Federal Geographic Data Committee

IMAGERY THEME OF THE NATIONAL SPATIAL DATA INFRASTRUCTURE

STRATEGIC PLAN
2017 - 2020

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1.   Executive Summary

Until the last few decades, much of the understanding of our nation's landscapes was informed by imagery captured from periodic aerial photography coverage flights. Because of the infrequency of these flights, decision makers were forced to draw conclusions based on an incomplete dataset that did not truly reflect changes in the land over time. Now, as the usefulness of imagery has become more and more apparent, the imagery holdings of the United States have expanded to include seasonal aerial and satellite orthoimagery, broadening both the frequency and the utility of such data.

This orthoimagery is foundational to most public and private Geographic Information Systems (GIS), which are in turn routinely integrated as critical components of applications that range across the spectrum of government operations, including public safety, health services, real property, agriculture, natural resource management, and beyond; to assist geospatial practitioners and decision makers in managing our public and private resources and monitoring the changing landscape. The Imagery Theme of the National Spatial Data Infrastructure (NSDI) reflects the dynamic imagery requirements set across all levels of government for observing our nation and our planet at multiple scales and using a diversity of methodologies throughout the year.

The following Agencies play a key role as Imagery dataset managers: Department of Agriculture, Farm Service Agency (FSA); Department of the Interior, United States Geological Survey (USGS); Department of Commerce, National Oceanic and Atmospheric Administration (NOAA); and the National Aeronautics and Space Administration (NASA). The Imagery Strategic Plan, meant to complement the NSDI Strategic Plan published in December 2013, was developed with input from key stakeholders, including the Federal Geographic Data Committee (FGDC) subcommittee National Digital Ortho-Imagery Program Committee (NDOP), and represents a shared vision for collection of overhead imagery of the United States and Insular Areas.

1.1   Vision Statement

To have full, open and non-duplicative data acquisition and access to meet and exceed imagery needs across the Federal spectrum.

1.2   Mission Statement

To develop and promote for the fifty States and Insular Areas a budget-aware and cost-efficient national strategy to acquire and access orthoimagery that meets Federal agency requirements, while being flexible enough to create partnerships with State, local, tribal, and private organizations.

1.3   Goals and Objectives

The goals and objectives in the Strategic Plan define areas of critical importance to the continued development of the Imagery Theme and provide a roadmap for Imagery dataset owners to follow over the next three years.

1.3.1   Goal 1: Fulfill Agency Imagery Business Requirements

Objective 1.1. Identify Agency Requirements: Complete a comprehensive assessment of all Federal agency imagery requirements through the following actions:

- Identify Department-wide imagery contacts from all participating FGDC agencies to participate in NDOP or at minimum to facilitate implementation of the Strategic Plan
- Evaluate individual agency/program imaging requirements via an annual self-reporting mechanism
- Review major imagery requirements for fifty States and Insular Areas
- Evaluate where imagery requirements converge and diverge.

Objective 1.2. Identify Mechanisms to Meet Agency Requirements and Build Effective Partnerships: Use the following mechanisms to review partner requirements and determine how to meet the greatest needs at the lowest cost through the following actions:

- Identify mechanisms for more flexible licensing options
- Identify mechanisms for improved contracting
- Identify mechanisms to enhance cost distribution within public/private partnership.

Objective 1.3. Assess Imagery Requirements Fulfillment: Identify gaps in imagery requirements fulfillment, identify potential modifications to meet new needs, and apply "lessons learned" for program improvement through the following actions:

- Assess effectiveness of the current imagery suite in meeting mission needs according to best practices
- Compile "lessons learned" documentation
- Identify required actions for future contracting vehicles and remedies to address shortcomings.
- Establish a mechanism to record and share collection strategies and requirements for routine and emergency imagery to remove redundancy and enhance effectiveness.

