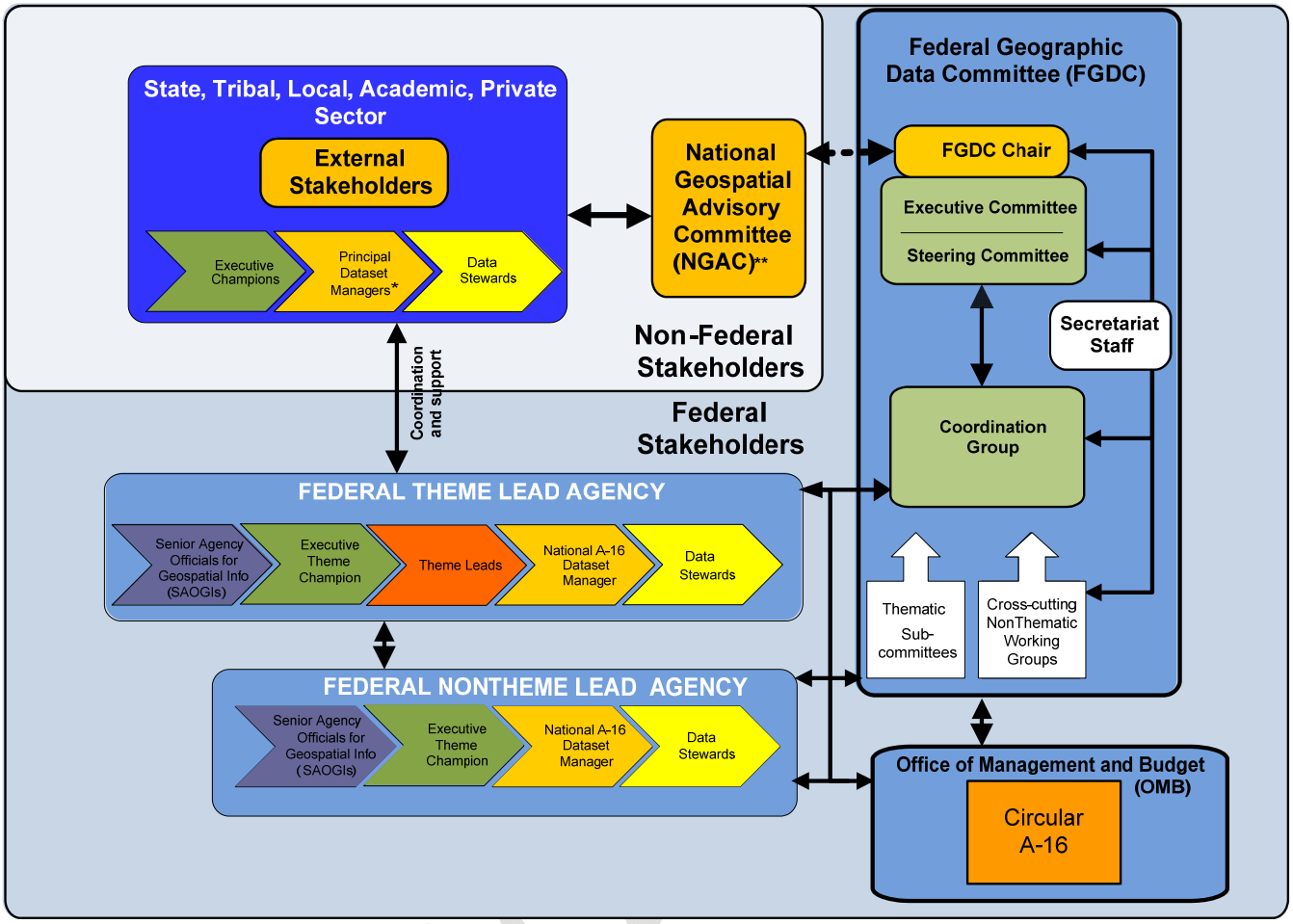


Figure 1. A–16 Production and management relationships.

2.4 Roles and Responsibilities

Table 1: Roles Summary[7]

Table 1 is a high-level overview of the roles of the key stakeholders in the geospatial community (Governmental and nongovernmental). Readers can use this summary table as a quick reference guide to direct them to the appropriate section of table 2, which explains the roles and responsibilities in greater detail.

Entity	Members	Role
1. Office of Management and Budget (OMB)	N/A	Maintain OMB Circular A–16
2. FGDC Executive Committee	Seven Members of the FGDC Steering Committee whose agencies most heavily produce or use geospatial data or technology	Advise the FGDC Steering Committee
3. FGDC Steering Committee	Senior Agency Officials for Geospatial Information (SAOGIs) as referenced in OMB Memorandum 06-07[8] or agency officials as specified in the FGDC Steering Committee Charter[9]	a. Provide A–16 community leadership b. Represent Federal agencies on the FGDC Steering Committee c. Oversee agency OMB Circular A–16 investments
4. FGDC Coordination Group	Representatives from Federal agencies as specified in the FGDC Coordination Group Charter[10]	a. Formulate recommendations by consensus on the strategic plans for OMB Circular A-16 portfolio management b. Advise the FGDC Steering Committee c. Increase awareness of efforts associated with OMB Circular A–16 implementation and portfolio management and foster partnerships at all levels of government to leverage efforts and reduce development and investment redundancies
5. FGDC subcommittees	FGDC member agency representatives and FGDC-recognized stakeholder groups who have common interests that cross-cut or affect several A–16 theme-based subcommittees	Advise Theme Leads and associated National A–16 Dataset Managers
6. FGDC working groups	Representatives from Federal agencies and FGDC-recognized stakeholder groups who have common interests that cross-cut or affect several A–16 theme-based subcommittees	Produce cross-theme and cross-dataset development, portfolio management guidance and procedures
7. FGDC Secretariat	Executive and support staff and administrators that support the FGDC	a. Assist agency Theme Leads and Dataset Managers b. Support the FGDC Steering Committee c. Support the FGDC Coordination Group d. Facilitate portfolio management activities with other FGDC activities and government initiatives

[7] Note: This table is a summary of the Entities and their roles. The multiple responsibilities associated with each role are defined in the complete table that follows.

[8] Memorandum available at http://www.whitehouse.gov/omb/memoranda/fy2006/m06-07.pdf

[9] Charter available at http://www.fgdc.gov/participation/steering-committee/steering-committee-charter.pdf

[10] Charter available at http://www.fgdc.gov/participation/coordination-group/coordination-group-charter

Entity	Members	Role
8. Lead agency for themes	Federal Agencies identified in OMB Circular A–16, appendix E, to lead the coordination of a theme	a. Oversee the development, implementation, and maintenance of themes and associated datasets b. Executive Theme Champion[11] c. Theme Lead[12] d. National A–16 Dataset Manager[13] e. Data steward[14]
9. Stakeholder Community	a. Members can come from Federal, State, tribal, or local governments as well as the private or nonprofit sectors or academia (may vary from theme to theme)	a. Data steward
	b. Federal Advisory Committee Act (FACA) Committee composed of representatives from Federal, State, tribal, and local governments and the private sector, the nonprofit sector, and academia	b. National Geospatial Advisory Committee (NGAC): provides advice and recommendations to FGDC Chair
	c. General users who may or may not have a relationship with a Federal agency	c. Data end users[15]

[11] The definition of this term can be found in appendix ,: Lexicon of Geospatial Terminology (ID A–16-9)
[12] The definition of this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-10)
[13] The definition for this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-11)
[14] The definition for this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-12)
[15] The definition for this term can be found in appendix B,: Lexicon of Geospatial Terminology (ID A–16-13)

Table 2 describes the responsibilities of each A–16 stakeholder in detail.

Table 2: Key Stakeholder Roles and Responsibilities

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
1. Office of Management and Budget (OMB)	N/A	Maintain OMB Circular A–16	The Federal agency that issues circulars that set policy and the direction for geospatial themes and datasets of national significance as defined in OMB Circular A–16.	• Acts as Vice Chair of the FGDC and is responsible for OMB Circular A–16 • Works with agency budget offices to provide appropriate resources in support of NSDI activities • Provides final concurrence to changes to OMB Circular A–16 or its appendices • Makes recommendations to agencies and to the President regarding the coordination of all governmental map making and surveying • Maintains and coordinates changes to OMB Circular A–16	• Responds to/implements recommendations from the FGDC Steering Committee with respect to portfolio management of A–16 themes and associated datasets • Reviews annual theme reports from FGDC and factors results into A–16 portfolio management resource planning with responsible agencies and factors these into budget discussions • Serves as catalyst to link A–16 portfolio management to Federal Enterprise Architecture (FEA) efforts through the Geospatial LoB and Chief Information Officers Council (CIOC)/Architecture Information Committee (AIC)
2. FGDC Executive Committee	Seven members of the FGDC Steering Committee whose agencies most heavily produce or use geospatial data or technology	Advise the FGDC Steering Committee	This committee is responsible for making recommendations to the FGDC Steering Committee on policy, implementation, and investment directions.	N/A	• Evaluates recommendations from the FGDC Coordination Group on proposed and current OMB Circular A–16 portfolios and portfolio management requirements • Develops, reviews, and coordinates interagency concepts and proposals, as requested by the FGDC Chair, for consideration by the FGDC Steering Committee as a whole. All final decisions will be made by the FGDC Steering Committee as described in the FGDC Steering Committee Charter • Recommends annual OMB Circular A–16 investment priorities, revisions to OMB Circular A–16, appendix E, and requirement analyses for new national efforts, based on input from the FGDC Coordination Group

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
3. FGDC Steering Committee	Senior Agency Officials for Geospatial Information (SAOGIs) as referenced in OMB Memorandum 06-07	a. Provide A–16 community leadership	The policy-level interagency group is responsible for overseeing OMB Circular A–16 related activities and the implementation of National Spatial Data Infrastructure (NSDI). The Steering Committee's central focus is to provide the leadership for the coordination of Federal geospatial activities between, among, and within agencies by establishing policy, providing guidance, and giving direction to FGDC member agencies.	• Leads, develops, and supports the NSDI strategy, spatial data policy development, management, and operational decision-making • Directs and facilitates national implementation of the Framework Data Theme and other themes in the NSDI and implements the NSDI Clearinghouse • Advises Federal and other spatial data end users on NSDI implementation • Serves as lead Federal executive body charged with the leadership, development, implementation, and review of a strategic plan for Federal agencies responsible for the NSDI Framework Data Theme and other themes to collect and provide broad access to spatial data assets • Takes actions to recommend to the OMB additions, revisions, or deletions to OMB Circular A–16 • Promotes and guides 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 and NSDI implementation	• Promotes coordination and portfolio management of the member agencies' acquisition, management, development, maintenance, documentation, and dissemination of geospatial themes and datasets for which they are responsible as designated in OMB Circular A–16, appendix E, through the National Spatial Data Clearinghouse and the Geospatial One-Stop (GOS) portal • Acts on recommendations from the FGDC Executive Committee and the FGDC Coordination Group on priority OMB Circular A–16 investments, resource needs, and adjustments to their respective themes and datasets found in appendix E of OMB Circular A–16 for which they are responsible • Promotes coordination of geospatial investment management • Endorses, adopts, and supports portfolio management requirements, including annual reporting, using the lifecycle guidance as a basis and reporting requirements proposed by the FGDC Coordination Group and considers recommendations for adoption of themes and datasets found in or proposed for inclusion in OMB Circular A–16, appendix E

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Steering Committee	SAOGIs	b. Represent Federal agencies on the FGDC Steering Committee	SAOGIs, as agency officials, have agency-wide responsibility, authority, and accountability for geospatial information issues.	• Promotes and utilizes partnerships that promote cost-effective data collection, documentation, maintenance, distribution, and preservation strategies, and that leverage resources • Coordinates national security, national defense, and emergency preparedness program policies regarding data accessibility • Appoints a contact to coordinate with lead agencies for the collection, acquisition, maintenance, or dissemination of the spatial data themes used by the agency	• Reports on status, requirements, implementation, and resource issues related to OMB Circular A–16 themes and associated datasets under the purview of their agencies to the FGDC Steering Committee and, as necessary, requests action • Identifies and reports on agency geospatial data requirements and resource needs to the FGDC Executive Committee about activities related to their respective themes for which they are responsible and for action • Ensures that anticipated OMB Circular A–16 data investments related to OMB Circular A–16 themes and associated datasets under the purview of their agencies are reported on the GOS Marketplace, and reviews the Marketplace prior to investments • Ensures agency compliance with OMB Circular A–16 Annual Reporting requirements, standards, and guidelines across the agency and its bureaus

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Steering Committee	SAOGIs	c. Oversee agency *Circular A–16* investments	SAOGIs, as agency officials, have responsibility, authority, and accountability for agency geospatial information related to OMB Circular A–16 investments.	• Carries out activities required to implement its responsibilities as described in section 8 of OMB Circular A–16 • Identifies proven practices • Allocates agency resources to fulfill responsibilities of effective spatial data collection, production, and stewardship	• Identifies an Executive Theme Champion for each agency that has been designated a "lead agency" for themes under OMB Circular A–16 • Consults and coordinates with the Executive Theme Champions for each agency that has been designated a "lead agency" for themes under OMB Circular A–16 • Meets regularly with Executive Theme Champions, under the purview of their agency, to keep current on planning, implementation, and overall portfolio management issues associated with each theme • Works with Executive Theme Champions to promote allocation of agency and partner resources to fulfill responsibilities of effective spatial data collection, production, and stewardship • Collaborates with agency chief information officers (CIOs) and Executive Theme Champions to ensure that agencies leverage cumulative geospatial information investments to benefit agency-wide business processes and support information technology

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
4. FGDC Coordination Group	Representatives from Federal agencies	a. Formulate recommendations by consensus on the strategic plans for OMB Circular A-16 portfolio management	This group of agency representatives provides recommendations to the FGDC Steering Committee and the FGDC Secretariat on the management of the Federal component of the OMB Circular A–16 portfolio.	• Communicates with and fosters communication among Federal agencies and others concerning spatial data technology development, transfer, and exchange	• Solicits concurrence on OMB Circular A–16 related lifecycle and portfolio management guidance, standards, and procedures developed by FGDC working groups, subcommittees, and theme communities of interest • Convenes regular meetings with Executive Theme Champions, Theme Leads, and stakeholders to hear requirements for changes to OMB Circular A–16, appendix E, including the consolidation, splitting, addition, or deletion of themes • Invites Theme Leads and National A–16 Dataset Managers to present at monthly meetings so sufficient information is available for making recommendations to the FGDC Steering Committee • Reviews and discusses results of the annual theme status reports and annual GOS Marketplace postings to determine if any themes or associated datasets need further discussion or whether the FGDC Steering Committee needs to make recommendations • Identifies wasteful, duplicative, and (or) unnecessary overlap of geospatial portfolio management and makes recommendations to the FGDC Steering Committee through such mechanisms as GOS Marketplace or analysis of OMB data calls

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Coordination Group	Representatives from Federal agencies	b. Advise the FGDC Steering Committee	This group of agency representatives provides recommendations to the FGDC Steering Committee on the content and configuration of themes in OMB Circular A–16, appendix E, and government-wide priorities for the development of standards and associated	N/A	• Makes recommendations to the FGDC Steering Committee about the adoption of lifecycle and portfolio management guidance, standards, and procedures associated with OMB Circular A–16 developed by FGDC working groups, subcommittees, and theme communities of interest • Makes recommendations to the FGDC Steering Committee on whether to maintain the current OMB Circular A–16, appendix E, as is or to modify the appendix. Modification of the appendix occurs at least annually but no more than twice in a fiscal year and may include

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
			datasets.		changes of lead agencies or configuration of the themes or associated datasets) • Makes recommendations on cross-agency investment priorities based on business requirements provided by member agencies and stakeholders for completing themes and associated datasets • Reviews, recommends, endorses, and, when appropriate, develops standards for themes and associated datasets and lifecycle and portfolio management guidance and procedures

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Coordination Group	Representatives from Federal agencies	c. Increase awareness of efforts associated with OMB Circular A–16 implementation and portfolio management and foster partnerships at all levels of government to leverage efforts and reduce development and investment redundancies	This group of agency representatives convenes sessions and makes presentations at stakeholder meetings to ensure that the appropriate decision-makers and resource managers understand the needs of stakeholders.	N/A	• Identifies and coordinates with agency and FGDC working group and subcommittee initiatives that may affect implementation of themes and associated datasets, either individually or across all themes • Attends stakeholder meetings and invites stakeholders to FGDC Coordination Group meetings to facilitate coordination, eliminate gaps, and reduce duplication • Develops mechanisms to routinely capture stakeholder business requirements and make Federal Government requirements known to stakeholders engaged in work associated with OMB Circular A–16 themes and datasets • Ensures leadership in FGDC subcommittees fully supports and has representation from theme lead agencies • Develops recommendations on the addition, deletion, or combination of A–16 themes and associated datasets • Develops recommendations for FGDC Steering Committee review on investment in activities and initiatives that support the NSDI

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
5. FGDC subcommittees [16]	FGDC member agency representatives and FGDC-recognized stakeholder groups who have common interests that cross-cut or affect several A–16 theme-based subcommittees	Advise Theme Leads and associated National A–16 Dataset Managers	Subcommittees focus on issues pertaining to coordination and standards associated with a specific geospatial theme and associated datasets (especially with regard to data collection, access, and exchange), and those applications using data.	N/A	• Advises A–16 National A–16 Dataset Managers on the direction, content and evolution of themes and associated datasets • Serves as subject matter experts on applying best practices for each area of the data lifecycle as it applies to specific themes and datasets • Provides recommendations to the Theme Leads and National A–16 Dataset Managers on how to organize themes and associated datasets • Advises the FGDC Coordination Group, the FGDC Executive Committee, and the FGDC Steering Committee, upon request

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
6. FGDC working groups	Representatives from Federal agencies and FGDC-recognized stakeholder groups who have common interests that cross-cut or affect several A–16 theme-based subcommittees	Produce cross-theme and cross-dataset development, portfolio management guidance and procedures	Working groups develop data standards and protocols across all A–16 themes, and provide recommendations to the FGDC Coordination Group.	• Assesses existing standards and identifies anticipated or needed data standards • Develops a plan to originate and implement needed standards with relevant community and international practices	• Develops guidance for lifecycle and portfolio management that pertains to all themes and associated datasets for consideration and approval by the FGDC Coordination Group and the FGDC Steering Committee, including establishing timeframes for compliance and reporting • Provides recommendations to the FGDC Coordination Group regarding the improvement of existing practices in each area of the data lifecycle • Provides recommendations to the FGDC Coordination Group regarding the continued existence or potential combination of each A–16 theme • Establishes recommendations for the FGDC Coordination Group, the FGDC Steering Committee, and the National A–16 Dataset Managers to prepare, maintain, publish, and implement strategies for advancing geographic information and related spatial data activities appropriate to their mission and in support of the NSDI

[16] More information on FGDC subcommittees and FGDC working groups is available on the FGDC Web site (www.fgdc.gov)

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
7. FGDC Secretariat	Executive and support staff and administrators that support the FGDC	a. Assist agency Theme Leads and Dataset Managers	The Secretariat oversees implementation of OMB Circular A–16 portfolio management processes and assists A–16 Theme Leads in keeping abreast of portfolio management requirements. The Secretariat also pursues partnership opportunities, as appropriate, across datasets housed within themes.	• Maintains an online FGDC membership directory, including current subcommittee and working group memberships • Provides and annually updates an online status summary for each theme authored by the lead agencies, the FGDC, or other subcommittees, working groups, and advisory committees	• Maintains the current list of themes and Theme Lead Agencies • Promotes maintenance of the current list of datasets, services, and metadata for each theme on Geospatial One-Stop (GOS) • Manages the FGDC Web site to disseminate information • Provides guidance for annual reporting to Theme Leads, National A–16 Dataset Managers, and data stewards • Analyzes annual theme reports from Theme Leads in a consistent manner providing the overall status of themes and datasets • Coordinates regular meetings with and among Theme Leads (for example, quarterly conference calls)

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Secretariat	Executive and support staff and administrators that support the FGDC	b. Support the FGDC Steering Committee	The Secretariat provides staff support to the FGDC Steering Committee in fulfilling its OMB Circular A–16 portfolio management responsibilities	N/A	• Provides annual theme status reports to the FGDC Steering Committee and identifies areas needing attention, including overall theme standards, production, and development, as well as production schedules, milestones, performance measures, and metrics information • Develops recommendations for the FGDC Steering Committee review on investment in activities and initiatives that support the NSDI • Arranges presentations on A–16 themes or associated datasets at monthly meetings, as requested • Arranges, at the request of the FGDC Coordination Group, special sessions to discuss theme and portfolio management issues • Reports on portfolio management issues and concerns • Present to the FGDC Steering Committee a systematic 5-year plan for reviewing the status of all themes contained in OMB Circular A–16, appendix E.

