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The National Map 2.0 Tactical Plan "Toward the (Integrated) National Map"

By William J. Carswell, Jr.

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Abbreviations and Acronyms

ADS	Authoritative Data Sources
ASPRS	American Society of Photogrammetry and Remote Sensing
AutoCarto	Automated Cartography
BLM	Bureau of Land Management, U.S. Department of the Interior
BGN	Board on Geographic Names
CIDR	Classless Inter-Domain Routing
COTS	Commercial off-the-shelf software or hardware products
CS-W	Catalog Service for the Web
DEMs	Digital Elevation Models
DHS	Department of Homeland Security
DOI	U.S. Department of the Interior
DOQ	Digital Orthophoto Quadrangle
DOQQ	Digital Ortho Quarter Quadrangle
DRG	Digital Raster Graphics
EDNA	Elevation Derivatives for National Applications
EROS	Earth Resources Observation and Science, U.S. Geological Survey
ESIC	Earth Science Information Center, U.S. Geological Survey
ESRI	Environmental Systems Research Institute, Inc.
ETM	Enhanced Thematic Mapper
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
GDA	Geospatial Data Architecture
GeoLoB	Geospatial Line of Business
GIIA	Geospatial Information Integration and Analysis
GIO	Geospatial Information Office, U.S. Geological Survey
GIS	Geographic Information Systems
GML	Geography Markup Language

GNIS	Geographic Names Information System
GOS	Geospatial One-Stop (portal)
DRG	Digital Raster Graphic
GSA	U.S. General Services Administration
GSD	Groundcover Sample Distance
HAZUS	FEMA's software program for estimating potential losses from disasters
HHS	U.S. Department of Health and Human Services
HSIP	Homeland Security Infrastructure Program
IFSAR	Interferometric Synthetic Aperture Radar
IFTN	Imagery for the Nation
IT	Information technology
LIDAR	Light Detection and Ranging
MAPPS	Management Association for Private Photogrammetric Surveyors
MRLC	Multi-Resolution Land Cover Consortium
MTAIP	MAF/TIGER Accuracy Improvement Project
NAPP	National Aerial Photography Program
NAIP	National Agriculture Imagery Program
NARC	National Association of Regional Councils
NED	National Elevation Dataset
NGA	National Geospatial-Intelligence Agency
NGP	National Geospatial Program
NGPO	National Geospatial Program Office
NGTOC	National Geospatial Technical Operations Center
NHD	National Hydrography Dataset
NLCD	National Land Cover Data
NLC	National League of Cities
NPS	National Park Service, U.S. Department of the Interior
NSDI	National Spatial Data Infrastructure
NSGIC	National States Geographic Information Council
NSN	Natural Science Network
OGC	Open Geospatial Consortium
OMB	Office of Management and Budget
PPWG	Program Partnership Working Group
RAMONA	Random Access Metadata tool for Online National Assessment
RASCI	Responsible, Accountable, Supportive, to be Consulted, to be Informed
R&D	Research and Development
RFP	Request for Proposal
SDDS	Seamless Data Distribution System
TGS	TGS Technology, Inc.
TNM	The National Map
TNMRP	The National Map Reengineering Project
UTM	Universal Transverse Mercator
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service, U.S. Department of Agriculture
USGS	U.S. Geological Survey, U.S. Department of the Interior
WCS	Web Coverage Services
WFS	Web Feature Services
WMS	Web Mapping Services

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Executive Summary

Overview

The National Map's 2-year goal, as described in this plan, is to provide a range of geospatial products and services that meet the basic goals of the original vision for The National Map while furthering the National Spatial Data Infrastructure that underpins U.S. Geological Survey (USGS) science. To accomplish this goal, the National Geospatial Program (NGP) will acquire, store, maintain, and distribute base map data. The management team for the NGP sets priorities for The National Map in three areas: Data and Products, Services, and Management. Priorities for fiscal years 2008 and 2009 (October 1, 2007 through September 30, 2009), involving the current data inventory, data acquisition, and the integration of data, are (1) incorporating current data from Federal, State, and local organizations into The National Map to the degree possible, given data availability and program resources; (2) collaborating with other USGS programs to incorporate data that support the USGS Science Strategy; (3) supporting the Department of the Interior (DOI) high-priority geospatial information needs; (4) emergency response; (5) homeland security and natural hazards; and (6) graphics products delivery.

The management team identified known constraints, enablers, and drivers for the acquisition and integration of data. The NGP management team also identified customer-focused products and services of The National Map. Ongoing planning and management activities direct the development and delivery of these products and services. Management of work flow processes to support The National Map priorities are identified and established through a business-driven prioritization process.