Objective 1.4. Funding: Create optimized funding model(s) through the following actions:

- Identify current imagery funding models and explore alternate funding sources and partnership models
- Identify the values and benefits of having a non-lapsing fund and establishing Memorandums of Agreement (MOAs) for effective interagency collaboration and transfer of funds

1.3.2   Goal 2: Facilitate the Availability and Usage of Imagery and Geospatial Data

Objective 2.1. Support and Collaboration: Create an interagency support network for use by existing and potential imagery programs (including technical, managerial, coordination, and other activities) through the following actions:

- Identify legal mechanism to build contractual partnerships between Federal and Non-Federal partners
- Create a directory of State agency representatives and publish expected contract vehicles to support partnership development
- Maximize interagency sharing of management expertise and technical support.

Objective 2.2. Data-Sharing: Identify Federal government options for licensed and unlicensed imagery and data distribution and access among agencies in an efficient and effective manner through the following actions:

- Identify mechanisms for expanding distribution rights
- Identify mechanisms for enhanced and cost-effective distribution for current and archived imagery.

2.   Background

Executive Order 12906, "Coordinating Geographic Data Acquisition and Access," describes the National Spatial Data Infrastructure (NSDI) as "the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data."

The NSDI is composed of sixteen National Geospatial Data Asset (NGDA) Themes, one of which is Imagery. Each NGDA Theme consists of a related group of NGDA Datasets selected from a larger, constantly changing universe of geospatial datasets because they meet the inclusion criteria for the NGDA Theme. An NGDA Dataset is defined as a geospatial dataset that has been designated as such by the Federal Geographic Data Committee (FGDC) Steering Committee and meets at least one of the following criteria:

1. Supports mission goals of multiple Federal agencies
2. Statutorily mandated
3. Supports Presidential priorities as expressed by Executive Order or by the Office of Management and Budget.

2.1   Imagery Theme Description

The Imagery Theme is described as "Georeferenced images of the Earth's surface, which have been collected via aerial photography or satellite. Orthoimagery is prepared through a geometric correction process known as orthorectification to remove image displacements due to relief and sensor characteristics, allowing their use as base maps for digital mapping and analyses in a GIS. Specific imagery data sets created through image interpretation and classification, such as a land cover image, can be found under themes specific to the subject matter. Includes imagery such as Landsat, NAIP, and DOQQs."

2.2   Imagery Theme Leadership

The United States Department of Agriculture, Farm Service Agency (FSA) and the United States Department of the Interior, United States Geological Survey (USGS) are the lead Federal agencies for the Imagery Theme.

Management of the Imagery Theme is an interagency effort and is supported by the NDOP.

2.3   Imagery Theme Datasets

Currently, the Imagery Theme consists of the following NGDA Data sets:

Imagery NGDA	Manager
Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)	NASA
Moderate Resolution Imaging Spectroradiometer (MODIS) - Aqua	NASA
Moderate Resolution Imaging Spectroradiometer (MODIS) – Terra	NASA
NOAA Coastal Mapping Remote Sensing Data	DOC-NOAA
High Resolution Orthoimagery	DOI-USGS

Imagery NGDA	Manager
Landsat 8 Operational Land Imager and Thermal Infrared Sensor	DOI-USGS
Landsat 7 Enhanced Thematic Mapper Scan Line Corrector Off (ETM SLC-off) (2003-present)	DOI-USGS
Landsat 1-5 Multispectral Scanner (1972-1992)	DOI-USGS
Landsat 4-5 Thematic Mapper (1982 - present)	DOI-USGS
The National Agriculture Imagery Program (NAIP) Imagery	USDA-FSA

3.   Vision and Mission

The NSDI Strategic Plan, which was published in December of 2013 and is the basis for this Strategic Plan, defined the following vision statement for the NSDI:

> The NSDI leverages investments in people, technology, data, and procedures to create and provide the geospatial knowledge required to understand, protect, and promote our national and global interests.

As stated in the NSDI Strategic Plan, the NSDI extends far beyond data. The NSDI encompasses the policies, organizational responsibilities, data, information, technologies, standards, services, and financial and human resources necessary to achieve this vision. The NSDI has become a critical vehicle for facilitating seamless data development, information sharing, and collaborative decision-making across multiple sectors of the economy.