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Secretariat	Executive and support staff and administrators that support the FGDC	c. Support the FGDC Coordination Group	The Secretariat provides staff support to the FGDC Coordination Group in fulfilling its OMB Circular A–16 portfolio management responsibilities	N/A	• Reviews each annual theme report against the reporting requirements, and reports the results of the review to the FGDC Coordination Group • Recommends topics, themes, and theme management for the FGDC Coordination Group to consider based on review of the annual theme report and new requirements identified by the FGDC Steering Committee, and FGDC working groups, subcommittees, and stakeholder groups, and (or) the OMB • Collaborates with the FGDC Coordination Group in developing recommendations for the FGDC Steering Committee on priorities of datasets within and across themes • Works with each Executive Theme Champion to prepare

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
					recommendations for changes to A–16 themes and facilitates the recommendations process with the FGDC Coordination Group • Performs administrative tasks, such as arranging meetings, issuing agendas, drafting meeting minutes, and providing presentation support • Facilitates annual theme status reports from agency theme leads to the FGDC Coordination Group, who recommends areas that need attention, including overall theme standards and production development as well as production schedules, milestones, performance measures, or metrics information • Promotes NSDI activities and partnerships to stakeholder communities and professional associations to support development, maintenance, and standards

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
FGDC Secretariat	Executive and support staff and administrators that support the FGDC	d. Facilitate portfolio management activities with other FGDC activities and Government initiatives	N/A	• Promotes and guides 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, in NSDI implementation, and in the identification of best practices • Manages the clearinghouse that supports the infrastructure of networks, systems, services, and standards that provide a digital representation of Earth's surface to users	• Identifies where A–16 portfolio management activities intersect and need coordination with other significant FGDC activities [for example, Cooperative Agreements Program (CAP) grants, the Fifty States Initiative, *The National Map*, GOS, and the Global Earth Observation System of Systems (GEOSS)] • Facilitates action plans and tactical plans developed by the FGDC Coordination Group and the FGDC Steering Committee to implement integration efforts • Tracks the implementation of action plans and tactical plans approved by the FGDC Coordination Group and the FGDC Steering Committee • Assures that appropriate initiatives are coordinated with portfolio management activities

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
8. Lead agency for themes	Federal agencies identified in OMB Circular A–16, appendix E, to lead the coordination of a theme	a. Oversee the development, implementation, and maintenance of themes and associated datasets	OMB Circular A–16, appendix E, lists agencies to whom responsibility for each spatial data theme is assigned. Although a lead agency for themes may not create the national dataset for the theme with which it is identified, it is still responsible for the coordination, planning, and leadership needed to develop nationwide data coverage.	• Designates a point of contact within the lead agency who will be responsible for the development, maintenance, coordination, and dissemination of data • Supports allocation of agency resources to fulfill the responsibilities of effective spatial data collection, production, and stewardship • Prepares goals that support the NSDI strategy and, as needed, collect and analyze information from users about their needs for spatial data	• Performs portfolio management for themes and associated datasets, including maintaining an inventory of themes and datasets, schedules for completion, and reports on progress • Other proposed tasks are associated with individual roles within the lead agency for each theme

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Lead agency for themes	Federal agencies identified in OMB Circular A–16, appendix E, to lead the coordination of a theme	b. Executive Theme Champion	Provides high-level sponsorship and support for the theme and associated datasets; facilitates communication among the FGDC, other Executive Theme Champions, and agencies to promote effective and efficient development and management of themes and their associated resources to benefit implementation.	N/A	• Plays a leadership role in promoting the theme vision and developing the initial scope and charter for the theme • Serves as director or senior level manager within the organization responsible for managing the theme • Provides (or finds) resources, in funding or in kind, for the theme and associated datasets by influencing program decision-making for the organization • Provides (or finds) resources (funding or in kind) for the theme and associated datasets through the agencies and business(es) served by the theme and associated datasets and advocates theme benefits • Provides (or finds) resources (funding or in kind) for the theme and associated datasets by establishing the appropriate core team • Ensures that the theme community focuses on business-critical issues that are in alignment with lifecycle outcomes and FGDC priorities • Promotes coordination among and reaches out to other agencies for development of the theme • Tracks common interests and facilitates common meetings of Theme Leads with representatives of relevant OMB cross-agency lines of business (LoBs) and Presidential Initiatives • Supports Theme Leads in convening communities of interest[17] around topics or themes by providing facilitation and outreach assistance • Supports Theme Leads, National A–16 Dataset Managers, and data stewards in convening communities of interest around datasets by providing facilitation and outreach assistance

[17] The definition of this term can be found in appendix B, Lexicon of Geospatial Terminology (ID A–16-14)

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Lead agency for themes	Federal agencies identified in OMB Circular A–16, appendix E, to lead the coordination of a theme	c. Theme Lead	Coordinates and oversees the strategic planning and implementation of themes and associated datasets	• Carries out the activities required to implement responsibilities as described in section 8 of OMB Circular A–16 • Collects, maintains, disseminates, and preserves spatial information such that resulting data, products, or information can be readily shared with other Federal agencies and non-Federal users • Searches all sources, including the National Spatial Data Clearinghouse, to determine if existing Federal, State, local or private data meet agency needs before expending funds for data collection • Provides leadership and facilitates the development and implementation of FGDC standards, especially data content standards for each theme • Assesses existing standards, identifies anticipated or needed data standards, and develops a plan to originate and implement standards with relevant community and international practices • Publishes maps or comparable graphics online showing the current extent and status of the	• Polls stakeholders on an ongoing basis within the context of subcommittee meetings, or through conference calls, Web meetings, or special interest group meetings at conferences, to either develop the theme or review the status of the various stages of the theme lifecycle to ensure that the theme remains relevant and current • Provides regular recommendations to the FGDC Coordination Group regarding datasets under each theme • Presents evaluation of various sources of datasets for decisions by the FGDC Coordination Group per stage 2 of the data lifecycle[18] (Inventory/Evaluate) • Works with National A–16 Dataset Managers and data stewards to plan, develop, distribute, maintain, and evolve themes and their associated datasets • Compiles information for annual theme reports in a consistent manner and provides the overall status of themes and datasets, as well as standards development, production schedules, milestones, performance measures, and metrics information to assist the FGDC Coordination Group • Analyzes the status of standards development, production schedules, milestones, performance measures, and metrics information

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
				A–16 themes for which the agency has the lead; encourages other sources of data for those same themes to provide access to data through the clearinghouse as often as appropriate for each theme • Facilitates implementation of a plan for nationwide population of the A–16 theme for which the responsible agency's plans include the development of partnership programs with States, tribes, academia, private sector organizations, 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 - advance a timetable for the development of NSDI themes	

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Lead agency for themes	Federal agencies identified in OMB Circular A–16, appendix E, to lead the coordination of a theme	d. National A-16 Dataset Manager	Directly develops data theme (in whole or part) as a primary data steward	• Supports annual reports to the OMB via the FGDC Secretariat on agency achievements relative to strategies as required by OMB Circular A–16 • Uses FGDC data standards, FGDC Content Standards for Digital Geospatial Metadata, and other appropriate standards, documents spatial data with the	• Identifies and tracks geospatial data requirements to be satisfied within the stakeholder community • Works with theme mangers and appropriate working groups to establish and use standards in dataset design, development, modification, and improvement efforts • Works directly with Theme Leads and data stewards to implement accepted business rules, best practices, standards, quality control procedures, and security requirements for agency geospatial themes or business lines

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
				relevant metadata, and makes metadata available online • Searches all sources, including the National Spatial Data Clearinghouse, to determine if existing Federal, state, local or private data meet agency needs before expending funds for data collection • Provides or develops the required technology and services required to enable and provide access to NSDI data and information • Coordinates and works 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 • Coordinates the creation or review of proposed data standards with all business data stewards and bureau data architects for their respective business subject area	• Informs the agency budget process as to the condition of the dataset with respect to norms and policies established under the geospatial data lifecycle • Develops a dataset implementation plan with key stakeholders that addresses overall requirements for the dataset and outlines each step in the lifecycle • Brings findings to the Theme Lead for resource planning • Works with the Executive Theme Champion and Theme Leads to outline a resource acquisition plan for the current fiscal year and for out years • Sets up mechanisms to meet regularly with key stakeholders to ensure that data stewardship processes are in place and that user requirements are identified and met • Meets with State, tribal, and local governments and private or nonprofit data collectors to measure Federal Government activities in a theme area and identify possible overlaps gaps, and available resources for theme development. • Evaluates theme portfolio management progress and reports progress, issues, or concerns to the Theme Lead • Maintains current data standards for the agency's line of business • Submits proposed data standards to the data architect for formal review • Resolves review comments and conflicting data issues • Provides program leadership and management to develop themes, datasets, and the NSDI • Promotes integration of all technical and management aspects of the datasets • Provides annual review and development of operations and maintenance budget • Organizes and schedules yearly stewardship workshops • Provides tools, documentation, and training necessary to edit and update the dataset(s) • Hosts or provides information on applications developed for the datasets

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
					• Ensures availability of data to the user community • Provides documentation on transaction processes and guidelines needed for updating the datasets • Provides clear guidance on format, validation criteria, and expectations for acceptable updates • Adheres to the agreed-upon transaction process workflow • Provides best information technology (IT) practices concerning database mirroring, backup, and recovery

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Lead agency for themes	N/A	e. Data steward	Individuals with formalized accountability for the management of data resources and a willingness to be accountable for a set of business information for the well-being of the larger organization by operating in service, rather than control.[19]	N/A	See data steward responsibilities under the Stakeholder Community section of this table

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Lead agency for themes	N/A	e. Data steward	The person charged by the National A–16 Dataset Manager in conjunction with his or her management to be accountable for the production, maintenance, and usage of the dataset within the agency.	N/A	See Data steward responsibilities under the Stakeholder Community section of this table

[19] Taken from English, L.P., 1999. Improving data warehouse and business information quality: John Wiley & Sons Press, p. 402.

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
9. Stakeholder Community	Members can be from Federal, State, tribal, or local governments, as well as the private or nonprofit sectors or academia (may vary from theme to theme)	a. Data steward	A group of two or more willing parties working with National A–16 Dataset Managers to create, maintain, and evolve nationally consistent datasets.	N/A	• Recommends to the FGDC Coordination Group agency member whether or not the FGDC Steering Committee should evaluate a data topic as a possible A–16 theme[20] • Performs other tasks as directed by the SAOGI[21] and any relevant Theme Lead • Ensures that data in datasets conform to all applicable FGDC data standards • Characterizes datasets using FGDC metadata that are then posted on the GOS • Makes datasets accessible to Federal and non-Federal Government users through the GOS • Informs the agency budget process as to the condition of the dataset with respect to norms and policies established under the geospatial data lifecycle • Informs the National A–16 Dataset Manager of the condition of the dataset with respect to norms and policies established under the geospatial data lifecycle • Ensures that data standards reflect the programmatic needs of users and cooperates with the appropriate Theme Lead(s). • Implements best practices and standards for developing logical and physical data models for A–16 themes or business lines • Identifies sensitive data associated with OMB Circular A–16, or other geospatial themes or business lines, to ensure appropriate designations (that is, "Government Use Only," "Proprietary," "Subject to the Privacy Act," or other applicable security classifications) • Identifies data quality metrics and coordinates data accuracy and quality assurance checks, formal reviews,

[20] Applies to Federal data stewards only; if the data steward is from a non-Federal entity, the Federal Theme Lead will assume responsibility for directing how the information will be provided back to the community.

[21] Interaction with SAOGI applies to Federal data stewards only.

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
					and information exchanges relevant to OMB Circular A–16 portfolio management and information exchange relevant to data standards with the bureau data architect, subject matter experts, and other data stewards • Provides publicly available information on the status of data stewardship activities • Coordinates with other Federal and in-state agencies, adjacent States, Native American organizations, and counties and other local governmental organizations to identify and provide programmatic coordination on maintenance activities • Works with the organizational data architect, subject matter experts, and other data stewards to develop, review, modify, and (or) establish data standards for bureau subject areas or business lines • Maintains awareness of the activities of other agencies and organizations involved in stewardship • Provides data maintenance and ensures that all edits are in accordance with established standards, procedures, and timelines • Ensures integration of geometry and attribution • Accepts and responds to submittal of suggested edits within a reasonable timeframe • Performs quality assurance checks, formal reviews, and information exchanges relevant to A–16 portfolio management

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Stakeholder Community	Federal Advisory Committee Act (FACA) Committee made up of representatives from Federal, State, tribal, and local governments, the private and nonprofit sectors, and academia	b. National Geospatial Advisory Committee (NGAC); provides advice and recommendations to FGDC Chair	The NGAC may offer advice to the FGDC Steering Committee on the content of OMB Circular A–16, appendix E, standards for themes and associated datasets, and lifecycle and portfolio management for themes and associated datasets	• Provides advice and recommendations related to management of Federal and national geospatial programs for the development of the NSDI, and the implementation of OMB Circular A–16 and Executive Order 12906[22] • Reviews and comments upon geospatial policy and management issues and provides a forum to convey views and representation of non-Federal stakeholders in the geospatial community [23]	• May review proposed lifecycle and portfolio management for A–16 themes and associated datasets and provides recommendations • May offer recommendations on stakeholder requirements for modifying, adding, or deleting themes and (or) datasets associated with OMB Circular A–16, appendix E

Entity	Members	Role	Description	Existing A–16 Responsibilities	Additional Responsibilities
Stakeholder Community	General users who may or may not have a relationship with a Federal agency	c. Data end users	General users who may or may not have a relationship with a Federal agency	N/A	• Provides feedback to data managers on how to make data and services more accessible and usable

[22] Adapted from the NGAC Charter.
[23] Adapted from the NGAC Charter.

3. Lexicon of Geospatial Terminology to clarify OMB Circular A–16, section 2(b)(1), section 8 (e)(c), and Appendix D

The purpose of the Lexicon of Geospatial Terminology is to provide a common set of geospatially-related terms and concepts in order to encourage consistent use of terminology and promote a clearer understanding of the commonly used terms. A common, but living, lexicon that meets logical and taxonomic standards is vital to achieving the goals of the Geospatial LoB and represents the first step in conforming all documents and discussions to a common vocabulary.

This lexicon builds upon existing concepts and provides a point of reference for OMB Circular A–16 reporting. The relationship of the lexicon to the Federal Enterprise Architecture (FEA) is also described.

The current Lexicon of Geospatial Terminology, which can be found in appendix B of this supplemental guidance, is not intended to be a complete vocabulary but is rather an evolving and expanding list of terms and definitions related to the geospatial community that will expand and change over time. For the most current version, please visit the moderated forum for the lexicon, which is hosted on the FGDC Web site (www.fgdc.gov).

4. Stages of the Geospatial Data Lifecycle pursuant to OMB Circular A–16, sections 8(e)(d), 8(e)(f), and 8(e)(g)

This section of the supplemental guidance contains the geospatial data lifecycle stages matrix (table 3) that agencies should use when developing, managing, and reporting on nationally significant datasets under the auspices of OMB Circular A–16. The matrix establishes a framework of standard terminology and processes for seven geospatial data lifecycle stages. Fig. 2 summarizes the data lifecycle stages, which are Define, Inventory/Evaluate, Obtain, Access, Maintain, Use/Evaluate, and Archive.

The stages associated with the management of the data lifecycle allow stakeholders to assess whether A–16 data production activities meet business requirements and utilize best practices that enable shared or common services. The data lifecycle is not intended to be rigidly sequential or linear. The quality assurance and (or) quality control (QA/QC) functions for the data should be included at every stage of the data lifecycle.

Business requirements drive what needs to occur at each stage. This concept is illustrated in fig. 2 by the purple arrows that point from the business requirements circle to each lifecycle stage. The orange arrows that point to the business requirements circle represent the feedback loop that needs to occur at each stage to reassess the business requirements.

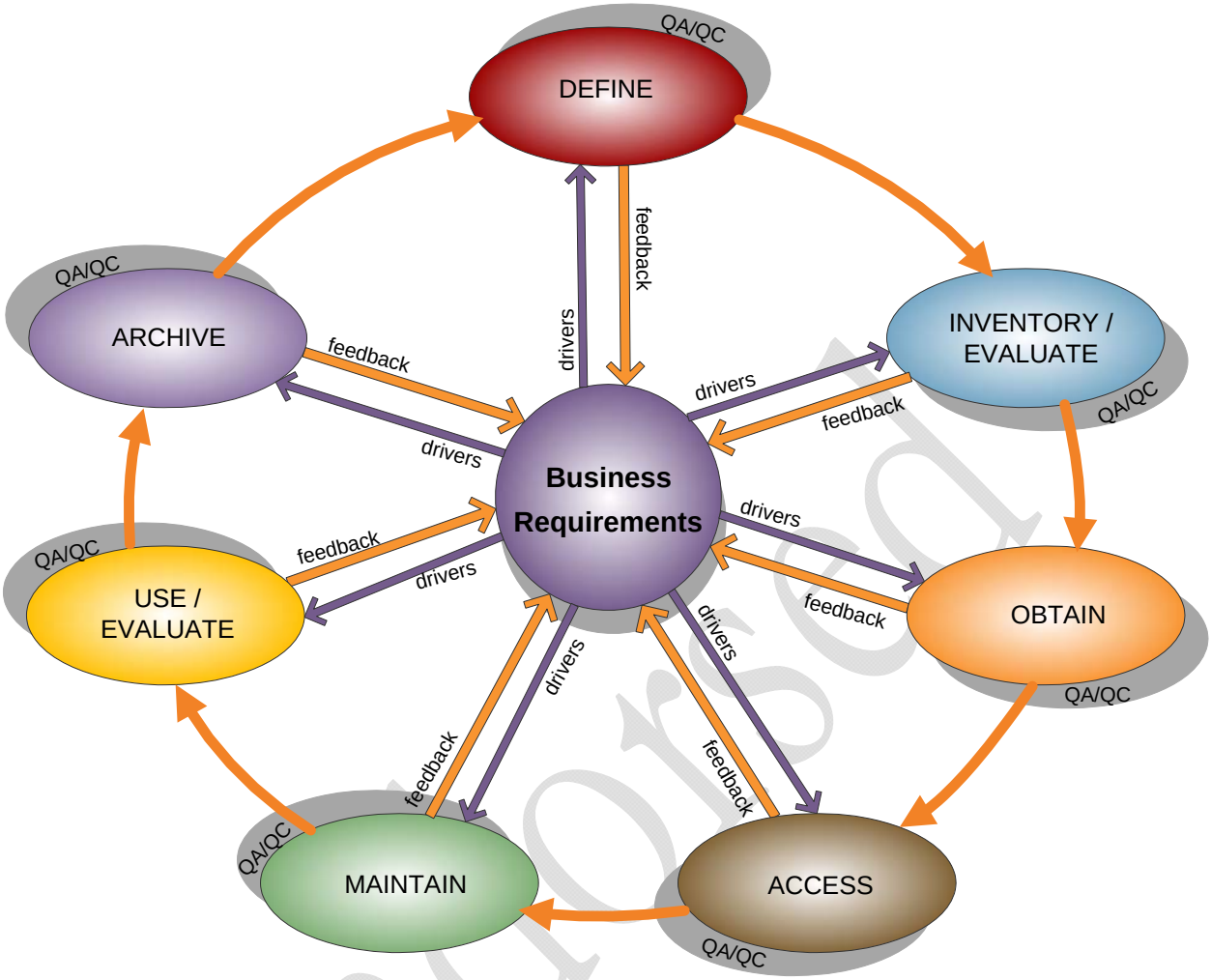


Figure 2. The data lifecycle.