This tactical plan is primarily for use as a document to guide The National Map program for the next two fiscal years. The document is available to the public because of widespread interest in The National Map.

The USGS collaborates with a broad range of customers and partners who are essential to the success of The National Map, including the science community, State and Federal agencies involved in homeland security, planners and emergency responders at the local level, and private companies. Partner contributions and data remain a primary input and foundation of The National Map. Partnership strategies for each of The National Map's component data themes are outlined in this plan. Because of the importance of The National Map customers, a reassessment of customer needs will be completed during 2008. Results of the assessment will be incorporated into future decisions and priorities

A performance milestone matrix has been developed that contains the full list of milestones, major deliverables, and major tasks. The matrix forms the basis for reporting on accomplishments and issues. However, a number of risks, dependencies, and issues have been identified that could affect meeting milestones in the matrix, such as the USGS is not the Circular A–16 (2002) lead for boundaries, transportation, and structures; availability of sufficient and sustainable funding; availability of Federal workforce and contractors with necessary skills; and numerous competing customer and stakeholder requirements.

Integration of Data

The integration of data is critical to the success of The National Map. The approach used depends on the product priorities, available technologies, and available resources. The edited data must be preserved and corrections passed back to the authoritative data source. An integration team will be established to plan for and coordinate the integration of data and reestablish the capabilities through the National Geospatial Technical Operations Center (NGTOC).

Products and Services

The term "Products and Services" is used to describe all business goods and services provided to a customer. Products are bundles of attributes (features, functions, benefits, and uses) and can be either tangible as in the case of physically delivered goods, or intangible, such as service benefits, or a combination of the two. In the context of The National Map (TNM), products are information assets with specified characteristics and qualities delivered in electronic (or in some emergency cases, paper) formats to consumers. Services are functional capabilities provided to TNM consumers that support a sustained interaction with TNM data and computing assets. TNM products and services are designed to satisfy consumer-initiated geospatial or mapping requests or inquiries.

The proposed priority areas are a composite of geographic data themes identified to address the needs of top stakeholder groups. The areas will be prioritized based on the highest number of overlapping occurrences resulting from an intersection of all stakeholder needs.

Elevation

- 10-meter gridded elevation data over 100% of the priority areas by September 30, 2008.
- Finer than 10-meter, gridded elevation data over the priority areas, where available, by September 30, 2009.
- 10-meter or finer elevation in National Elevation Dataset (NED) from agreements for all areas.
- Working with the Graphics Program and Common Systems, develop a plan, specifications and service for automated contour generation in support of the graphics program.
- Revise the USGS Elevation Specifications by June 30, 2008.

Geographic Names

- Collect names for administrative features along the East Coast by September 30, 2008.
- Maintain Louisiana, Montana, Missouri, Idaho, and New Mexico data through stewardship agreements during the 1-year contract period.
- Have agreements in place for Google Earth to use and credit USGS Geographic Names by December 31, 2007.

Hydrography

- 100% national coverage at 1:24,000 scale available by August 31, 2007.
- 100% of the Nation upgraded to interim design standard by September 30, 2008.
- 25% of the Nation upgraded to final design standard by December 31, 2008.
- 50% of the Nation covered by stewardship agreements by December 31, 2008.
- 25% of the Nation upgraded by maintenance by December 31, 2008.

Land Cover (Responsibility of the Geography Discipline)

- NLCD 2006 update products including percent canopy and percent impervious surface for NGP high priority areas completed by September 30, 2009.
- NLCD 2006 processed data update beginning in 2009 and completed by March 31, 2010.

Orthoimagery

- 10% of the Nation (5,500 quads) acquired/updated from October 1, 2007, to September 30, 2008
  - 2% high resolution orthoimagery (24-inch, 18-inch, 1-foot, 6-inch, and 3-inch orthoimagery)
  - 8% 1-meter resolution orthoimagery
- 10% of the Nation (5,500 quads) acquired/updated from October 1, 2008, to September 30, 2009
  - 2% high resolution orthoimagery (24-inch, 18-inch, 1-foot, 6-inch, and 3-inch orthoimagery)
  - 8% 1-meter resolution orthoimagery

Boundaries

- 80% national coverage at 1:24,000 scale through application of Census 2007 updates by June 30, 2008.
- 100% national coverage at 1:24,000 scale through application of Census 2008 updates by December 31, 2008.
- 100% national coverage at 1:24,000 scale of major Federal boundaries by December 31, 2008.