Within the above as the overall vision, the Imagery Theme vision is:

> To have full, open and non-duplicative data acquisition and access to meet and exceed imagery needs across the Federal spectrum.

The Imagery Theme Mission is:

> To develop and promote a budget-aware national strategy for all fifty States and Insular Areas to acquire and/or access the best imagery data or services for Federal agencies while promoting the creation of partnerships with State, local, tribal, and private organizations, striving for financial flexibility and cost efficiency.

3.1   Desired State of Imagery Theme

The Imagery Theme of the NSDI will strive to achieve the following:

- Leverage shared and open standards-based services and applications (e.g., Open Geospatial Consortium compliance).
- Rapidly utilize suitable, cost-effective technologies to meet business requirements
- Optimize discovery and access of imagery ensuring widespread use by all Federal agencies and the public
- Maintain program consistency for the various user communities that are dependent on the identified data sets

4. Goals and Objectives

The Imagery Theme Strategic Plan consists of two strategic goals that were developed in concert with the NSDI Strategic Plan and from consultations with the managers/owners of the individual Imagery Theme NGDA datasets and other key stakeholders. The strategic goals include objectives and actions that describe how the goals will be accomplished. The following section describes Imagery Theme Strategic Plan goals, objectives and actions and the outcomes that will result from their implementation.

4.1 Goal 1: Fulfill Agency Imagery Business Requirements

4.1.1 Objective 1.1. Identify Agency Requirements

Anticipated Outcome: Compile a comprehensive assessment of all Federal agency imagery requirements.

- Action 1.1.1 – Identify Department-wide imagery contacts from all participating FGDC agencies to participate in NDOP or at minimum to facilitate implementation of the Strategic Plan
- Action 1.1.2 – Evaluate individual agency/program imaging requirements via annual self-reporting mechanism
- Action 1.1.3 – Review major imagery requirements for fifty States and Insular Areas
- Action 1.1.4 – Evaluate where imagery requirements converge and diverge

4.1.2 Objective 1.2. Identify Mechanisms to Meet Agency Requirements and Build Effective Partnerships

Anticipated Outcome: Use the following mechanisms to review partner requirements and determine how to meet the greatest needs at the lowest cost.

- Action 1.2.1 - Identify mechanisms for more flexible licensing options
- Action 1.2.2 - Identify mechanisms for improved contracting
- Action 1.2.3 - Identify mechanisms to enhance cost distribution within public/private partnerships.

4.1.3 Objective 1.3. Assess Imagery Requirements Fulfillment

Anticipated Outcome: Identify gaps in imagery requirements fulfillment, identify potential modifications to meet new needs, and apply "lessons learned" for program improvement.

- Action 1.3.1 – Assess effectiveness of the imagery suite in meeting mission needs according to best practices
- Action 1.3.2 – Compile "lessons learned" documentation
- Action 1.3.3 – Identify required actions for future contracting vehicles and remedies to address shortcomings

- Action 1.3.4 – Establish a mechanism to record and share collection strategies and requirements for routine and emergency imagery to remove redundancy and enhance effectiveness

4.1.4   Objective 1.4. Funding

Anticipated Outcome: Optimize funding model(s).

- Action 1.4.1 – Identify current imagery funding models and explore alternate funding sources and partnership models
- Action 1.4.2 – Identify the values and benefits of having a non-lapsing fund, and establishing MOAs for effective interagency collaboration (per GAO 13-94 recommendations to eliminate duplication of geospatial investments)[1] and transfer of funds

4.2   Goal 2: Facilitate the Availability and Use of Imagery and Geospatial Data

4.2.1   Objective 2.1. Support and Collaboration

Anticipated Outcome: Create an interagency support network for use by existing and potential imagery programs. This may include technical, managerial, coordination, and other activities.