The expected outcomes of adopting this framework include:

- Timely and high-quality geospatial data to support business processes and operations;
- Stronger partnerships across all levels of government and, when appropriate, the private sector, to increase cost efficiency and return on investment; and
- Improved strategies for completing and maintaining nationally significant themes and datasets associated with OMB Circular A–16 to enhance services to citizens.

4.1 Stages of the Data Lifecycle

Stage	Data Lifecycle Stage Details
Stage 1	**Define**
Definition	Characterization of data requirements based upon business-driven user needs
User requirements	The following steps occur when defining data needs: • Define user requirements o Identify business needs ▪ Review organizational documentation (many organizations publish information on business requirements) ▪ Evaluate internal and external needs ▪ Identify available funding and resources ▪ Review current collaboration efforts ▪ Review and evaluate existing knowledge base ▪ Identify business data quality requirements (including both locational and positional accuracy and quality measures for the attribute information associated with the geospatial features) o Identify agency or program requirements ▪ Determine the levels of government involved ▪ Identify sources for requirements • Examples: FGDC standards, existing program and project requirements, surveys, workshops and conferences, town hall meetings, annual meetings, discussions with subject matter experts ▪ Determine if requirement is annual or recurring versus one-time (for example, a special focus project) ▪ On a case-by-case basis, determine the user requirements for— • Resources (human, capital, financial, and technical) • Resource availability • Project schedules • Define data needs o Determine appropriate feature types o Identify attributes needed o Determine data schema o Identify accuracy levels for individual attributes and for the dataset as a whole o Determine status of data timeliness (that is, how current are the data) o Determine data format needs o Determine appropriate resolution or scale of data o Identify any seasonal concerns with data collection, acquisition, or production o Determine data specifications (that is, raster or vector, infrared, or black and white) o Sample method 1: business process reengineering to determine data needs ▪ Complete a series of process modeling sessions to document the business processes of the organization ▪ Determine what information flows are generated as input for data needs

Stage	Data Lifecycle Stage Details
Stage 1	**Define**
	▪ Determine what information flows are generated as output data ▪ Create a logical data model of those information flows to describe data needs ▪ Develop use cases for the business areas identified o Sample method 2: GIS analysis ▪ Perform use case analyses to determine actual data requirements ▪ Define data in geospatial terms of features and attributes • Define data standards[24] o Data standards refer to the name, definition, presentation, and business rules governing datasets; they are based on the known data requirements, are set by the stakeholders who need the data and can cross organizational boundaries o Data standards should be defined before data are collected. Advantages to having a standard before data collection include the following: ▪ Ensuring users have the right data to accomplish the task ▪ Knowing what the data are once they are collected ▪ Having the ability to reproduce the data and collect additional matching data at a later date that can be used in analysis • Evaluate past data uses for programs and projects and verify that past data products met user business requirements o Example: project driven reports that take place over a 2- to 3-year span o Identify geospatial data that can fill those needs o Consider data schemas that will allow for change analysis over time; standards based on logical data models can be flexible to adapt to changing physical environments o Address potential integration issues (that is, quality, consistency, and compatibility) before data are collected, including: standards, geo id and datum, positional accuracy, classification system (scheme), *in situ* sampling logic, census enumeration logic, metadata collection, address matching, and privacy issues • Determine if data required contain any information governed by the Privacy Act of 1974 • Determine if data required will be of a sensitive nature and require any special handling including: o Data that can be collected but that should not be shared with the public (for example, cultural resources data or personally identifiable information (PII) o Data that must be generalized before release o Data that may not be sensitive by itself but which may become sensitive when combined with other datasets o Records requirements which may determine whether or not data will become a dataset of record • Define and develop quality assurance and (or) quality control (QA/QC) measures o Develop QA/QC measures to match the business requirements for the dataset o Define processes and measures on datasets that will ensure QA/QC

[24] For more information about data standards, please refer to ISO/IEC 15288:2008, 2008, Systems and software engineering -- System lifecycle processes (Edition 2), International Organization for Standardization (http://www.iso.org). Available from: http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43564

Stage	Data Lifecycle Stage Details
Stage 2	**Inventory/Evaluate**
Definition	The creation and publication of a detailed list of data assets and data gaps (both internal and external) as they relate to business-driven user needs
	• Research internal assets first; research external assets second o Inventory list should be regularly maintained • Take the following steps to search for defined requirements and create an inventory matrix o Define the area(s) of interest (AOI) for the data o Locate viable resources for required data (including internal and external sources) o Identify internal resources that may need conversion o Review dataset descriptions, metadata records, attributes, domains, and so forth o Address accuracy issues and tiers of accuracy o Review date ranges and currency of the dataset(s) and identify limitations o Include restrictions, licensing, and copyright status of obtained datasets documented in a matrix o Identify closely matched datasets • The results of the inventory will be a matrix of available geospatial data, which helps users to o Exhaust all possible means to identify existing data ▪ Examples: • Preliminary list of available data and their characteristics (GIS Inventory System, GOS, Web searches) • www.statelocalgov.net (site for finding data inventories) • Data centers provide points of contacts for sources and base maps o Identify attributes and domains ▪ Determine if data meet the identified business requirements ▪ Determine if data are missing requirements o Assess the suitability of data for meeting the business requirements identified and perform a QA/QC evaluation ▪ Reject metadata as unsuitable or incomplete ▪ Request additional metadata information o Identify suitability of dataset to meet business needs ▪ Evaluate free datasets ▪ Obtain datasets ▪ Perform a QA/QC evaluation ▪ Document whether not data are acceptable and, if not acceptable, find alternative solutions o Evaluate datasets for price ▪ Review datasets carefully against business requirements ▪ Check with other sources, previous users, technical expert specifications, and so forth, to ensure that data will meet the requirements ▪ Example: cost of imagery acquisition or cost of LIDAR acquisition

Stage	Data Lifecycle Stage Details
Stage 2	**Inventory/Evaluate**
	• Determine the limitations of what is found against the requirements to ensure that the data can be integrated for analysis o Evaluate whether data should be made available for public distribution or limited distribution (for example, contractual data, classified data, public domain data, and so forth) • Assess conversion, transformation, or modification of closely matched datasets to meet requirements • Recommend procedures to acquire datasets that meet the specified requirements

Stage	Data Lifecycle Stage Details
Stage 3	**Obtain**
Definition	The collection, purchase, conversion, transformation, sharing, exchanging, or creation of geospatial data that were selected to meet the business needs is identified
	Follow the process below to obtain data: o Establish a plan to obtain data and review results with the program or project documents that defined the requirements ▪ Complete writing of dataset specifications and statements of work (SOWs) ▪ Identify and review similar contracts and SOWs from the immediate agency ▪ Utilize agency expertise to review contract specifications ▪ Ensure that geospatial requirements boilerplate language is included in planning documents o Identify the appropriate contracting officer's technical representative (COTR); that is, one with geospatial capabilities that allow for appropriate QA/QC of the dataset o Ensure that metadata meet the requirements of the organization; that is, make sure that all metadata fields are completed, not just the mandatory metadata elements (sections 1 and 7) ▪ Reject metadata that are unsuitable or incomplete ▪ Request additional metadata information o Use inventory lists to identify agencies or entities that have needed data to see if you can establish a partnership to leverage acquisition costs and activities o Review agreements that may limit or enhance the sharing and exchange of information, including the following: ▪ Memoranda of understanding and service-level agreements (SLAs) ▪ Interagency agreements ▪ Military interagency purchase requests ▪ Multiagency purchase requests) ▪ Cost-sharing activities ▪ Collaboration activities ▪ Free exchange sites ▪ In-kind services • Adhere to existing data standards[25] • Define data collection specifications • Obtain datasets necessary to meet program or project needs in one of the following four ways: **1) Purchase** o Identify outside sources or other government agencies that currently have (or have access to) the needed data o Acquire and assess the suitability of data (using a decision tree) and perform QA/QC evaluation ▪ Identify required data items that are essential for acquisition of the dataset o Use QA/QC measures established during the Define stage to perform measurements of the data to determine suitability

[25] For more information about data standards, please refer to ISO/IEC 15288:2008, 2008, Systems and software engineering -- System lifecycle processes (Edition 2), International Organization for Standardization (http://www.iso.org). Available from: http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43564

Stage	Data Lifecycle Stage Details
Stage 3	**Obtain**
	▪ Determine the data format; geospatial data will be in an agreed upon format (for example, shape files, geodatabases, and so forth) ▪ Complete the metadata with respect to contract specifications ▪ Check to see that the required metadata sections are populated; the content must be validated by knowledgeable staff to assure compliance • Complete mandatory metadata sections 1 and 7 (recommended is 1 through 7) • Complete intermediate requirements for the specified sections • Obtain full FGDC compliance in all sections o Establish database schema validation, including the following: ▪ Dataset name and organization ▪ Attributes and relationships ▪ Domains, topology, and so forth ▪ Ability to automate based on database schema required and organizational business requirements o Determine projection (spatial reference) and ensure that the coordinate system is fully defined o Ensure that the metadata meet the requirements of the organization; that is, make sure that all metadata fields are completed o Consider the level at which the data are certified ▪ Verify the certification level of the data ▪ Evaluate the data against the information required by the Information Quality Act ▪ If data are not certified, establish a certification plan o Review licensing agreements and any restrictions on release of the information (the Freedom of Information Act may come into play here) ▪ Examples of purchased data: U.S. Geological Survey (USGS) Center for Earth Resources Observation and Science (EROS) satellite imagery, aerial photography ▪ Vehicles of Procurement: request for proposal (RFP), License, request for information (RFI), General Services Administration (GSA) Schedule, grants, SLAs, best practices ▪ Review agreements to share the data (see Geospatial LoB grants and contracts language) **2) Modify, convert, or transform legacy data** <u>Modify</u> o Identify missing requirements and correct the following: ▪ Attributes – add necessary attributes ▪ Domain – populate or modify ▪ Status of data timeliness – if not current, update as necessary ▪ Completeness – fill in or add additional feature types, as needed o Review the quality and suitability of data for use by geospatially knowledgeable staff and program or project managers

Stage	Data Lifecycle Stage Details
Stage 3	**Obtain**
	▪ Use QA/QC measures established during the Define stage to perform measurements of data to determine suitability ▪ Establish the data format – geospatial data will be in an agreed-upon format (for example, shape files, geodatabases, and so forth) ▪ Complete or revise the metadata with respect to contract specifications ▪ Check that the required sections are populated; have the content validated by knowledgeable staff to assure compliance • Complete mandatory metadata sections 1 and 7 (recommended is 1 through 7) • Complete intermediate requirements for the specified sections • Obtain full FGDC compliance in all sections o Establish database schema validation including the following: ▪ Dataset name and organization ▪ Attributes and relationships ▪ Domains, topology, and so forth ▪ Ability to automate based on database schema required and organizational business requirements o Determine projection (spatial reference) and ensure that the coordinate system is fully defined <u>Convert/Transform</u> o Review format, data storage method, and data field information and determine what items need conversion and (or) transformation o Evaluate the extract, transform, load (ETL) hardware or software[26] o Evaluate the conversion and (or) transformation tools for compatibility with data formats o After conversion/transformation, determine if legacy data will meet user needs o Review the quality and suitability of the data for use by geospatially knowledgeable staff and program or project manager ▪ Use QA/QC measures established during the Define stage to perform measurements of the data to determine suitability ▪ Establish the data format – geospatial data will be in an agreed upon format (for example, shape files, geodatabases, and so forth) ▪ Complete or revise the metadata with respect to contract specifications ▪ Check to see that the required sections are populated; have the content validated by knowledgeable staff to assure compliance • Complete mandatory metadata sections 1 and 7 (recommended is 1 through 7) • Complete intermediate requirements for the specified sections • Obtain full FGDC compliance in all sections

[26] ETL hardware/software assists in the process of defining and applying algorithms to change data from one form or domain value set to another domain value set in the target architecture

Stage	Data Lifecycle Stage Details
Stage 3	**Obtain**
	o Establish database schema validation, including the following: ▪ Dataset name and organization ▪ Attributes and relationships ▪ Domains, topology, and so forth ▪ Ability to automate based on the database schema required and organizational business requirements o Determine projection (spatial reference) – coordinate system is fully defined **3) Share/Exchange with others** o Identify agencies or entities that have needed data o Review agreements that may limit or enhance the sharing and exchange of information (see list at beginning of Stage 3) o Consider how the data are organized and how the data relate to user business needs o Identify the data sharing method as distinguished by the OMB ▪ Data exchanges • Determine permissions involved for one or more persons to input information into a common data store or information system • Update data in real-time as the entries are made • Access permissions made to the individual per agreement between and among organizations ▪ Data-sharing • Establish permission for each party to retain its own database or application and for the other party to be permitted to read the information • Give access rights to individuals from the other organization but on a "read only" capability • Allow for agencies to do one-time-only data collection yet use information across the agencies o Review the quality and suitability of the data for use by geospatially knowledgeable staff and program or project managers ▪ Use QA/QC measures established during the Define stage to perform measurements of the data to determine suitability ▪ Establish the data format – geospatial data will be in an agreed upon format (for example, shape files, geodatabases, and so forth) ▪ Complete or revise the metadata with respect to contract specifications ▪ Check to see that the required sections have are populated; have the content validated by knowledgeable staff to assure compliance • Complete mandatory metadata sections 1 and 7 (recommended is 1 through 7) • Complete intermediate requirements for the specific sections • Obtain full FGDC compliance in all sections

Stage	Data Lifecycle Stage Details
Stage 3	**Obtain**
	o Establish database schema validation, including the following: ▪ Dataset name and organization ▪ Attributes and relationships ▪ Domains, topology, and so forth ▪ Ability to automate based upon the database schema required and organizational business requirements o Determine projection (spatial reference) and ensure that the coordinate system is fully defined ▪ Reject the dataset ▪ Accept the dataset **4) Create** o Using the inventory matrix from the Inventory/Evaluate stage, determine which datasets meet the needs of the program or project o Create new geospatial datasets from analog maps, printed reports, archived resources, and so forth ▪ Evaluate requirements for collection of data • Scheduled timeframe for collection of data • Certifications, user needs grants and contracts language, and so forth • Frequency of collection (that is, recurring versus special use) ▪ Evaluate internal and external funding resources for the collection of data ▪ Enter data – digitize, key entry, scan, and so forth ▪ Complete or revise metadata (recommended sections 1 through 7) o Review and acceptance of data by geospatially knowledgeable staff and by program or project manager

Stage	Data Lifecycle Stage Details
Stage 4	**Access**
Definition	Making data produced known and retrievable to the community through documentation and discovery mechanisms so the users can meet their business requirements

	1) Publish
	• Determine where to publish the data or offering of services
	  o Consider the user community and determine if the data should be made available in hard copy, harvested by the GOS portal or other portals, provided to a clearinghouse, and so forth (for example, GOS existing, planned, and new data)
	  o Review user needs and business requirements
	  o Review Geospatial LoB grants and contracts language for publishing restrictions or requirements
	  o Review regulations for requirements
	  ▪ Example: Executive Order No. 12906, section 3(c*)* (April 11, 1994) mandates that each agency must have procedures to make geospatial information available to the public
	• Determine the format in which the data will be published (for example, shape files, E00 format, data streaming, Extensible Markup Language (XML), Generalized Markup Language (GML), and so forth)
	• Comply with any formatting requirements, including the following:
	  o Metadata standards (recommended minimum 1 through 7)
	  o Attribution for legacy data migration that links back to source
	  o Agency requirements
	  o FGDC requirements
	  o Federal guidelines
	  o Executive Order 12906 requirements
	  o OMB Circular A–16 requirements
	  o GOS guidance
	• Determine where partnerships might exist to meet interagency and other stakeholder needs
	• Comply with electronic data management requirements for the following regulations and any others that may apply:
	  o Determine what effects the Freedom of Information Act (FOIA)[27] and the Privacy Act[28] may have on publishing the dataset
	  o Perform a privacy impact assessment (PIA)[29]
	  o Perform Federal Information Security Management Act (FISMA) review.[30] All data must have a security review and be categorized (that is, establish security controls that prevent harm or protect integrity and confidentiality)

[27] The Freedom of Information Act (FOIA), Title 5 United States Code, section 552

[28] The Privacy Act of 1974, Pub. L. 93-579, 88 Stat. 1897 (Dec. 31, 1974), codified in part at 5 U.S.C. §552a

[29] Section 208 of the E-Government Act of 2002 (Pub. L. 107-347, 44 U.S.C. Ch 36) requires that OMB issue guidance to agencies on implementing the privacy provisions of the E-Government Act.

[30] The Federal Information Security Management Act of 2002 is the primary legislation governing Federal information security. FISMA was built upon and was an expansion of earlier legislation and added particular emphasis to the management dimension of information security in the Federal Government. FISMA establishes stronger lines of management responsibility for information security and provides for substantial oversight by the legislative branch. It is also called the Electronic Government Act of 2002, Title III of the E-Government Act of 2002, The Federal Information Security Management Act of 2002, FISMA, eGovernment Act of 2002, and E-Government Act of 2002.

Stage	Data Lifecycle Stage Details
Stage 4	**Access**
	o Determine type of records that may be produced from data according to the National Archives and Records Administration (NARA)[31] **2) Disseminate** • Consider data organization • Perform records management review (create and publish a records schedule) • Evaluate data steward data completeness o Determine if agencies have a dissemination plan for internal and external stakeholders o Determine if agencies have a format for dissemination o Determine if data completeness changes with stakeholders o Review Web feature services, specific requests, and agency restrictions (for example, if an agency does not permit FTP sites or has security restrictions) o Determine nonproprietary and proprietary formats (many agencies must disseminate nonproprietary data when they provide proprietary) o Review Web feature service/Web mapping service and Open Geospatial Consortium (OGC) compliance • Review dissemination requirements including: o 508 compliance (enables those with visual disabilities to access the information and understand the description of the data, metadata, and so forth) o Agency requirements o FGDC requirements • Determine internal versus external dissemination and access levels including: o Security o Copyright o Licensing agreements • Identify partnerships that may impact dissemination schedule

[31] NARA Regulations are published in the 36 CFR Chapter XII; Electronic Records Management is published under PART 1234 of the 36 CFR Chapter XII

Stage	Data Lifecycle Stage Details
Stage 5	**Maintain**
Definition	Ongoing processes and procedures to ensure that the data meet business requirements
	1) Maintenance Plan • Use the steps below to help build a maintenance plan for data and services o Determine hardware and software needed to effectively maintain both data and services o Determine other resources available to maintain the data ▪ Establish a strategy to track funding ▪ Establish a strategy to track and evaluate partnerships o Determine requirements including: ▪ Records • NARA requirements[32] • Business requirements ▪ Retention schedule • NARA requirements • Other Government or agency requirements ▪ Snapshots requirements • NARA requirements • National Environmental Planning Act (NEPA) requirements o Develop a records plan, retention schedule, and snapshots plan o Review accuracy of the data, including attributes, to see that they met the business needs of the customer ▪ Make additions, deletions, and updates to the database in a tightly controlled environment to retain database quality and integrity o Create a data QA/QC plan for the dataset ▪ Establish controls for edits and updates ▪ Create review cycles for periodic review of the data against the established QA/QC measures established during the Define stage ▪ Complete reviews and measures with a random sampling of the data or by creating a data review cycle before posting the data to the dataset in final form o Obtain material from the ground (that is, by way of field data collection) and roll up the information into a maintenance plan o Establish standards for maintenance that can be updated to keep data in line with user needs o Establish a standard process for version control ▪ If needed, implement manual version control to facilitate dataset maintenance ▪ Create static snapshots of the dataset at key critical points (for example, updates, modifications to data structure, format changes, attribute additions or modifications, and so forth) o Develop a strategy for updating the process of maintaining the data

[32] 36 CFR Chapter 12, electronic records management

Stage	Data Lifecycle Stage Details
Stage 5	**Maintain**
	▪ Review responsibilities for maintenance, including the following: • FGDC Theme Lead roles • Data steward roles • MOUs between agencies and partners (outline an agreed-upon process) • National and State stewardship plans o Define and develop performance expectations for SLAs as part of service-oriented architecture (SOA) o Establish a feedback process to obtain information from users and incorporate feedback into future maintenance plans o Establish a strategy to retain knowledgeable, experienced and trained staff and make sure that they are using current standards and guidelines **2) Store and manage** • Develop a plan to store and manage data and services (for example, coverage, map, image services geocoding, tools and applications) o Determine the frequency of updates (may vary by dataset or by service) ▪ Determine if updates are reoccurring or performed on an as needed or as requested basis ▪ Establish a point of contact and responsibilities for updates (this is especially important for partnerships) ▪ Use metadata to identify data that may need to be updated in a proactive manner o Evaluate resources based on the projected frequency of the updates o Determine resources available, including the following: ▪ Cost and available funding ▪ Staffing available ▪ Existing or potential partnerships o Determine internal and external storage and management access needs, including the following: ▪ Level of access (classified versus unclassified) ▪ Availability appropriate to the user community o Determine container for data storage and management [for example, databases, compact discs (CDs), clearinghouse, and so forth] ▪ Evaluate internal storage versus external storage ▪ Evaluate internal management versus external management ▪ Evaluate partnerships in management and storage o Establish process for version control (manual, automated, hybrid, and so forth) o Evaluate decision points on data or services that can become key considerations in storage or management o Evaluate storage and management plan against the FEA Geospatial Profile Version 2.0

Stage	Data Lifecycle Stage Details
Stage 6	**Use/Evaluate**
Definition	The ongoing assessment, validation, and potential enhancement of data to meet user needs and business requirements
	• Perform the following steps to help ensure efficient and effective use of geospatial assets: o Review requirements to see that use of the asset meets the requirements and intended outcomes o Validate and verify that the data continue to meet business requirements and user needs ▪ Was information provided in a timely manner? ▪ Are attributes meeting user needs? ▪ Are domain values appropriate and current? ▪ Did the information help the user? ▪ Did the user need to modify the information for his or her use? ▪ Was the information used to geo-enable other business data? ▪ Did or can the information contribute to business process engineering or reengineering within the agency? o Evaluate the data as a part of common services across lines of business ▪ Can data stewards engage in outreach and communication efforts across agencies? ▪ Can data be used in other agencies or organizations? ▪ Do applications that help others use and re-use the agency data currently exist? o Evaluate how resources are being utilized and tracked as the data are used ▪ Do resources used meet expectations? ▪ Did the user take advantage of SOA approaches and SLAs? o Determine the availability or development of user groups to do the following: ▪ Share tools ▪ Identify and develop services ▪ Encourage partnerships and resource sharing ▪ Encourage feedback between user and producer of the data o Establish a feedback loop (an important element of data stewardship) between end users and producers where end users assist in the evolution of the dataset by communicating how they use the data o Enter analysis information and incorporate it into the feedback loop ▪ Periodically evaluate if the data remain useful ▪ If data are becoming obsolete, determine why and if action needs to be taken o Perform QA/QC reviews ▪ Evaluate the data against the quality measures established during the first (Define) and second (Inventory/Evaluate) stages of the data lifecycle ▪ Review the measures established during the first (Define) and second (Inventory/Evaluate) stages of the data lifecycle if the business requirements have changed

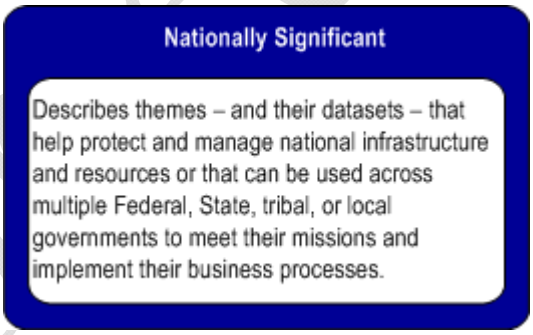
Stage	Working Stage Details
Stage 7	**Archive**
Definition	Required retention of data and the data's retirement into long-term storage
	▪ Develop a written policy for data disposal in accordance with NARA requirements; NARA is mandated to archive for all agencies o Review requirements for archiving information ▪ Records management practices established in the Federal Records Act ▪ 36 CFR 1200 ▪ FGDC requirements ▪ Agency requirements o Archive both internally in the organization responsible for the data (offline storage) and externally (snapshot transfers) o Provide time-stamped versions of copies of data to NARA for long-term preservation in a sustainable format o Work in conjunction with agency IT and records officers to create and implement an archival plan o Identify business needs for archiving: ▪ Isolate datasets to archive; decide whether archived datasets will be composed of the entire dataset each time or subsets of the data • Review business requirements and business needs identified in the first stage (Define) of the data lifecycle • Review plans to obtain and maintain data as established in the third (Obtain) and fifth (Maintain) stages of the data lifecycle ▪ Identify available funding and resources ▪ Develop a method for transferring permanent data to NARA ▪ Dispose of data identified (tied to the plan developed in the Maintain stage) o Determine technical requirements including: ▪ Create data schema to accompany transfer ▪ Select sustainable format to store data in (tied into original decision about data in the Obtain stage) ▪ Establish preservation procedures ▪ Sample to make sure that the data are readable

4.2 Differences between the ISO System Lifecycle and the Data Lifecycle

The International Organization for Standardization (ISO) system lifecycle and the A-16 data lifecycle are both necessary. These two lifecycles are not the same or interchangeable, but are complementary. The ISO system lifecycle provides the framework on which to build a specific application that supports the collection, maintenance, and delivery of data to users. It is physically oriented (focused on computer hardware and software) and has a technical lifespan that requires upgrading and eventual replacement because of its dependency on programming and technical specifications. The data lifecycle uses many of the same concepts but focuses specifically on the data, which may exist within a system or be maintained by one or more specific applications. The data and the data lifecycle should be platform and system independent so that the data can evolve or be migrated to a new platform or application as the business requirements change. Unlike an interface, which may change in response to future developments, the data may change in form but not necessarily in content; the data should be multiple-use (that is, the data should be able to be accessed by multiple users, on multiple systems, for multiple purposes).

5. Process for adjusting OMB Circular A–16 Appendix E: NSDI Geospatial Data Theme Principles

5.1 Purpose of the NSDI Geospatial Data Theme Principles



The purpose of this portion of the supplemental guidance is to create a method for identifying geospatial themes that fall under the purview of OMB Circular A–16. Appendix E of OMB Circular A–16 contains a list of nationally significant themes. This list, however, is not a complete list of all themes and datasets that could be considered nationally significant. OMB Circular A–16, therefore, authorizes the FGDC to adjust the existing list of themes in appendix E after notifying OMB and receiving approval. Accordingly, this supplemental guidance does the following:

- Describes the NSDI geospatial data theme principles, which are to be used collaboratively to identify how a specific topic[33] aligns to OMB Circular A–16 themes of national significance;
- Defines the process for evaluating the topic against the guidelines; and
- Provides a method for the FGDC to exercise its responsibility for adjusting appendix E of OMB Circular A–16.

For purposes of this guidance, "adjusting a theme" in appendix E of OMB Circular A–16 is interpreted to mean adding, deleting, or combining existing themes.

The principles outlined in the following subsections are intended for use by the FGDC to establish, modify, and maintain the list of spatial themes that make up the NSDI. The principles articulate the priorities by which the FGDC shall continue to seek common solutions for geospatial information and

[33] The definition of "topic" can be found in appendix B, ID code A–16-2; see also fig. 3.

services to implement the vision for the NSDI. Thus, any theme and associated data added to OMB Circular A–16, appendix E, is also considered part of the NSDI.

5.2 Geospatial Data Theme Principles

This section contains a brief definition and explanation of each NSDI geospatial data theme principle. To the extent possible, the definition of each principle is consistent with or contains language from official Federal Government documents. These documents include Architecture Principles for the U.S. Government (2007), OMB Circular A–16, OMB Circular A–130, and Geospatial LoB documents.

5.2.1 Principle 1

Themes are national capital assets that serve the needs of citizens, and they should be readily discoverable and accessible to anyone.

- Themes ensure that the needs of citizens are served through the effective and efficient development, provision, and interoperability of geospatial data and services.
- Themes support the development of the National Spatial Data Infrastructure (NSDI), facilitate the efficient collection, sharing, and dissemination of spatial data with public and private sectors; and help address issues that affect the Nation's physical, economic, and social well-being.

Principle 1 correlates directly with principle 1 of the FEA,[34] the vision of the Geospatial LoB, and the vision of the NSDI. Under this principle, A–16 datasets associated with each theme enable Governments to serve the needs of citizens. This is achieved through theme management that promotes the effective and efficient collection, sharing, and disseminations of spatial data. Coordinated collection and use of geospatial data and services allow decision-makers to meet the diverse needs of the Nation.

5.2.2 Principle 2

Themes are national in scope and are created and managed in response to well-defined spatial data requirements that are common across multiple Federal agencies and other organizations.

- Themes are derived from specified or implied requirements for spatial data and services, as articulated in the agencies' federal enterprise architecture (FEA) reference models, data reference models, or related products.
- Themes are mission driven; spatial data are national capitol assets.
  For more information about the FEA and its principles refer to: http://www.whitehouse.gov/omb/egov/a-1-fea.html
- Datasets associated with themes are managed as close to the source as practical.

[34] For more information about the FEA and its principles refer to: http://www.whitehouse.gov/omb/egov/a-1-fea.html

Principle 2 correlates with principle 2 of the FEA, which states that the "Federal architecture is mission-driven." The FEA supports program mission needs and enables technology. When choosing process and technology solutions, agencies seek to optimize business processes, integrate technologies, and then use performance standards to define automation requirements. The business reference models,[35] which are products of the FEA, categorize the functions of the Federal Government. Thus, Federal agencies, which create and maintain geospatial data, must align their investments with those broad functional categories.

5.2.3 Principle 3

Themes reflect legislated mandates; clearly defined directives, such as Homeland Security Presidential Directive 7 (HSPD-7); or core spatial reference datasets.

- Efficient and effective development, provision, and interoperability of geospatial data and services enable the core missions of Federal agencies and their partners.
- Themes reflect foundational, program specific, and homeland security needs that are consistent with the business reference model as well as cross-agency line of business initiatives, E-government initiatives, and other initiatives that span multiple government agencies.

The main purpose of principle 3 is to weigh the need for spatially referenced datasets described under the NSDI, as well as the need for cross-functional spatial data and services. The Federal Government creates vast amounts of geospatial data. Some data form the foundation for georeferencing other data, while other data are common to any cartographic, navigational, or analytic project, are critical to national defense or law enforcement, or are useful for the proper administration of public policy. This principle conveys that datasets may have overarching national significance because they are legislatively required, are essential to homeland security, or are necessary for georeferencing business data. These priorities must be consistent with the business reference models and the other NSDI geospatial data theme principles.

[35] The FEA Business Reference Model is a function-driven framework for describing the business operations of the Federal Government independent of the agencies that perform them (http://whitehouse.gov/omb/egov/a-3-brm.html)

5.2.4 Principle 4

A-16 Themes should promote cohesive and collaborative development, maintenance, and evolution of multiple datasets across Federal, State, tribal, and local governments and the private or nonprofit sectors.

- National spatial data themes collectively enable services that are reliable, effective, and efficient.
- Portfolio management of geospatial resources is essential to help eliminate duplication, avoid redundant expenditures, reduce resources spent on unfunded mandates, accelerate the development of E-government to meet the needs and expectations of citizens and agency programmatic mandates, and improve the efficiency and effectiveness of public management.

Principle 4 correlates with stages of the geospatial data lifecycle (See Figure 2. The data lifecycle) as well as FEA principles 4 and 5. A–16 themes should promote cohesive and collaborative development, maintenance, and evolution of multiple datasets across Federal, State, tribal, and local governments and the private sector. Geospatial themes and associated datasets are key for a single integrated enterprise, which improves the implementation of Government-wide strategies and the coordination of the services to citizens.

5.2.5 Principle 5

Themes focus on the spatial representation of physical assets that are important to the Nation, including boundaries (jurisdictional, legal, and analytical).

- Natural and manmade assts are inherently spatial phenomena.
- Geospatial data are a means to describe the physical location, attributes, and relationships of these phenomena to other business or statistical data and to each other.

Principle 5 loosely correlates with principle 7 of the FEA and, more importantly, it is fundamental to ensuring the integrity of geospatial data and services, given their unique structure. Geospatial data are distinctly different from non-geospatial data. Processes and systems used for geospatial data must be correctly integrated with business data and systems to effectively and accurately leverage the additional levels of business intelligence gained by adding the ability to influence decisions through the examination, analysis, and context of spatial characteristics. Themes and associated datasets are integral parts of unified common operating database (COD), (an interoperable national view and background). Under this COD, the physical, natural, and manmade geographic features, as well as administrative boundaries (which provide a statistical reference) are digitally referenced to each other and to the Earth's surface (that is,

they share the same horizontal and vertical coordinate reference systems). Thus, datasets under each theme provide positional control and referential context, which users can attach to or use to produce their own spatial datasets for a specific subject of interest.

5.3 Application of the NSDI Geospatial Data Theme Principles

In developing the NSDI geospatial data theme principles, the Geospatial LoB Lifecycle Management Work Group explored several processes to adjust themes found in OMB Circular A–16. This assessment included evaluating quantitative and qualitative criteria for modifying A–16 themes and the appropriate communication channels to validate recommendations. The following is a summary of the method agreed upon by the work group:

- Any stakeholder (Federal or non-Federal) requesting to adjust an existing theme or to add a new theme shall inform the chair of the FGDC of said request in writing.
- Requests to adjust an existing theme shall originate from that theme's current lead agency and be presented in writing to the chair of the FGDC.
- The chair of the FGDC shall forward this request to the FGDC Secretariat, whose executive director shall invite the lead agency for the theme to prepare a formal proposal for consideration by the FGDC Coordination Group. The FGDC Secretariat may provide the requesting agency with guidance in the development of the proposal.
- The requesting agency's FGDC Coordination Group member shall present the proposal to the FGDC Coordination Group for consideration.
- The FGDC Coordination Group shall apply the NSDI geospatial data theme principles to the topic(s) presented by the requestor agency.
- Each FGDC Coordination Group[36] member agency may cast one vote on the outcome of the proposal.
- The FGDC Coordination group makes recommendations to the Steering Committee on requests to add, delete, or modify a theme.
- The FGDC Steering Committee votes (in accordance with voting processes outlined in the Coordination Group charter) to approve or disapprove the recommendations of the FGDC Coordination Group.
- Annually, the FGDC Steering Committee shall submit recommended changes to Circular A-16 appendix E to OMB[37] for concurrence.

[36] As identified in FGDC Coordination Group Charter (http://www.fgdc.gov/participation/coordination-group/coordination-group-charter)

Appendix A: Federal Agency and Bureau Representation

Table A-1 lists Federal agencies and bureaus that participate in geospatial data management and the FGDC committees, subcommittees, and groups with which each is associated. The information contained in the table was collected from the FGDC Web site (www.fgdc.gov) and from the list of Federal theme lead agencies included in OMB Circular A–16, appendix E.

Table A-1. High-Level FGDC Representation and Theme Lead Responsibility Matrix

Federal Agency or Bureau[1]	FGDC Executive Committee	FGDC Steering Committee	FGDC Coordination Group	FGDC Subcommittee [2]	FGDC Working Groups [2]	A–16 Lead Agency
OMB	X	X				
Dept. of Ed.		X*	X			
DHS	X	X	X		X	
FEMA		X				X
DOC	X	X	X			
Census		X	X	X		X
NOAA		X*	X	X	X	X
SBA		X*	X			
NGS				X		
DOD	X	X	X			
NGA		X*	X			
USACE		X*	X		X	X
DOE		X	X			
DOI	X	X	X	X		
BIA					X	
BLM			X	X		X
FWS			X	X	X	X
MMS			X		X	X
NPS			X			X
USGS			X	X	X	X
DOJ		X	X			X
DOL		X*	X			

[37] Currently the OMB Office of Electronic Government and Information Technology

Table A-1. High-Level FGDC Representation and Theme Lead Responsibility Matrix

Federal Agency or Bureau[1]	FGDC Executive Committee	FGDC Steering Committee	FGDC Coordination Group	FGDC Subcommittee [2]	FGDC Working Groups [2]	A–16 Lead Agency
DOS		X	X	X		X
DOT		X	X	X		
BTS		X*				X
EPA	X	X	X		X	
FCC		X**	X			
FERC			X			
GSA		X	X			X
HHS		X	X			X
HUD		X	X			X
LOC		X	X			
NARA		X	X		X	
NASA	X	X	X		X	
NCPC		X**	X			
NRC		X*	X			
NSF		X	X			
OPM		X*	X			
Smithsonian		X*	X			
SSA		X*	X			
Treasury		X*	X			
TVA		X	X			
USAID		X*	X			
USDA	X	X	X			
NRCS			X	X	X	X
FS			X	X	X	
FSA			X			
VA		X*	X			

1 - information as of October 2008

2 - indicates agency representative(s) chair(s) FGDC subcommittee or FGDC working group; does not include general membership representation
3 - "*" indicates agencies that have been added by request under the direction of the Charter (see www.fgdc.gov for access to participant charters)
4 – "**" indicates a non-voting agency
NOTE: The FGDC Secretariat provides administrative, technical, and management support for the above FGDC committees/groups

Appendix B: Lexicon of Geospatial Terminology

B.1 Purpose of the Lexicon of Geospatial Terminology

The purpose of the Lexicon of Geospatial Terminology is to provide a common set of geospatially-related terms and concepts to encourage consistent use of terminology and to promote a clearer understanding of the commonly used terms. A common, but living, lexicon that meets logical and taxonomic standards is vital to achieving the goals of the Geospatial LoB and represents the first step in conforming all documents and discussions to a common vocabulary.

This lexicon builds upon the concepts and procedures established within OMB Circular A–16 and provides a point of reference for A–16 reporting (for example, FGDC annual data calls).

B.2 Background and Context of the Lexicon of Geospatial Terminology

In OMB Circular A–16, a single term is sometimes used to represent multiple concepts, which can cause confusion. The data context portion of the Federal Enterprise Architecture (FEA) Data Reference Model includes a framework that was developed to address such problems. The FEA Consolidated Reference Model[38] defines data context as "a standard approach to representing taxonomies that an agency uses to categorize its data. Such categorization enables the business context of data to be well understood." To develop the Lexicon of Geospatial Terminology included in this appendix, the concepts and glossary of OMB Circular A–16 were adapted using this approach. Ongoing modifications of the lexicon will also use this approach.

Topics included in the current lexicon are limited to and consistent with those included in the FEA Business Reference Model (BRM).[39] Although non-Federal stakeholder BRMs will be considered as

[38] This document outlines other FEA reference models (for example, the Service Reference Model, the Data Reference Model, and so forth) in addition the FEA Business Reference Model.

sources for future topics, most future topics are expected to be derived from the nineteen lines of business that are included under the service to citizens component of the FEA BRM.

Topics belong to subfunctional areas under a BRM from which an entity might derive one or more themes. Each theme, in turn, is composed of one or more datasets. Datasets are the actual logical and physical representations of geographic features. As of this writing, all the potential or existing datasets that might make up the National Spatial Data Infrastructure (NSDI) have not yet been identified. The Lexicon of Geospatial Terminology formalizes the hierarchy of topics, themes, and datasets. Currently, there is no concept to capture potential "themes" that are not currently part of OMB Circular A–16. To define possible themes not presently included in the list in OMB Circular A–16, appendix E, the authors chose the word "topic," which is consistent with the FEA Data Reference Model. Fig. B-1 portrays the hierarchy of topics, themes, and datasets and the relationship of topics to themes. It also provides examples of topics and themes, how they flow from BRMs, and how one might use NSDI geospatial data principles or other guidelines to discover candidate A–16 themes.