- Action 2.1.1 – Identify best practices to build contractual partnerships between Federal and non-Federal partners
- Action 2.1.2 – Create and maintain a directory of State agency representatives and publish expected contract vehicles to support partnership development
- Action 2.1.3 – Maximize interagency sharing of management expertise and technical support

4.2.2   Objective 2.2. Data-Sharing

Anticipated Outcome: Identify Federal government options for licensed and unlicensed imagery and data distribution and access among agencies in an efficient and effective manner

- Action 2.2.1 – Identify mechanisms for expanding distribution rights for licensed imagery data (e.g., Digital Globe Enterprise Premium)
- Action 2.2.2 – Identify mechanisms for enhanced and cost-effective distribution for current and archived imagery

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[1] GAO-13-94 *United States Government Accountability Office Report to the Committee on Homeland Security and Governmental Affairs, U.S. Senate. Geospatial Information – OMB and Agencies Need to Make Coordination a Priority to Reduce Duplication*, (Washington, D.C.: November 2012)

5.   Roles and Responsibilities

Role	Responsibilities
Executive Champion	Provide high-level sponsorship and support for the Imagery Theme and associated NGDA Datasets; facilitate 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.
Senior Agency Official for Geospatial Information	Oversee, coordinate, and facilitate the agency's implementation of the geospatial-related requirements, policies, and activities. While these activities may be undertaken by various components of an agency, OMB will look to the senior agency official for information regarding the agency's coordination of these activities.
Theme Lead	Coordinate and oversee the strategic planning and implementation of the Imagery Theme and associated NGDA Datasets and the development of annual Imagery Theme Report.
NGDA Dataset Manager	Act as primary data steward(s), directly develop(s) national geospatial data assets (i.e. datasets) that fall under an NGDA Theme (in whole or part) in conjunction with other Dataset Managers and Data Stewards; work with Theme Lead to produce annual NGDA Dataset Reports.

6.   Challenges and Opportunities

6.1   Challenges

The following challenges have been identified that may threaten the implementation of this Strategic Plan:

- Inconsistent and inadequate funding
- Comprehensive Federal agency requirements are currently unclear and undocumented
- Ability to effectively and appropriately incorporate advancing technologies for imagery, collection, and distribution
- Inadequate contract vehicles exist for Federal and non-Federal partnerships
- Lack of a uniform commercial licensing model that fully meets Federal civilian agency needs
- Limited imagery availability over Non-CONUS and Insular Areas

- Restricted use of unmanned aerial vehicles (UAVs) in national airspace challenges Federal agency ability to acquire small footprints
- Inconsistent policies relating to restricted airspace hinder aerial acquisition for Federal civilian program purposes
- Limited access to original data (e.g., obtaining pixels via streaming)
- No common storage component for organization and access (e.g. cataloging)
- Imagery usage is very dynamic, making it difficult to
    o pinpoint current imagery usage and forecast future use
    o identify current and future business models in light of changes to imagery technology (e.g., Microsats)

6.2   Opportunities

The following opportunities have been identified that may assist in the implementation of the Strategic Plan:

- New or advancing products, services, and delivery methods may provide access to imagery products more efficiently and cost-effectively. Two such examples are:
    o Small satellites
    o Unmanned aircraft systems (UAS)
- Cloud based storage, services, and processing may reduce cost and increase capability
- New and advancing derived products including elevation, normalized difference vegetation index (NDVI), and thematic data may be more readily available as sensors/technology improves
- Improved licensing vehicles may make:
    o cost-effective imagery products available in a more timely fashion
    o imagery products publically available for non-commercial use
- New public/private partnerships may be established to further reduce the cost of imagery products and services.
- More effective interagency partnerships may be established to more fairly share the cost burden of imagery acquisition
- Continued reduction of duplication of effort to increase cost avoidance

7.   Implementation of the Imagery Theme Strategic Plan

Following the adoption of the Imagery Theme Strategic Plan, Theme Leads, Dataset Managers and other key stakeholders will develop a project plan outlining how the goals and objectives will be achieved.

The project plan will include:

- Tasks and milestones
- Timelines
- Responsible parties
- Performance indicators/measures
- Identification of resources available to achieve the objectives
- Assessment of unresolved risks.

The Executive Champions will provide guidance throughout the development and implementation of the project plan.