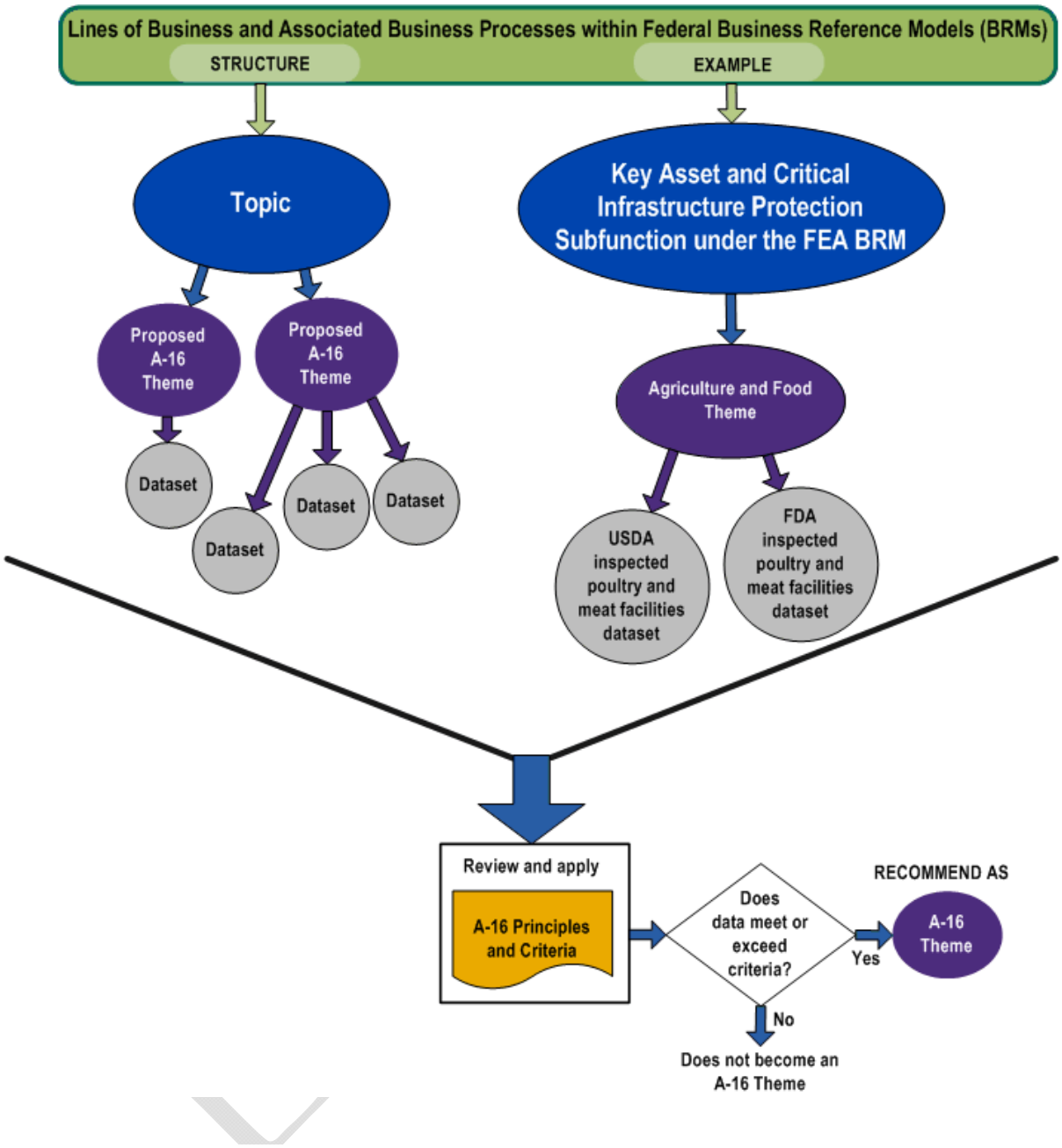


Figure B-1. Hierarchy of topics and themes, and the relationship of topics to themes.
Terms used: BRM, Business Reference Model; FDA, Food and Drug Administration; FEA, Federal Enterprise Architecture; USDA, U.S. Department of Agriculture.

Terms and definitions relevant to the management of A–16 themes are scattered among various key documents, including OMB Circular A–16, FGDC standards, International Organization for Standardization (ISO) standards, U.S. statutes and administrative laws, the FEA Geospatial Profile

Version 2.0, the Geospatial LoB Common Solutions and Common Architecture (CSTA),[40] and various data calls. The Lexicon of Geospatial Terminology incorporates, synthesizes, and resolves the differences among concepts when there are duplicates or conflicts. Every effort was made to recognize existing standards or commonly accepted definitions among the Geospatial LoB representatives. Where standardized definitions were not available, final definitions were determined by consensus among the Geospatial LoB Lifecycle Management Work Group members.

B.3 Geospatial Terminology Categories and Terms

A common, but living, lexicon that meets logical and taxonomic standards is vital to achieving the goals of the Geospatial LoB and represents the first step in conforming all documents and discussions to a common vocabulary. The major categories for geospatial terminology include the following:

- Information (INF)
- Data services (DSV)
- Program management (PMT)
- Geospatial (GEO)
- General services (GSV)
- Geospatial information system services(GIS)
- Data analysis/data services (DAS)
- GIS needs assessment (GNA)
- OMB Circular A–16 data themes (A–16)
- National Spatial Data Infrastructure data themes (NDT)
- Geospatial One-Stop data communities (GOS)
- FEA Geospatial Profile V2, Appendix B: Glossary of Terms (FEA)
- Department of Homeland Security Homeland Security Presidential Directive-7 sectors (DHS)

B.3.1 Information (INF)

Table B-1 is a listing of terms in the Information category as identified in OMB Circular A–130a.

INF ID #	Terms	Definitions of Terms	Source
INF-1	Information	Any communication or representation of knowledge, such as facts, data, or opinions in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audiovisual forms.	OMB Circular A–130a, sSection 6
INF-2	Information Dissemination Pproduct	Any book, paper, map, machine-readable material, audiovisual production, or other documentary material, regardless of physical form or characteristic, disseminated by an agency to the public.	OMB Circular A–130a, section 6
INF-3	Information lifecycle	The stages through which information passes, typically characterized as creation or collection, processing, dissemination, use, storage, and disposition.	OMB Circular A–130a, section 6
INF-4	Information management	The planning, budgeting, manipulating, and controlling of information throughout its lifecycle.	OMB Circular A–130a, section 6
INF-5	Information resources	The term that includes both government information and information technology.	OMB Circular A–130a, section 6

[40] This document was published under the Geospatial Line of Business March 2006 and redacted August 2007 (http://www.fgdc.gov/geospatial-lob/CSTA-redacted-march2007.pdf)

INF ID #	Terms	Definitions of Terms	Source
INF-6	Information processing services organization	A discrete set of personnel, information technology, and support equipment with the primary function of providing services to more than one agency on a reimbursable basis.	OMB Circular A–130a, section 6
INF-7	Information resource management	The process of managing information resources to accomplish agency missions. The term encompasses both information itself and the related resources, such as personnel, equipment, funds, and information technology.	OMB Circular A–130a, section 6
INF-8	Information systems	A discrete set of information resources organized for the collection, processing, maintenance, transmission, and dissemination of information, in accordance with defined procedures, whether automated or manual.	OMB Circular A–130a, section 6
INF-9	Information systems lifecycle	The phases through which an information system passes, typically characterized as initiation, development, operation, and termination.	OMB Circular A–130a, section 6
INF-10	Information technology	Any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by an executive agency. For purposes of the preceding sentence, equipment is used by an executive agency if the equipment is either used by the executive agency directly or is used by a contractor under a contract with the executive agency which (i) requires the use of such equipment, or (ii) requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product. The term "information technology" includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources. The term "information technology" does not include any equipment that is acquired by a Federal contractor incidental to a Federal contract. The term "information technology" does not include national security systems as defined in the Clinger-Cohen Act of 1996 (40 U.S.C. 1452).	OMB Circular A–130a, section 6
INF-11	Hardware	Equipment acquired and maintained, including under vendor and contractor maintenance contracts, and used for geographic information systems. Such equipment includes the following: • Personal computers (PCs): desktop PCs, workstations, laptops and associated components, such as memory and memory upgrades, hard drives and other storage devices, video and sound cards, cables, keyboards, mice, monitors, and so forth; • Servers: file, print, application, Web, database, and any other types of servers and associated components, such as hard drives, backup units, memory, equipment, cables, adapters, and so forth; • Printers and scanners: printers, plotters, digital scanners, and barcode readers; • Handheld devices: global positioning system (GPS) units and personal digital assistants (PDAs); • Other storage devices: removable hard drives, zip drives, and jump drives; • Telecommunications services that specifically support geospatial information systems and program operations, including: o Cabling - purchase and (or) installation of facility wiring and related components to support data communications; o Maintenance - maintenance and repair of local area network (LAN)/wide area network (WAN) connectivity, in total or any part, including telecommunications support for network infrastructure; • Hosting: database and application hosting costs; and • Other: related components and costs not specifically mentioned above.	OMB Geospatial Data Call 2006/2007

INF ID #	Terms	Definitions of Terms	Source
INF-12	Software	Applies to all types of computers (for example, desktops, laptops, servers, and so forth) and includes operating systems, application software, database management software, software development suites, and any ongoing software maintenance and upgrades. Software can be either commercial off-the-shelf software or custom-developed software (that is, software developed by a vendor or contractor). Computer software used for geographic information systems (GIS) (see definition GEO-1) includes but is not limited to spatial database software, spatial data viewers, three-dimensional visualization software, software used for map development, and the associated software licenses and maintenance plans and contracts for this software. It does not include Web-based geospatial services (see definition GEO-6) nor software that comes loaded on or with a personal computer (PC) at the time of purchase.	OMB Geospatial Data Call 2006/2007

B.3.2 Data Services (DSV)

Table B-2 is a listing of terms in the Data Services category.

DSV ID #	Terms	Definitions of Terms	Source
DSV-1	Services	Automated program, interface, application, or engine that performs a defined action that can be found, invoked, and executed over the Web. A geospatial Web-based service is a service that performs an action on geospatial data or information to transform, translate, or convert it to a more usable format or to update, distribute, or integrate it into an existing database or dataset for use.	OMB Geospatial Data Call 2006/2007
DSV-2	Data acquisition	Activities and costs associated with the purchase or lease of geospatial datasets from commercial, governmental, or nongovernmental entities, including States, tribes, local governments, other Federal agencies, and nongovernmental organizations for use in geospatial information systems and software.	OMB Geospatial Data Call 2006/2007
DSV-3	Data collection	Activities and costs associated with the collection of new geospatial data (that is, data not available commercially or from other governmental or nongovernmental entities) for use in geospatial information systems and software. Includes costs associated with data development and with joining a data consortium that collects or develops new data.	OMB Geospatial Data Call 2006/2007
DSV-4	Data distribution	Any dissemination of data for use, manipulation, or integration into a geospatial information system or application that is not specifically part of a Web-based geospatial service (as defined in definition DSV-1, services). Can include a wide variety of formats and mechanisms, including electronic data interchange (EDI), Extensible Markup Language (XML), File Transfer Protocol (FTP) sites, Web sites, data marts and data warehouses, CD-ROMs, and DVDs. Can also include a variety of file types, including shapefiles, coverages, personal geodatabases, spreadsheets, and relational database files. The types of data disseminated may include raster, vector, and tabular data.	OMB Geospatial Data Call 2006/2007

DSV ID #	Terms	Definitions of Terms	Source
DSV-5	Data processing	Any computer process that converts geospatial data into information. Applies defined operations to a set of geospatial data inputs and generates new information that answers a spatial question. Geoprocessing tools range from common geographic information system (GIS) operations, such as overlay, buffer, and data management, to more advanced operations for raster processing, topology, and schema definition. Data processing is usually automated and electronic in nature, and occurs prior to usage. Conversion of source files from one format to another [for example, conversion of existing non-GIS hard copy materials or electronic files, such as engineering or computer-aided design (CAD) drawings, site maps, and aerial photographs, into digital inputs and outputs, or from a spreadsheet file to a database (.dbf) file] would fall under the data processing category, as would geocoding.	OMB Geospatial Data Call 2006/2007
DSV-6	Data and (or) spatial analysis	Analysis of geospatial data for the purpose of developing a targeted geospatial product or answering a specific programmatic question; for example, analysis of geospatial data for the purpose of developing a fact sheet and associated maps on permitted outfalls within a mile of a priority watershed in New Jersey. Data and (or) spatial analyses are usually done after the initial data processing and distribution are complete.	OMB Geospatial Data Call 2006/2007
DSV-7	Data layer	Visual representation of a geographic dataset in any digital map environment; a slice of geographic reality in a particular area.	Adapted from ESRI Web site (November 2008) (www.esri.com)

B.3.3 Program Management (PMT)

Table B-3 is a listing of terms in the Program Management category.

PMT ID #	Terms	Definitions of Terms	Source
PMT-1	Program management	Includes a suite of activities that support the goals of the national geospatial program, including: geospatial policy and guidance development (for example, National geospatial data policy), geospatial enterprise architecture planning (for example, business process to geospatial component mapping), governance development (for example, creation of a geospatial Steering Committee and associated charter and standard operating procedures), standards development (for example, FGDC standards), and strategic planning support (for example, data acquisition planning and geospatial blueprint development).	Adapted from FGDC Web site (May 2008) (www.fgdc.gov)
PMT-2	Program outreach	Includes such activities as training and help desk support focused on providing education and assistance to program staff for the purpose of enabling increased usage of geospatial data and tools in day-to-day business operations. Also includes support provided to internal and external customers for the purpose of facilitating use of geospatial data and tools in decisionmaking or program evaluation efforts, as well as the development of partnerships among Federal agencies or among Federal agencies and non-Federal stakeholders.	Adapted from FGDC Web site (May 2008) (www.fgdc.gov)
PMT-3	Policy and guidance development	The development of an overall vision, set of policies, implementation strategy, and set of best practices for utilizing geospatial data and technologies as effectively as possible across an enterprise.	Adapted from FGDC Web site (May 2008) (www.fgdc.gov)

PMT ID #	Terms	Definitions of Terms	Source
PMT-4	Enterprise architecture planning	The development of a framework in which one describes and justifies investments of personnel, data, and applications within an enterprise. Enterprise architecture planning is a practice used to identify geospatial capabilities across an enterprise to address consistency, functional capabilities, and performance in order to leverage geospatial investments.	Adapted from FGDC Web site May 2008 (www.fgdc.gov)
PMT-5	Standards development	Development of common geospatial content, structure, or exchange specifications.	Adapted from FGDC Web site (May 2008) (www.fgdc.gov)
PMT-6	Enterprise Architecture	The explicit description and documentation of the current and desired relationships among business and management processes and information technology.	*CSTA* Document (Redacted March 2007)
PMT-7	Strategic planning	Planning that focuses on longer range objectives and goals.	*CSTA* Document (Redacted March 2007)
PMT-8	Governance	The people, policies, and processes that provide the framework within which managers make decisions and take actions to optimize outcomes related to their spheres of responsibility.	*CSTA* Document (Redacted March 2007)

B.3.4 Geospatial (GEO)

Table B-4 is a listing of terms in the Geospatial category as identified in the Federal Enterprise Architecture Geospatial Profile, ver 2.

GEO ID #	Terms	Definitions of Terms	Source
GEO-1	Geographic information system	A system for the storage, retrieval, analysis, display, and maintenance of geographic information.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GEO-2	Geospatial data	Data with implicit or explicit reference to a location relative to the Earth's surface; Spatial data are geographically referenced features that are described by geographic positions and attributes in an analog or computer-readable (digital) form.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GEO-3	Feature	An abstraction of real world phenomena.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GEO-4	Geospatial information	Information concerning phenomena implicitly or explicitly associated with a location relative to the Earth's surface.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GEO-5	Geospatial information system	An information system dealing with information concerning phenomena associated with a location relative to the Earth's surface.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)

GEO ID #	Terms	Definitions of Terms	Source
GEO-6	Geospatial service	A service that transforms and manages geospatial information and presents the information to users.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)
GEO-7	Geospatial service component	A component or service that has geospatial data or information as a primary input or output.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GEO-8	Lead agency point of contact for data themes	Designated point of contact within the lead agency for themes who will be responsible for the development, maintenance, coordination, and dissemination of data using the National Spatial Data Clearinghouse.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GEO-9	Framework data themes	Themes providing the core (most commonly used) set of base data are known as framework data; the themes are geodetic control, orthoimagery, elevation and bathymetry, transportation, hydrography, cadastral, and governmental units. Other themes of national significance are also an important part of the National Spatial Data Infrastructure (NSDI), and must be available to share with others. Additional themes may be added with the approval of the FGDC.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)

B.3.5 General Services (GSV)

Table B-5 is a listing of terms in the General Services category.

GSV ID #	Terms	Definitions of Terms	Source
GSV-1	Shared services	A form of internal outsourcing that enables corporations to achieve economies of scale by creating a separate internal entity within the company to perform specific services, such as payroll, accounts payable, travel, and expense processing. A typical shared services initiative takes advantage of enterprise applications and other technological developments, enabling the company to achieve additional improvements in quality to processes, such as finance, accounting, procurement, information technology (IT), and human resources. At the core of shared services is the idea that new technologies offer businesses the opportunity to (1) make better use of scarce skills, (2) provide information and services more efficiently, and (3) reduce the cost of administration. (See also definition GSV-2, service.)	OMB Circular A–16 2002) ISO191192005 (E)
GSV-2	Service	A specific type of component that is explicitly intended to be shared and reused by multiple applications, either internal or external to the organization. Also defined as a distinct part of the functionality that is provided by an entity through interfaces.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
GSV-3	Service component	Modularized service-based applications that package together and process service interfaces with associated business logic into a single cohesive conceptual module. The aim of a service component is to raise the level of abstraction in software services by modularizing synthesized service functionality and by facilitating service reuse, service extension, specialization, and service inheritance.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)

GSV ID #	Terms	Definitions of Terms	Source
GSV-4	Service-oriented architecture (SOA)	A way of designing a system to provide services to either end-user applications or other services through published and discoverable interfaces. In many cases, services offer a better way to expose discrete business functions and, therefore, an excellent way to develop applications that support business processes.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)

B.3.6 GIS Services (GIS)

Table B-6 is a listing of terms in the GIS Services category.

GIS ID #	Terms	Definitions of Terms	Source
GIS-1	Mapping services	These services access vector and raster data and render them in the form of a map for display (combines access and portrayal). Independent of whether the underlying data are features (point, line, and polygon) or coverages (such as gridded digital terrain models or images), the mapping service produces data that can be directly viewed in a Web browser. Data are labeled as one or more "layers," each of which is available in one or more "styles."	
GIS-2	Image services	Upon request, an image service provides an image of the requested layer(s) in either the specified or default rendering style(s). Typical output formats include Portable Network Graphics (PNG) format, Graphics Interchange Format (GIF), Joint Photographic Expert Group (JPEG) format, and Tagged Image File Format (TIFF).	
GIS-3	Feature services	An application and supporting services for selecting, browsing, extracting, transforming, integrating, and updating of a feature database. Assures that requestor credentials are sufficient for requested changes and that changes requested do not violate validation rules. Accesses one or more resource catalog servers.	
GIS-4	Metadata services	An application and supporting services for browsing, entering, transforming, integrating, and updating metadata for geospatial resources, and optionally, updating of associated geospatial resource records. (Geospatial resources include maps and data from which maps may be derived, and may include ancillary products and services. A geospatial catalog lists the various ways by which geospatial resources may be characterized and associated.)	
GIS-5	Gazetteer services	A service that provides the ability to determine the geospatial coordinates for a place, given the place name or attributes. This function accesses a database of geographic place names, together with their geographic locations and other descriptive information.	
GIS-6	Geo-analytical services	A Web service that computes a geographic function for a specified geographic input. For example, the TotalWaters Web service computes the amount of stream miles and lake acres within a user-defined bounding box.	
GIS-7	Image processing system (IPS)	An integrated system for collecting, storing, accessing, sharing, disseminating, integrating, manipulating, visualizing, analyzing and otherwise exploiting geospatial imagery. An IPS focuses on producing and exploiting digital orthoimagery that conveys geospatial information in raster image form. It is used widely in government, education, and business. Also, a general-purpose collection of tools for processing geospatial imagery. It normally consists of one or more applications with one or more databases. The IPS may be configured as a desktop application or as a collection of client and server components.	

B.3.7 Data Analysis/Data Services (DAS)

Table B-7 is a listing of terms in the Data Analysis/Data Services (DAS) category.

DAS ID #	Terms	Definitions of Terms	Source
DAS-1	Maps/cartography	A graphical depiction or representation of geospatial information and related data.	
DAS-3	Plats	A plan showing lines and interrelationship of lines with dimensional data on lines.	
DAS-2	Geospatial product development	Development of output from geospatial software, including both digital and hardcopy formats. Geospatial products may include maps (hard or soft copy), digital data, compact discs, charts, or other secondary products derived from geospatial input.	

B.3.8 GIS Needs Assessment (GNA)

Table B-8 is a listing of terms in the GIS Needs Assessment (GNA) category as identified in the Geospatial Common Solutions and Target Architecture document (CSTA, which was redacted in March 2007).

GNA ID #	Terms	Definitions of Terms	Source
GNA–1	Budget planning	Tactical or operational financial planning.	CSTA Document (Redacted March 2007)
GNA–2	Asset lifecycle management	The management of an asset (both data and services assets) covering all phases of acquisition, operation, and logistics support of an item, beginning with concept definition and continuing through disposal of the asset.	CSTA Document (Redacted March 2007)
GNA–3	Relationship management	The management of relationships formed by two or more organizations that share or participate in joint investments, and develop linked and common processes to increase the performance of both organizations.	CSTA Document (Redacted March 2007)
GNA–4	Acquisition planning	The process by which all acquisition-related disciplines of an acquisition program are developed, coordinated, and integrated into a comprehensive plan for executing the program and meeting the stated requirements within the cost and schedule boundaries.	CSTA Document (Redacted March 2007)
GNA–5	Requirements management and planning	Requirements management and planning is concerned with understanding the goals of the organization and its customers, and the transformation of these goals into potential functions and constraints.	CSTA Document (Redacted March 2007)
GNA–6	Requirements prioritization	The strategic organization of requirements to address business priorities.	CSTA Document (Redacted March 2007)
GNA–7	Requirements optimization	The tactical organization of requirements to maximize the return on investment.	CSTA Document (Redacted March 2007)
GNA–8	Define	Characterization of data requirements based upon business-driven user needs (stage 1 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)
GNA–9	Inventory/Evaluate	The creation and publication of a detailed list of data assets and data gaps (both internal and external) as they relate to business-driven user needs (stage 2 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)
GNA–10	Obtain	The collection, purchase, conversion, transformation, sharing, exchanging, or creation of geospatial data that were selected to meet the business needs identified (stage 3 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)
GNA–11	Access	Making the data produced known and retrievable to the user community through documentation and discovery mechanisms so the users can meet their business requirements (stage 4 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)
GNA–12	Maintain	Ongoing processes and procedures to ensure that the data meet business requirements (stage 5 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)

GNA ID #	Terms	Definitions of Terms	Source
GNA–13	Use/Evaluate	The ongoing assessment, validation, and potential enhancement of data to meet user needs and business requirements (stage 6 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)
GNA–14	Archive	Required retention of data and the data's retirement into long-term storage (stage 7 of the geospatial data lifecycle).	A–16 supplemental guidance (2008)
GNA–15	Update resource content	To change content of a published asset.	CSTA Document (Redacted March 2007)
GNA–16	Resource maintenance	The provision of a level of service against assets.	CSTA Document (Redacted March 2007)

B.3.9 A–16 Data Themes (A–16)

Table B-9 is a listing of terms in the A–16 Data Themes category. It includes the definitions of key stakeholder groups and terms associated with A–16 portfolio management and OMB Circular A–16, appendix E.

A–16 ID #	Terms	Definitions of Terms	Source
A–16-1	Themes	Representations of conceptual topics describing digital spatial information for the Nation. Themes contain associated datasets (with attribute records and coordinates) that are documented, verifiable, and officially designated to meet recognized standards. A theme contains one or more datasets of geographic information to be used in common and from which other datasets can be derived. Themes are codified in OMB Circular A–16.	A–16 supplemental guidance (2008)
A–16-2	Topics	The central concept for applying context to data; an aggregate of characteristics, occurrences, and roles played in associations with other topics, whose organizing principle is a single subject. A subject (an area of study) is, in the most generic sense, anything whatsoever, regardless of whether it exists or has any other specific characteristics, about which anything whatsoever may be asserted by any means whatsoever.	FEA and ISO 13250:2002
A–16-3	Datasets	Actual logical and physical representations of geographic features.	OMB Circular A–16
A–16-4	Geospatial portfolio	Geospatial assets that can be brought to bear to address an issue. These assets include funding, data, infrastructure, hardware, software, applications, personnel, services, and products.	A–16 supplemental guidance (2008)
A–16-5	Portfolio management	Geospatial portfolio management (portfolio management) is the process of tracking, maintaining, expanding, and aligning or realigning assets to address and solve the business needs of an enterprise. To understand what assets exist and to ensure their quality and usability, data must be: • Reliable – coordinated by a recognized national steward • Consistent – supported by defined and understood content definitions to ensure their integrity • Current and applicable – maintained regularly and adaptable to current needs • Resourced – established and recognized as an enterprise investment Although geospatial portfolio management is much broader than just these few described aspects, these form the foundation on which geospatial portfolio management is built.	A–16 supplemental guidance (2008)

A–16 ID #	Terms	Definitions of Terms	Source
A–16-6	Framework data	Seven themes of geospatial data that are used by most organizations (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.	OMB Circular A–16: Appendix E (2002)
A–16-7	National Spatial Data Infrastructure (NSDI)	The NSDI ensures that spatial data from multiple sources (Federal, State, tribal, and local governments, academia, and the private sector) are available and easily integrated to enhance the understanding of our physical and cultural world. The NSDI reflects several key public values: ● Privacy and security ● Data accuracy ● Access for all citizens ● Protection of proprietary interests ● Interoperability of Federal information systems	Adapted from OMB Circular A–16 (2002)
A–16-8	Lead agencies (for themes)	Certain Federal agencies have lead responsibilities for coordinating the national coverage and stewardship of specific spatial data themes. The themes in the NSDI, their description, and the responsible lead for each theme are listed in OMB Circular A–16, appendix E. Lead agency responsibilities and new themes may be added or altered by recommendation of the FGDC and concurrence by the OMB.	OMB Circular A–16: Appendix E (2002)
A–16-9	Executive Theme Champions	Senior-level individuals who advocate for a particular theme and its associated datasets, including marketing the benefits of the theme in meeting Federal Government business requirements and stakeholder needs. They have fiduciary responsibilities and access to resources, which allow them to reach out to other senior leaders from other organizations to obtain funding and resources for their assigned theme(s). They are also involved in establishing the high-level vision for their theme(s) and dataset(s) and provide strategic direction that ensures alignment with other A–16 themes and key Federal initiatives.	A–16 supplemental guidance (2008)
A–16-10	A–16 Theme Leads	Individuals who provide government-wide and nongovernment stakeholder coordination, planning, and leadership needed to develop and integrate datasets that fall under a theme. These individuals manage and coordinate their theme(s) with managers of other themes, as appropriate. They work with National A–16 Dataset Managers to develop effective strategies for planning, developing, distributing, maintaining, and evolving datasets associated with the theme(s) for which they are responsible, including ensuring overall dataset requirements and addressing each stage of the data lifecycle in accordance with the lifecycle management guidance (December 2008). They are responsible for annually reporting progress in completing and maintaining all datasets, under the purview of the theme(s) they manage, to the FGDC Secretariat as outlined in FGDC reporting guidance.	A–16 supplemental guidance (2008)

A–16 ID #	Terms	Definitions of Terms	Source
A–16-11	National A–16 Dataset Managers	Individuals who work with Theme Leads and data stewards to ensure successful planning, implementation, maintenance, and evolution of nationally significant datasets associated with the themes listed in OMB Circular A–16. As necessary, they work with the Theme Leads and critical stakeholders to establish standards for the dataset(s) whose production they manage. They are accountable for overseeing the implementation of all seven phases of the data lifecycle outlined in the lifecycle management guidance (December 2008) and are responsible for reporting progress in completing and meeting the requirements of this guidance and the overall state of the dataset to the Theme Lead. They provide an annual written report on progress made toward completing the dataset and maintaining it over time to the Theme Lead who manages the theme(s) under which their data falls.	A–16 supplemental guidance (2008)
A–16-12	Data stewards	Individuals who work with Theme Leads and National A–16 Dataset Managers (or principal dataset managers) to ensure the successful implementation of nationally significant datasets associated with themes identified in OMB Circular A–16. They are accountable for implementing national standards and data models within their organization. They are responsible for the documentation, metadata, and responsible usage of the datasets within their organization. Data stewards also work with subject matter experts and program specialists within in their organization to integrate geospatial data into agency business processes.	A–16 supplemental guidance (2008)
A–16-13	Data end users	Individuals and agencies who use data after the dataset has been fully developed; the intended user s of the data.	A–16 supplemental guidance (2008)
A–16-14	Community of interest (COI)	Group of individuals and (or) agencies that exchange information in pursuit of common goals, missions, or business processes.	Adapted from DoD TECHGUIDE (December 2004)
A–16-15	Community of practice (CoP)	A group of individuals and (or) agency geospatial practitioners who promote collaboration of people and efforts around a common issue, topic, goal, or objective.	
A–16-16	Common operating picture (COP)	A single identical display of relevant information shared by more than one organization. A COP facilitates collaborative planning and assists all echelons to achieve situational awareness.	DoD Dictionary of Military and Associated Terms (Amended October 2008)
A–16-17	A-16 Stakeholder Community	A group of individuals and (or) agencies that affect or are affected by A–16 themes and associated datasets. This group is composed of Federal agency partners, including State, tribal, and local governments, the private and nonprofit sectors, academia, and the public at-large.	Adapted from OMB Circular A–16 (2002)
A–16-18	Annual reporting	The submission of progress reports on the NSDI that are made by theme lead agencies to the FGDC to fulfill the yearly reporting requirements of OMB Circular A–16	Adapted from FGDC Web site November 2008 (www.fgdc.gov)
A–16-19	Executive agency	An Executive department, a Government corporation, and an independent establishment (5 USC § 105)	Accessed from www.whitehouse.gov November 2008
A–16-20	Government corporation	(1) "Government corporation" means a corporation owned or controlled by the Government of the United States; and (2) "Government controlled corporation" does not include a corporation owned by the Government of the United States (5 USC § 103)	Accessed from www.whitehouse.gov November 2008
A–16-21	Independent establishment	An independent establishment means an establishment in the Executive branch (other than the United States Postal Service or the Postal Regulatory Commission) that is not an Executive department, military department, Government corporation, or part thereof, or part of an independent establishment (5 USC § 104)	Accessed from www.whitehouse.gov November 2008

B.3.10 NSDI Data Themes (NDT)

Table B-10 is a listing of terms in the NSDI Data Themes (NDT) category as identified in OMB Circular A–16, appendix E.

NDT ID #	Terms	Definitions of Terms	Source
NDT-1	Nationally significant	Describes themes—and their datasets—that help protect and manage national infrastructure and resources or that can be used across multiple Federal, State, tribal, or local governments to meet their missions and implement their business processes.	Adapted from OMB Circular A–16: Appendix E (2002)
NDT-2	Baseline (maritime)	Baseline (maritime) 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 to mean lower low water, as depicted on National Ocean Service nautical charts and (or) appropriate supplemental information.	OMB Circular A–16: Appendix E (2002)
NDT-3	Biological resources	Biological resources include data pertaining to, or descriptive of, (nonhuman) biological resources and their distributions and habitats, including data at the suborganismal (genetics, physiology, anatomy, and so forth), organismal (subspecies, species, systematics), and ecological (populations, communities, ecosystems, biomes, and so forth) levels.	OMB Circular A–16: Appendix E (2002)
NDT-4	Cadastral	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.	OMB Circular A–16: Appendix E (2002)
NDT-5	Cadastral (offshore)	Offshore cadastre is the land management system used on the Outer Continental Shelf. It extends from the baseline to the extent of U.S. jurisdiction. Existing coverage is currently limited to the conterminous United States and portions of Alaska. The maximum extent of U.S. jurisdiction is not yet mathematically calculated.	OMB Circular A–16: Appendix E (2002)
NDT-6	Climate	Climate data describe the spatial and temporal characteristics of 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.	OMB Circular A–16: Appendix E (2002)
NDT-7	Cultural and demographic statistics	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.	OMB Circular A–16: Appendix E (2002)
NDT-8	Cultural resources	Cultural resources include 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.	OMB Circular A–16: Appendix E (2002)
NDT-9	Digital orthoimagery	This dataset contains georeferenced images of 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 the image qualities of a photograph.	OMB Circular A–16: Appendix E (2002)

NDT ID #	Terms	Definitions of Terms	Source
NDT-10	Earth cover	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 Earth. This theme differs from the Vegetation and Wetlands themes, which provide additional detail.	OMB Circular A–16: Appendix E (2002)
NDT-11	Elevation bathymetric	Bathymetric data for inland and intercoastal waterways are 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. These data are also used to create electronic navigational charts. The bathymetric sounding data support the elevation layer of the geospatial data framework.	OMB Circular A–16: Appendix E (2002)
NDT-12	Elevation terrestrial	These data contain georeferenced digital representations of terrestrial surfaces, natural or manmade, that describe vertical position above or below a datum surface. Data may be encapsulated in an evenly spaced grid (raster form) or may be randomly spaced (triangular irregular network, hypsography, and single points). The elevation points can have varying horizontal and vertical resolution and accuracy.	OMB Circular A–16: Appendix E (2002)
NDT-13	Buildings and facilities	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, powerplant, fishery, national park, office building, space command center, or prison. Facility data are submitted from several agencies because there is no one party responsible for all the facilities in the Nation and because facilities encompass a broad spectrum of activities. The FGDC promotes standardization of database structures and schemas to the extent practical.	OMB Circular A–16: Appendix E (2002)
NDT-14	Federal land ownership status	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.	OMB Circular A–16: Appendix E (2002)
NDT-15	Flood hazard	National Flood Insurance Program has prepared flood hazard data (Digital Flood Insurance Rate Maps, or DFIRM) 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.	OMB Circular A–16: Appendix E (2002)
NDT-16	Geodetic control	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.	OMB Circular A–16: Appendix E (2002)
NDT-17	Geographic names	This dataset contains data or information on geographic place names deemed official for Federal use by the U.S. Board on Geographic Names pursuant to Public Law 80-242. Geographic names information includes both the official place name (current, historical, and aliases) and the locative direct (that is, geographic coordinates) and indirect (that is, State and County where the place is located) geospatial identifiers; place names are categorized as populated places, schools, reservoirs, parks, streams, valleys, and ridges.	OMB Circular A–16: Appendix E (2002)

NDT ID #	Terms	Definitions of Terms	Source
NDT-18	Geologic	The geologic spatial 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 pursuant to Public Law 106-148.	OMB Circular A–16: Appendix E (2002)
NDT-19	Governmental units	These data describe, by a consistent set of rules and semantic definitions, the official boundary of Federal, State, tribal, or local governments as certified by responsible officials of each government and reported to the U.S. Census Bureau for the purpose of reporting the Nation's official statistics.	OMB Circular A–16: Appendix E (2002)
NDT-20	Housing	The U.S. Department of Housing and Urban Development's (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.	OMB Circular A–16: Appendix E (2002)
NDT-21	Hydrography	This 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 (U.S. 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.	OMB Circular A–16: Appendix E (2002)
NDT-22	International boundaries	International boundary data include both textual information to describe, and geographic information system (GIS) digital cartographic data to depict, both land and maritime international boundaries, other lines of separation, limits, zones, enclaves and exclaves, and special areas between States and dependencies.	OMB Circular A–16: Appendix E (2002)
NDT-23	Law enforcement statistics	Law enforcement statistics describe the occurrence of events (including incidences, offenses, and arrests) that are geospatially located and 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. Note, DOJ will not release the names of "individuals involved in those occurrences" unless it is already part of a public data release in the data set.	OMB Circular A–16: Appendix E (2002)
NDT-24	Marine boundaries	Marine boundaries depict offshore waters and seabeds over which the United States has sovereignty and jurisdiction.	OMB Circular A–16: Appendix E (2002)
NDT-25	Offshore minerals	Offshore minerals include minerals occurring in submerged lands. Examples of marine minerals include oil, gas, sulfur, gold, sand and gravel, and manganese.	OMB Circular A–16: Appendix E (2002)
NDT-26	Outer Continental Shelf submerged lands	These data include 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.	OMB Circular A–16: Appendix E (2002)
NDT-27	Public health	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 factors, tuberculosis surveillance, hazardous substance releases and health effects, hospital statistics, and other similar data.	OMB Circular A–16: Appendix E (2002)
NDT-28	Public land conveyance (patent) records	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 that describe the right, title, and interest of a parcel.	OMB Circular A–16: Appendix E (2002)

NDT ID #	Terms	Definitions of Terms	Source
NDT-29	Shoreline	Shorelines represent the intersection of the land with the water surface. The shoreline shown on National Oceanic and Atmospheric Administration (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.	OMB Circular A–16: Appendix E (2002)
NDT-30	Soils	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 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.	OMB Circular A–16: Appendix E (2002)
NDT-31	Transportation	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 nonphysical components representing all modes of travel that allow the movement of goods and people between locations.	OMB Circular A–16: Appendix E (2002)
NDT-32	Transportation (marine)	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 U.S. Army Corps of Engineers (USACE). The Navigation Framework will provide the basis for the marine transportation theme of the geospatial data framework.	OMB Circular A–16: Appendix E (2002)
NDT-33	Vegetation	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.	OMB Circular A–16: Appendix E (2002)
NDT-34	Watershed boundaries	This 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.	OMB Circular A–16: Appendix E (2002)
NDT-35	Wetlands	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.	OMB Circular A–16: Appendix E (2002)

B.3.11 Geospatial One-Stop (GOS) Data Communities – (GOS)

Table B-11 is a listing of terms in the Geospatial One-Stop Data Communities (GOS) category. These definitions have been adapted from information on the Geospatial One-Stop Web site (www.geodata.gov).

GOS ID #	GOS Terms	Definitions of Terms	Source
GOS-1	Administrative and political boundaries	The Administrative and Political Boundaries channel accommodates the voluminous universe of geospatial boundary types, including governmental unit boundaries, statistical tabulation boundaries, marine boundaries, and administrative areas. Examples of administrative and political boundaries include State and county boundaries, voting districts, Federally owned and managed lands, local tax districts, school districts, flood zones, empowerment and enterprise zones, American Indian trust lands, and minor civil divisions. The administrative and political boundaries channel is maintained by the U.S. Census Bureau.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-2	Agriculture and farming	The Agriculture and Farming category Web page was authored by the geodata.gov development team in May 2003.Typical keywords are agriculture, irrigation, aquaculture, plantation, crops, herding, pests, diseases, or livestock.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-3	Atmosphere and climate	Climate data describe the spatial and temporal characteristics of 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. Typical keywords are cloud cover, weather, climate, atmospheric conditions, climate change, atmosphere, air, sky, or precipitation.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-4	Biology and ecology	The Biology and Ecology category Web page was authored by the National Biological Information Infrastructure (NBII) knowledge management team. These data pertain to, or are descriptive of (nonhuman) biological resources and their distributions and habitats, including data at the suborganismal (genetics, physiology, anatomy, and so forth), organismal (subspecies, species, systematics), and ecological (populations, communities, ecosystems, biomes, and so forth) levels.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-5	Business and economics	The Business and Economic category Webpage has been managed since June 2004 by Professor Grant Thrall of the University of Florida, and a team representing the American Real Estate Society (ARESnet.org). If you are new to this site, one might first check out the collection of links on Downloadable Data—Featured Real Estate and Business Geography. Metadata there includes keywords that one can use to query with the Geospatial One-Stop (GOS) search engine. Typical keywords are income, wage, production, labor, revenue, commerce, housing, office, retail, unemployment, industry, population.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-6	Cadastral	The Cadastral category Web page is maintained by the FGDC Subcommittee for Cadastral Data. 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. Offshore Cadastre is the land management system used on the Outer Continental Shelf. It extends from the baseline to the extent of U.S. jurisdiction. Existing coverage is currently limited to the conterminous United States and portions of Alaska. Maximum extent of U.S. jurisdiction is not yet mathematically calculated.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)

GOS ID #	GOS Terms	Definitions of Terms	Source
GOS-7	Culture, society and demographics	The Cultural, Society, and Demographic channel is maintained by the U.S. Census Bureau. Because it is the largest and most diverse of the Geospatial One-Stop (GOS) channels, the information has been subdivided into a number of sub-channels. Examples of information available through this channel include archeological sites, crime statistics, population statistics, housing characteristics, and information on education, tribal populations and welfare.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-8	Elevation and derived products	The Elevation and Derived Products category Web page was authored by the U.S. Geological Survey and its partners in June 2004. These data contain georeferenced digital representations of terrestrial surfaces (natural or manmade) or bathymetric data, and their height above or below a reference datum surface. Data may be encapsulated in an evenly spaced grid (raster form) or may be randomly spaced (triangular irregular network, hypsography, and single points). The elevation points can have varying horizontal and vertical resolution and accuracy.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-9	Environment and conservation	The Environment and Conservation category Web page was authored by the geodata.gov development team in May 2003, and will be maintained by the U.S. Environmental Protection Agency. Typical keywords are environment, pollution, waste storage, waste treatment, environmental impact assessment, environment, conservation, meteorology, land use, remediation, nature, EIA, monitoring, risk, nature reserves, landscape, natural resources, environmental risk, heritage, water quality, and habitat.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-10	Geology and geophysical	The Geological and Geophysical category Web page was authored by the geodata.gov development team in May 2003. The geologic spatial 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 pursuant to Public Law 106-148. Offshore minerals include minerals that occur in submerged lands. Examples of marine minerals include oil, gas, sulfur, gold, sand and gravel, and manganese. 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 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.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-11	Human health and disease	The Human Health and Disease category Web page was authored by the geodata.gov development team in May 2003. Human health theme relates 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 factors, tuberculosis surveillance, hazardous substance releases and health effects, hospital statistics, and other similar data. Typical keywords are disease, illness, health, hygiene, substance abuse, mental health, physical health, or health care providers.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)

GOS ID #	GOS Terms	Definitions of Terms	Source
GOS-12	Imagery and base maps	The Imagery and Base Maps category Web page was authored by the U.S. Geological Survey (USGS) and its partners in September 2004 and was last updated in April 2007. Eventually, it will consist of the following three sub-areas: orthoimagery, base maps, and other imagery. The Orthoimagery sub-channel, which is the only sub-channel currently populated, contains general information about rectified imagery, its sources, orthoimagery acquisition programs, and the access and dissemination of those data, including aerial photography, which is the source of orthoimagery. The Base Maps sub-channel category will consist of those base themes not covered by other categories. They are represented by such national datasets as the Geographic Names database and the National Land Cover Database. The Other Imagery sub-channel will consist of general information about imagery other than orthoimagery. Much of the information and data contained in this sub-channel will be satellite and other remotely sensed imagery.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-13	Inland water resources	The Inland Water Resources category deals with the movement and characteristics of water on or under the surface of the earth. This includes, but is not limited to, themes about rivers, lakes, wetlands, canals, glaciers, dams, wells, floods and flood hazards, streamflow, and water use. Some of the most prominent links in this category are to large databases, such as the National Hydrography Dataset (NHD). However, the category also includes many thematic datasets dealing with water issues in specific locations. There are two major sub-categories. The first, The Drainage Network, includes the NHD and digital elevation models. The second, Major Water Databases, includes the U.S. Geological Survey's (USGS) National Water Information System (NWIS) and U.S. Environmental Protection Agency's (EPA) Storage and Retrieval (STORET) database.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-14	Locations and geodetic networks	Geodetic control provides a common reference system for establishing coordinates for all geographic data. All National Spatial Data Infrastructure (NSDI) framework data and user applications data require geodetic control to accurately register spatially. The National Spatial Reference System is the fundamental geodetic control for the United States. Typical keywords are geodetic networks, survey, or control points.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-15	Oceans and coasts	The Oceans and Coasts community Web page is organized around coastal and ocean framework data, or data needed for research, planning, and management of coastal and ocean resources. These data include, but are not limited to, bathymetry, shoreline, sea floor mapping, habitat, land cover, seismic data, fisheries, and marine boundaries. This community seeks to provide access to these data, clearinghouses, and applications; as well as information about the activities, programs, and committees that support the ocean and coastal community. The Oceans and Coast community is co-led by the Interagency Working Group on Ocean and Coastal Mapping and the FGDC's Marine and Coastal Spatial Data Subcommittee. For more information on these efforts, refer to the "committees, programs, and organization" section of the community.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)
GOS-16	Transportation networks	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 nonphysical components representing all modes of travel that allow the movement of goods and people between locations. Typical keywords are roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, or railways.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)

GOS ID #	GOS Terms	Definitions of Terms	Source
GOS-17	Utilities and communication	The Utilities and Communication category Web page was authored by the geodata.gov development team in May 2003. Typical keywords are hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, or communication networks.	Adapted from the Geospatial One-Stop (GOS) Web site (May 2008) (www.geodata.gov)

B.3.12 FEA Geospatial Profile Ver. 2 Appendix B: Glossary of Terms (FEA)

Table B-12 is a listing of terms in the FEA Geospatial Profile, ver. 2, appendix B, Glossary of terms (FEA) category. The FEA Geospatial Profile provides agency personnel with approaches to gather answers and establish a framework to effectively manage geospatial data and services. The terms in table B-1 mirror terms listed in the Geospatial Profile, V2. Appendix B: Glossary of Terms.[41]

FEA ID #	Terms	Definitions of Terms	Source
FEA–1	Bathymetry	The measurement of the depth of bodies of water.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–2	Cadastral data	The data representing the cadastre.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–3	Cadastre	A public record, survey, or map of the value, extent, and ownership of land as a basis of taxation.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms) (2008)
FEA–4	Catalog	A collection of entries, each of which describes and points to a feature collection or a service (often used as synonym for register).	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms) (2008)
FEA–5	Coverage	A function to return values from its range for any direct position within its spatial, temporal, or spatiotemporal domain (for example, include a raster image or a digital elevation model or a satellite image). See also feature (ISO 19123:2005(E)).	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms) (2008)
FEA–6	Geocoding	The process of identifying the geographic location of a postal address—a subset of georeferencing.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms) (2008)

[41] As the GeoProfile: FEA Geospatial Profile, ver. 2. appendix B, Glossary of Terms is revised, this list may need modification over time.

FEA ID #	Terms	Definitions of Terms	Source
FEA–7	Geodetic control	Geodetic control surveys are usually performed to establish a basic control network (framework of known point locations) from which supplemental surveying and mapping work is performed. Geodetic network surveys are distinguished by use of redundant, interconnected, permanently monumented control points that comprise the framework for the National Spatial Reference System (NSRS) or are often incorporated into the NSRS.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–8	Georeferencing	The process of identifying the geographic location of a piece of information. A common example is finding the latitude and longitude of a postal address, which is usually called geocoding (a subset of georeferencing).	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–9	Hydrography	The scientific description and analysis of the physical conditions, boundaries, flow, and related characteristics of Earth's surface waters. Hydrographic data typically refer to the boundaries of water bodies.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–10	Line of sight	The indirect or direct cause-and-effect relationship from a specific information technology (IT) investment to the processes it supports and, by extension, the customers it serves and the mission-related outcomes to which it contributes.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–11	Metadata	Data about data (often in the form of descriptive text about a digital data file).	ISO 19115:2003(E)
FEA–12	Orthoimage	A georeferenced image prepared from a perspective photograph or other remotely-sensed data in which displacement of objects due to sensor orientation and terrain relief have been removed. It has the geometric characteristics of a map and the image qualities of a photograph.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–13	Orthorectification	The process of transforming raw imagery to an accurate orthogonal projection. Without orthorectification, scale is not constant in the image and accurate measurements of distance and direction cannot be made.	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–14	Patterns	Unique combinations of architectural or design elements (for example, processes, components, and so forth) that have proven to be useful in solving recurring architectural or design problems. The naming and reuse of patterns forms the basis of a vocabulary for communicating past experience between architects and designer .	Federal Enterprise Achitecture Geospatial Profile, ver. 2, appendix B (Glossary of terms)(2008)
FEA–15	Product Specification	Description of a universe of discourse and a specification for mapping the universe of discourse to a dataset.	ISO 19113:2002(E)
FEA–16	Register	A set of files containing identifiers assigned to items with descriptions of the associated items.	ISO 19113:2002(E)
FEA–17	Registry	An information system on which a register is maintained.	ISO 19113:2002(E)

B.3.13 Department of Homeland Security Homeland Security Presidential Directive 7 Sectors (DHS)

Table B-13 is a listing of terms in the Department of Homeland Security Homeland Security Presidential Directive 7 Sectors (DHS) category. The table includes descriptions of the eighteen HSPD–7 sectors identified in the Critical Infrastructure and Key Resources Sector Plan for each sector.

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-1	Agriculture and Food	The Agriculture and Food sector comprises systems of individual assets that are closely dependent upon each other. Because of its complexity, the sector has struggled to identify its most critical assets, systems, networks, and functions. Although the sector understands its individual systems and basic interrelationships, the challenge has been to understand the complexities and interdependencies across the farm-to-table continuum on national and regional scales. The Agriculture and Food sector has extensive, open, widely dispersed, diverse, and complex interdependent systems; therefore, the physical asset-based approach may not fit the Agriculture and Food sector.	HSPD–7 Sector Plan for Food and Agriculture

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS -2	Defense Industrial Base (DIB)	The DIB is a large, diverse, complex, interdependent, hierarchical, and free-flowing collection of asset owners and operators governed by various regulations, laws, treaties, and precedents. The U.S. Department of Defense (DoD) and the U.S. Census Bureau estimate that the DIB is composed of hundreds of thousands of worldwide Government and private sector sites, with capabilities to perform research and development, design, production, delivery, and maintenance of military weapon systems, subsystems, components, and parts to meet military requirements. Unlike other infrastructure sectors, the DIB is defined not based primarily on the type of goods and services it produces, but rather on who the customer is for these goods and services. It includes companies that perform under direct contract with the DoD, the subcontractors of these companies, and companies that provide incidental materials and services to either the DoD or the contractors. The DoD collects the following information on potential critical DIB assets: • Contractor and Government entity code, name, street address, city, State, subject matter experts, facility security officers, and facility security officer contact information; • Sales, employment, capacity utilization, square footage; • Products, functions, production rates; • Programs, components, and subsystems; • Prime contractors, subcontractors, and critical subcontractors (first and second tier, selection criteria, products, and services); • Business overview (for example, privately or publicly held, non-U.S. owned); • Financial information; and • Critical technologies. Once an asset is determined to be critical, the DOD collects the following additional information: • Longitude and latitude; • Buildings or other structures where industry manufactures or stores critical items; • Dependencies (that is, the services and support that an asset requires to function) that a sector's asset has on other assets in the same sector and dependencies between assets from different sectors; • Continuity and redundancy, including backups built into the asset (alternative sources of supply and backup production facilities); • Impact on sector in cases of loss or failure (for example, economic, public health and welfare, public psyche, national security); • Existing protective actions (for example, fencing, biometrics, firewalls); and • Exposure to known foreign intelligence threat, such as treaty compliance regimes.	HSPD–7 Sector Plan for Defense Industrial Base (DIB)

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-3	Energy (except Nuclear Power)	Broadly speaking, Homeland Security Presidential Directive 7 (HSPD–7) defines the energy sector as the Nation's electric system (excluding nuclear powerplants and hydroelectric dams), natural gas system, and petroleum and petroleum product systems. These energy systems are highly interdependent (for example, natural gas is a significant fuel for electric generation) and are critical for other infrastructure sectors, including Communications, Drinking Water and Water Treatment Systems, Chemical, Information Technology, and Transportation Systems. Each of these interdependent energy systems consists of many individual assets, which in some cases may be highly important, but their importance varies dramatically depending on such factors as the time of day, the time of year, and system conditions. From a reliability and security perspective, however, systems are the critical characteristic of the energy sector. The Energy sector has identified six general asset or system characteristics that are important for evaluating the vulnerabilities of Energy sector infrastructure and for developing risk management programs: • *Physical and location attributes* – assist the Energy sector to develop consequence, vulnerability, and protective strategies; • *Cyber attributes* - help monitor and control the energy systems; • *Volumetric or throughput attributes* – define the extent of the damage, depending on the utilized capacity of the system, or points where the system may be capacity constrained; • *Temporal/Load profile attributes* – temporal or time-dependent dimension affected by the season of the year or the time of day; • *Human attributes* - include highly trained and skilled personnel who are key factors in a comprehensive Energy sector security plan; and • *Importance of asset or system to the energy network* – factors that impact the ability of power generation assets to function properly.	HSPD–7 Sector Plan for Energy
DHS-4	Public Health and Healthcare	This sector is generally categorized in terms of health care, such as the following: • Companies that develop, manufacture, market, or distribute health-related products or provide health care services, such as hospitals, nursing homes, or pay for care, including public health, health care-sector-specific plans, and health maintenance organizations (HMOs); • Medical product suppliers; • Medical equipment and medical device makers; • Medical laboratories; and • Life science organizations in the fields of biotechnology, biomedical technologies, pharmaceuticals, environmental, and biomedical devices. Relationships can be described as many-to-many, with interdependencies tied to both economic and functional stability. Hospitals represent only a fraction of the total sector.	HSPD–7 Sector Plan for Public Health and Healthcare

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-5	National Monuments and Icons (NMI)	A number of NMI assets located within the United States and its Territories (for example, Puerto Rico and the Northern Mariana Islands) are listed on *the National Register of Historic Places or the List of National Historic Landmarks. The National Register of Historic Places* is the Nation's official list of cultural resources reserved for preservation. The National Historic Landmarks are significant historic places designated by the Secretary of the Interior for their exceptional value or quality in illustrating or interpreting the heritage of the United States. Currently, fewer than 2,500 historic places bear this national distinction. The criteria applied to evaluate properties for possible designation as National Historic Landmarks are delineated in the Code of Federal Regulations (36 CFR 65.4, National Historic Landmark Criteria). Through the U.S. Department of Homeland Security (DHS) and State Offices of Homeland Security, the U.S. Department of the Interior (DOI) will work at the Federal, State, tribal, and local government levels, and with the private sector, to identify other NMI assets that may not be on either list but should be considered as National Critical.	HSPD–7 Sector Plan for National Monuments and Icons (NMI)

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-6	Banking and Finance	The Banking and Finance sector may be divided into several functions: deposit and payments systems; credit and liquidity products; investment products; and risk transfer products. Various members of the Financial and Banking Information Infrastructure Committee (FBIIC) regulate each of these functions. The financial regulators, through their oversight authority, obtain a vast amount of information on institutions, critical assets and processes, and potential vulnerabilities. Sector-wide risks assessments are process-driven and address interdependence. Individual institutions also conduct their own risk assessments to identify and mitigate internal vulnerabilities and external dependencies. The Treasury Department, through collaboration and insights obtained from the members of the FBIIC, gathers sector-specific information. Although the definition of asset data is limited to the categories collected by the regulators, regulatory examinations and trade association surveys are thorough and provide adequate information for defining financial assets. General information for assets may include the following (as appropriate): • Asset name, mailing address, physical location,owner and (or) operator name; • *Function or type of transaction* – deposit and payments systems; credit and liquidity products, including investment and risk transfer; • Geographic region and financial center; • Number of employees; • *Economic contribution* – total market value of financial transactions conducted by or through the asset on a daily, weekly, monthly, and yearly basis; • International considerations; • Existing and planned protective measures; • Membership in a regional partnership or Information Sharing and Analysis Center (ISAC); • *Dependence on other sectors* – Communications, Energy, Information Technology, and Transportation; • Interaction with other assets (that is, other critical national assets directly and indirectly affected by the operation of each asset); • *Backup capability* – location and function of backup facilities (data center and business resumption); and • *Substitutability* – whether other industry systems or infrastructures would be able to serve the same function. Intangible assets, such as systems, databases, or networks, are linked to physical assets and locations. Systemically significant assets are stratified by their examination agency with respect to criticality to the financial services sector as a whole.	HSPD–7 Sector Plan for Banking and Finance

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-7	Drinking Water and Waste Treatment Systems	Drinking water and wastewater assets are defined as entire utilities for purposes of identification, prioritization, and coordination in the water sector. The water sector is composed of a diverse set of drinking water and wastewater utilities. Characteristics of these utilities useful for defining sector infrastructure information are available in databases maintained by the U.S. Environmental Protection Agency (EPA). Owners and operators are responsible for conducting risk assessments of their utilities to identify components (for example, pumps, generators, and supervisory control and data acquisition systems) the loss or damage of which, whether owing to manmade or natural events, could adversely affect the utility's operation, threaten public health or the environment, or have significant economic impacts. Critical water sector infrastructure is owned and operated predominantly by the public sector (that is, local governments). The EPA, the U.S. Department of Homeland Security (DHS), and water sector owners and operators and security partners work together to develop robust threat, vulnerability, and consequence information to help water sector utilities identify their most critical components.	HSPD–7 Sector Plan for Drinking Water and Waste Treatment Systems

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-8	Chemical	Information regarding Chemical sector infrastructure for inclusion in the National Asset Database (NADB) includes the following: • Regulated chemicals produced or stored onsite; • Annual production quantity of regulated chemicals; • Quantity of regulated chemicals stored onsite; • Existance of an U.S. Environmental Protection Agency (EPA) risk management plan (RMP); • Regulated chemicals transported; • Quantity of regulated chemicals transported; • Facility security officer designated under MTSA regulations (where applicable); and • Facility emergency coordinator as identified to the local emergency planning committee (LEPC) and the State emergency response commission (SERC) pursuant to EPCRA section 303 (where applicable). The U.S. Department of Homeland Security (DHS) works with sector security partners through the Communications Government Coordinating Council (CGCC) and the Communications sector Coordinating Council (CSCC) to identify what other data fields are required to accomplish critical infrastructure and key resources (CI/KR) protection activities in the Chemical sector using a risk-informed approach. Some potential data fields include: • Dependencies and interdependencies (for example, the energy supply needed by chemical facilities, facilities requiring chemicals for wastewater treatment); • Primary area of industry end products (for example, organic, inorganic, and agricultural); • Other areas of industry end products (for example, organic, inorganic, and agricultural); • Region or service area (for example, Midwest, South, international); • Membership in the Chemical Information Sharing and Analysis Center (ISAC) or a chemical industry association; • Names of companies that provide the facility with hazardous materials transport services; • Continuity and redundancy to include backups built into the asset; • Impact on sectors (both Chemical and other CI/KR sectors) in case of loss or failure; • Existing protective measures; • Population distribution in the area surrounding the facility; • Terrain (vegetation, elevation) in the area surrounding the facility; • Land use in the area surrounding the facility; • Imagery and spatial data of the area surrounding the facility; • Structures and lines of sight to the facility; • Other critical assets in the area surrounding the facility; and • Access controls for the facility.	HSPD–7 Sector Plan for Chemical

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-9	Commercial Facilities	Several of the Commercial Facilities sub-sectors have identified the following attributes of interest for commercial facilities: • *Facility location* – general geographic situation (for example, financial district, industrial park); • *Facility proximity* – proximity to high-risk enterprises (for example, adjacency to an iconic landmark or important Federal building); • *Facility size* – height, footprint, number of floors, public areas; • *Facility type* – purpose or use of the facility (for example, office building, stadium, hotel, amusement park); • *Facility functions* – types of events held in the facility (for example, sporting events, political conventions, controversial exhibitions); and • *Facility value* – iconic and economic status of the facility (for example,.historical status, height, owner, tenants, clientele). The Commercial Facilities sector-specific agencies (SSAs) will work with each sub-sector to help identify and refine the categories of information sought for different commercial facility asset types. The types of information sought for inclusion in the National Asset Database (NADB) will then be updated accordingly.	HSPD–7 Sector Plan for Commercial Facilities
DHS-10	Dams	Information parameters relevant to the Dams sector include sector assets' physical structures, personnel needs, cyber infrastructure, and protective measures. The complexity of dam functions dictates the importance of these elements.	HSPD–7 Sector Plan for Dams

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-11	Emergency Services	The Emergency Services System (ESS) consists of assets, systems, and networks that perform preparedness, prevention, response, and recovery functions so critical to protecting communities, saving lives, protecting property, and recovering essential community services in the wake of a disaster, that their incapacitation or destruction would have a debilitating impact on the Nation's security, public health and safety, and psychological or moral well-being. Once nationally critical infrastructure and key resources (CI/KR) have been identified, assessed, and protected, the ESS will also address those CI/KR that are important at State, regional, tribal, and local levels. ESS assets, systems, networks, and functions embody physical, cyber, and human aspects or elements, as detailed below: • Physical CI/KR elements - An ESS facility may require specialized protection due to its unique or specialized characteristics. These can include anything that—if lost, stolen, released, damaged, compromised, or exploited—could cause an adverse effect or would be difficult to replace. Examples include: – Equipment. Unique devices, parts, or pieces of equipment; these include the key elements of communications systems; – Conveyances. Aircraft, vessels, or ground transportation vehicles housed within an ESS facility and used to carry out critical functions; – Materials. Critical items used in providing emergency service functions; and – Records. Documents in electronic or nonelectronic media. • Cyber CI/KR elements. These include cyber assets (for example, hardware and software components), systems (for example, a set of cyber assets that interact to perform a particular function), and networks (for example, interconnected assets and systems that store, process, or communicate information), as well as the information contained in them. Cyber CI/KR elements may be identified individually or included as a cyber element of a facility or asset, system, or network, and typically fulfill one of the following three roles: – Access control. Allowing only authorized personnel and visitors physical access to defined areas of a facility; – Control. Used to monitor and control sensitive processes and physical functions. Most communications systems fall within this role; – Warning and alert. Used for alerting and notification purposes to pass critical information that triggers protection and response actions. • Human elements or positions. These include positions staffed within ESS facilities that represent unique knowledge, skills, authorities, or roles, the absence of which could cause undesirable consequences. In general, the human aspect is best captured within the system or functional dimension of the assets, systems, networks, and functions continuum. They both serve as part of a system and help to perform or carry out critical functions. Categories of positions that support continuity of operations at all levels of government and functioning of the ESS include the following: – Strategic positions. Held by individuals and must be identified, assessed, and prioritized for protection to ensure continuity of essential government operations; and – Operational positions. Responsible for operating CI/KR systems, whose impairment could result in either cessation or takeover of operations, or whose compromise would make recovery from an attack more difficult (for example, law enforcement officials, HAZMAT experts, bomb squad members). Many of these elements are unlikely to be nationally critical in and of themselves, unless they are part of the communications systems that allow for resources to be moved from one location to another and for MAAs to be put into action.	HSPD–7 Sector Plan for Emergency Services

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-12	Nuclear Reactors, Materials and Waste	A license or certificate from the U.S. Nuclear Regulatory Commission (NRC) is required before any entity is permitted to operate a civilian nuclear facility or receive risk-significant nuclear or radioactive material. Records of the formal NRC regulatory process and licensing and certificate reviews are a means of identifying the nuclear facilities and other entities that use, acquire, transport, or dispose of risk-significant nuclear or radioactive material.	HSPD–7 Sector Plan for Nuclear Reactors, Materials and Waste
DHS-13	Information Technology	Critical Information Technology sector functions support the sector's ability to produce and provide high-assurance information technolgoy (IT) products and services for a variety of sectors. Through the IT sector-specific plan (SSP) development process, the sector identified six critical functions: • Provide IT products and services; • Provide incident management capabilities; • Provide domain name resolution services; • provide identity management and associated trust support services; • Provide Internet-based content, information, and communications services; and • Provide Internet routing, access, and connection services. These functions are distributed across a broad network of infrastructure, are managed on a proactive basis, and are therefore able to withstand and rapidly recover from most threats. These critical Information Technoogy sector functions are provided by a combination of entities—often owners and operators and their respective associations—who provide hardware, software, IT systems, and services. IT services include development, integration, operations, communications, and security. Information Technology sector entities include the following: • Domain Name System (DNS) root and generic top-level domain operators; • Internet service providers (ISPs); • Internet backbone providers; • Internet portal and e-mail providers; • Networking hardware companies (for example, fiberoptics makers and line acceleration hardware manufacturers) and other hardware manufacturers [for example, personal computer (PC) and server manufacturers and information storage companies); • Software companies; • Security services vendors; • Communications companies that characterize themselves as having an IT role; • Edge and core service providers; • IT system integrators; and • IT security associations. In addition, Federal, State, and local governments are a component of the Information Technology sector as providers of government IT services that are designed to meet the needs of citizens, businesses, and employees. The Information Technology sector includes public and private sector entities.	HSPD–7 Sector Plan for Information Technology

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-14	Communications	The complexity of sector assets, indepth corporate security programs, technology, and the numerous systems that make up the communications infrastructure help reduce the likelihood of a significant national-level network failure. For example, resiliency is achieved through the technology and redundancy employed in designing networks, and by encouraging customers to employ diverse primary and backup communications capabilities. Communications network architects employ technology and protocols (for example, Synchronous Optical Network (SONET) rings, and routing protocols), creating effective "self-healing" networks, and helping to mitigate risk at the design stage. Sector owners and operators focus on ensuring overall network reliability, maintaining "always on" capabilities for customers, and quickly restoring capabilities following a disruption. Data parameters for the sector will be defined primarily by the architecture elements of assets, systems, networks, and functions. Architectural elements in the Communications sector include the following: • *Assets* – shared assets and systems owned and operated by multiple companies Includes facilities in which equipment is collocated and systems shared by network operators, and equipment is owned and operated by the end user or located at the end user's facility. Customers include individuals, organizations, businesses, and government. • *Systems* – signaling and control systems that exchange information about establishing a connection and control the management of the network; these systems access, primarily, the local portion of the network t end users to the backbone that enables users to send or receive communications. Access includes equipment and systems, such as Public Switched Telephone Network (PSTN) switches, Asynchronous Transfer Mode (ATM) switches, video servers for video on demand, and Internet Protocol (IP) routers for Internet service providers (ISPs). • Networks – core network/Internet backbone elements of the communications network that represent high-capacity network elements that servicing service regional, national, and international connectivity. • Functions – as defined in the National Infrastructure Protection Plan (NIPP), service, process, capability, or operations performed by specific infrastructure assets, systems, or networks.	HSPD–7 Sector Plan for Communications
DHS-15	Postal and Shipping	Postal and Shipping sector assets include fixed assets, such as mail distribution centers and transportation hubs, as well as complex systems, such as mail collection, transportation and distribution processes, and the information technology systems that enable e-commerce. These assets must work seamlessly together to maintain continuity of sector operations and may be subject to attack or used as mechanisms to deliver attacks. Sector security occurs in the context of extremely time-sensitive and critical business processes that are fundamental to the effectiveness and efficiency of the sector's core operations and the business operations of its customers.	HSPD–7 Sector Plan for Postal and Shipping

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-16	Transportation Systems	The national transportation network is a large, multifaceted, interdependent mix of links, nodes, flows, processes, agreements, rules, relationships, and regulations. This complex cloud of activity must be reduced into more manageable data to be used for risk analysis. To assist stakeholders within the Transportation Systems sector in defining systems, thematic perspectives or risk views will be used. It presumed that data collected in these views will be collectively exhaustive. Instead, the risk view structure supports a scalable system analysis capability, allowing for the examination of how risk manifests in the system. Risk views are the first step in defining the boundaries of a system, establishing relationships within the system, and identifying interdependencies. The initial set of risk views includes the following: • *Modal* – Traditional industry delineation (that is, aviation, maritime, mass transit, highway, freight rail, and pipeline). All assets within a mode can be collectively evaluated as a system. • *Geographic* – All assets within a geographic boundary (for example, New York State or the city of Los Angeles). This view may be used most often by the grants and training (G&T) community, and State, tribal, and local government partners. • *Functional* – All assets that, taken together, perform a specific function or service (for example, supplying fuel to the Northeast). This view is supply chain-focused and may be used by, for example, the U.S. Coast Guard (USCG), U.S. Customs and Border Protection (CBP), interagency hazardouse materials (HAZMAT) transportation working groups, and private sector partners. • *Ownership* – All assets that fall under a defined set of decision rights, recognized by Federal, State, tribal, and local governments (for example, all assets owned and operated by the New York Mass Transit Authority) can be evaluated as a system.	HSPD–7 Sector Plan forTransportation Systems
DHS-17	Government Facilities (GFS)	The GFS categorization structure captures the different types of facilities and associated elements that represent the entire sector. Although government facilities may be categorized based on type of ownership or facility security level, four sector-wide categorization based on a facility's predominant use maximizes risk reduction opportunities among similar facilities. The predominant use of a facility is the main function or purpose of the building based on its contents and functions. Four security levels were established in the U.S. Department of Justice (DOJ) vulnerability assessment report and adopted by the Interagency Security Committee and are applicable to Federal facilities. Five predominant use categories for buildings, structures, and land were established as part of the Federal Real Property Profile by the Federal Real Property Council.	HSPD–7 Sector Plan for Government Facilities

DHS ID #	Sector Terms	Definitions of Terms	Source
DHS-18	Manufacturing Facilities	Today's manufacturing environment has several underlying characteristics that influence its business risks, security posture, and continuity of operations. These characteristics include the following: 1. Most manufacturing enterprises are integrated into complex, interdependent supply chains. A failure in any part of the supply chain can ripple through manufacturing systems, causing cascading economic impacts; 2. Supply chains have been optimized for productivity and efficiency—such methods as just-in-time production have created some fragile supply networks that are susceptible to disruptions; 3. Manufacturers rely highly on information and communications systems; this reliance has introduced new cyber risks that could degrade, damage, or shut down operations; 4. Globalization and outsourcing has caused some U.S. manufacturers to become highly reliant on foreign sources of supply and the transcontinental transportation systems that support them; 5. Manufacturers rely heavily on electricity and fuels, sometimes with only limited power backup and fuel storage. These characteristics increase the likelihood that a disruption in an existing critical infrastructure and key resources (CI/KR) sector could have major economic consequences on the manufacturing industries. Conversely, a direct attack on or disruption of certain elements of the manufacturing industries could disrupt essential functions in some CI/KR sectors.	HSPD–7 Sector Plan for Manufacturing Facilities

Appendix C: HSPD–7 and OMB Circular A–16

Homeland Security Presidential Directive 7 (HSPD–7)

On December 17, 2003, Homeland Security Presidential Directive 7 (HSPD–7), Critical Infrastructure Identification, Prioritization, and Protection was issued. This directive established "a national policy for Federal departments and agencies to identify and prioritize United States critical infrastructure [as defined in the USA PATRIOT Act of 2001] and key resources and to protect them from terrorist attacks."[42] This directive also instructs that "The Secretary [DHS] will collaborate with other appropriate Federal departments and agencies to develop a program, consistent with applicable law, to geospatially map, image, analyze, and sort critical infrastructure and key resources by utilizing commercial satellite and airborne systems, and existing capabilities within other agencies. National technical means should be considered as an option of last resort. The Secretary, with advice from the Director of Central Intelligence, the Secretaries of Defense and the Interior [FGDC], and the heads of other appropriate Federal departments and agencies, shall develop mechanisms for accomplishing this initiative. The Attorney General shall provide legal advice as necessary."

HSPD-7 Sectors

1. Agriculture and Food
2. Defense Industrial Base (DIB)
3. Energy (except commercial nuclear energy)
4. Public Health and Healthcare
5. National Monuments and Icons
6. Banking and Finance
7. Drinking Water and Waste Treatment Systems
8. Chemical
9. Commercial Facilities
10. Dams
11. Emergency Services
12. Nuclear Reactors, Materials, and Waste
13. Information Technology
14. Communications
15. Postal and Shipping
16. Transportation Systems
17. Government Facilities
18. Manufacturing Facilities

Critical infrastructure and key resources are defined as follows:

[42] http://www.whitehouse.gov/omb/memoranda/fy04/m-04-15.pdf

Critical infrastructure.[43] Systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

Key resources.[44] Publicly or privately controlled resources essential to the minimal operations of the economy and government.

In addition, section 8201 of Public Law 108–458, "Intelligence Reform and Terrorism Prevention Act of 2004," directs the DHS to coordinate its needs and plans for the use of geospatial data with OMB Circular A–16 and the FGDC. Similar to OMB Circular A–16, Public Law 108-458 directs DHS to coordinate with the FGDC but does not provide any criteria about how to coordinate in a commonly understood fashion.

OMB Circular A–16, in conjunction with Public Law 108-458, provides authority to DHS to develop plans for the protection of critical infrastructure and key resources, in coordination with the FGDC, for DHS spatial data needs.

The geospatial data theme principles described in section 5 provide a means to address DHS requirements and incorporate HSPD–7 critical infrastructure and key resources data into OMB Circular A–16, appendix E, applying the geospatial data theme principles to the spatial data needs of DHS programs.

[43] USA PATRIOT Act of 2001 (Public Law 107-56)
[44] http://www.whitehouse.gov/omb/memoranda/fy04/m-04-15.pdf

Appendix D: Acronyms

Acronym	Definition
A–130	OMB Circular A–130
A–16	OMB Circular A–16
AIC	Architecture Information Committee
AOI	Area of interest
ARES	American Real Estate Society
ATM	Asynchronous Transfer Mode
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BRM	Business reference model
BTS	Bureau of Transportation Statistics
CAD	Computer Aided Design
CAP	Cooperative Agreements Program
CBP	U.S. Customs and Border Protection
CD	Compact disc
CDC	Centers for Disease Control and Prevention
CD-ROM	Compact disc read-only memory
CFR	Code of Federal Regulations
CGCC	Communications Government Coordinating Council
CI/KR	Critical infrastructure and key resources
CIO	Chief Information Officer
CIOC	Chief Information Officers Council
COD	Common operating data
COI	Community of interest
CoP	Community of practice
COP	Common operating picture
COTR	Contracting Officer's Technical Representative
CSCC	Communications Sector Coordinating Council
CSTA	Common Solution and Target Architecture
DAS	Data Analysis/Data Services (Lexicon Term Category)
DCG	Data Communities – GOS (Lexicon Term Category)
DFIRM	Digital Flood Insurance Rate Maps
DHS	Department of Homeland Security
DIB	Defense industrial base
DNS	Domain Name System
DOC	U.S. Department of Commerce

Acronym	Definition
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOJ	U.S. Department of Justice
DOS	U.S. Department of State
DOT	U.S. Department of Transportation
DOTreas	U.S. Department of the Treasury
DTI	Data Theme Items (Lexicon Term Category)
DVD	Digital video disc
DSV	Data Services (Lexicon Term Category)
EDI	Electronic data interchange
eGOV	E-Government Initiative
EIA	U.S. Energy Information Administration
ELA	Enterprise licensing agreement
E.O.	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EROS	Center for Earth Resources Observation and Science
ESS	Emergency Services System
ETL	Extract, transfer, load
FACA	Federal Advisory Committee Act
FBIIC	Financial and Banking Information Infrastructure Committee
FEA	Federal Enterprise Architecture
FGDC	Federal Geographic Data Committee
FISMA	Federal Information Security Management Act
FOIA	Freedom of Information Act
FPS	Federal Protective Service
FS	U.S. Forest Service
FSSCC	Financial Services Sector Coordinating Council
FTP	File Transfer Protocol
FWS	U.S. Fish and Wildlife Service
G&T	Grants and training
GEO	Geospatial (Lexicon Term Category)
Geospatial LoB	Geospatial Line of Business
GEOSS	Global Earth Observation System of Systems
GFS	Government Facilities sector
GIF	Graphics Interchange Format
GIO	Geographic Information Officers
GIS	Geographic information system
GNS	Geospatial Needs Assessment (Lexicon Term Category)
GOS	Geospatial One Stop
GPS	Global positioning system
GSA	General Services Administration
GSV	General Services (Lexicon Term Category)
HAZMAT	Hazardous materials
HHS	U.S. Department of Health and Human Services
HMO	Health maintenance organization

Acronym	Definition
HSIN	Homeland Security Information Network
HSPD–7	Homeland Security Presidential Directive 7
HUD	U.S. Department of Housing and Urban Development
IAA	Interagency agreement
ICE	Immigration and customs enforcement
ID	Identification
IEC	International Electrotechnical Commission
INF	Information (Lexicon Term Category)
IP	Internet Protocol
IPS	Image processing system
ISAC	Information sharing and analysis
ISO	International Organization for Standards
ISP	Internet service provider
IT	Information technology
JPEG	Joint Photographic Expert Group
LAN	Local area network
LEPC	Local Emergency Planning Committees
LiDAR	Light detection and ranging
LoB	Line of business
MAA	Medi-Cal administrative activities
MMS	Minerals Management Service
MOU	Memorandum of understanding
MS	Microsoft
MTSA	Maritime Transportation Security Act
NADB	National Asset Database
NARA	National Archives and Records Administration
NASA	National Aeronautics and Space Administration
NBII	National Biological Information Infrastructure
NEPA	National Environmental Planning Act
NGAC	National Geospatial Advisory Committee
NHD	National Hydrography Dataset
NIPP	National Infrastructure Protection Plan
NMI	National monuments and icons
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NSDI	National Spatial Data Infrastructure
NSRS	National Spatial Reference System
NWIS	National Water Information System
OCS&T	Office of Cyber Security and Telecommunications
OGC	Open Geospatial Consortium
OIP	Office of Infrastructure Protection
OMB	Office of Management and Budget

Acronym	Definition
PC	Personal computer
PDA	Personal digital assistant
PIA	Privacy impact assessment
PII	Personally identifiable information
P.L.	Public Law
PMT	Program Management (Lexicon Term Category)
PNG	Portable Network Graphics
POC	Point of contact
PSTN	Public Switched Telephone Network
QA/QC	Quality assurance and quality control
R&D	Research and development
RFI	Request for information
RFP	Request for proposal
RMD	Risk Management Division
RMP	Risk management plan
ROI	Return on investment
SCADA	Supervisory control and data acquisition
SERC	State Emergency Response Commission
SLA	Service level agreement or shared licensing agreement
SOA	Service-oriented architecture
SOAGI	Senior Agency Official for Geospatial Information
SONET	Synchronous Optical Network
SOW	Statement of work
SSA	Sector-specific agencies
SSP	Sector-specific plan
STORET	Storage and retrieval
TIFF	Tagged Image File Format
TSA	Transportation Security Administration
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFG	Unified Facilities Guide Specifications
USGS	U.S. Geological Survey
WAN	Wide area network
XML	Extensible markup language