Structures

- 100% national coverage at 1:24,000 scale of essential facilities, including hospitals, schools, police stations, and fire stations available by December 31, 2008.

Transportation

- 80% national coverage at 1:24,000 scale through application of Census 2007 updates by June 30, 2008.
- 100% national coverage at 1:24,000 scale through application of Census 2008 updates by December 31, 2008.
- 20% of Nation under active stewardship for roads data by December 31, 2008.
- Work with providers of other transportation data, including airports, pipelines, trails and railroads, to develop nationally maintained and integrated geospatial data inventories.
- Develop pilots in five States to test and implement data exchange workflows between State implementations and The National Map.
- Incorporate Emergency-911 and evacuation route content in support of disaster response capabilities.

Scanned 7.5-Minute Topographic Maps

- Approximately 3,000 7.5-minute quadrangles covering the East and Gulf Coast States will be scanned and converted to high resolution geopdfs by December 31, 2008
- Approximately 250 additional 7.5-minute high resolution geopdfs will be created across the U.S. to support print-on-demand for low-selling, out-of-stock quadrangles.
- To be determined is the number of high resolution, "geomark enabled" geopdfs from the Reston library (early FY08).

7.5-Minute Digital Topographic Maps

- Develop standard specifications for the product
- Acquire customer input on prototype products by March 31, 2008
- Develop a streamlined production process
- Produce topographic maps based on quality and currentness of available data
- Publish maps as digital files and distribute through the USGS store at: *http://store.usgs.gov*

Image Maps with Selected Overlays

- Produce 1:24,000-scale image maps with selected overlays two counties deep (50 miles) along the Atlantic Coast (Florida to Delaware) and the Gulf Coast (Florida to Texas).
- Develop full automation of image map production so that image maps can be rapidly produced for emergency response needs.
- Write specifications for image maps.

Custom Maps Service On-the-Fly

- Systems Phase II—Evaluation in the second quarter of FY08.

Data Download

- Systems Phase II—Evaluation in the second quarter of FY08

Web Services

- Includes Web Mapping Services (WMS), Web Feature Services (WFS), and Web Coverage Services (WCS).
- Systems Phase II—Evaluation in the second quarter of FY08.

Data Catalogs

- Geospatial One-Stop (GOS) Catalog Version 2.2 released by October 31, 2007.
- Geospatial One-Stop (GOS) Catalog Version 2.3 released by September 30, 2008.
- TNM Catalog Alignment with New Business Model Requirements by March 31, 2008.
- Assessment of integration with TNM Planning functionality—Common Systems Phase 1—Agreements/Status Development Activity (See Systems Schedule).

Marketplace

- GOS Marketplace (Version 2.2) released by October 31, 2007.
- Assessment of integration with TNM Planning functionality—Common Systems Phase 1—Agreements/Status Development Activity (See Commons Systems Schedule).
- GOS Marketplace (Version 2.3) released by September 30, 2008.

Data Theme Status Graphics

- Development of standards-based inventory metadata around TNM data holdings
- Development of status map visualization and performance metrics capabilities
- Development of basic planning queries and reports

Supporting and Enabling Activities

During the 2-year period, the following supporting and enabling activities will take place.

Partnerships in Support of Products and Services

- USGS Geospatial Liaisons will develop a business plan focused on data discovery and acquisition for each State.
- Data acquisition efforts, footprint, specifications, and work priorities will be aligned with a joint schedule and plans for The National Map.
- Products and services feedback will be collected from partners and customers.
- USGS Geospatial Liaisons will provide outreach and support to the other USGS Disciplines on The National Map Tactical Plan and products and services.

Systems in Support of Products and Services

- Agreements Management System by December 31, 2008
- Performance Management and Status System by September 30, 2008
- Portal and User Interface Improvements (GOS and TNM) by December 31, 2008
- Data Integration Strategy and Technical Approaches by September 30, 2008
- Make improvements to The National Map Architecture by September 30, 2008
- Business Case Analysis of Hosting Original Partner Data by March 31, 2009

Outreach in Support of Products and Services

- Establish criteria for comprehensive and specific training, workshop, focus group, fact sheet, and promotional item (giveaway) requirements.
- Coordinate the theme-driven outreach activities with the broader NGP activities.
- Ensure outreach efforts, as appropriate, are coordinated with the USGS Office of Communications.
- Gather geospatial data from partners' current geospatial information.
- Develop an individual life cycle for all TNM fact sheets.

- Craft specific messages targeted to specific audiences.

Integration of Data Themes in Support of Products and Services

- Horizontal integration
- Vertical integration

Management

The National Map Tactical Plan is overseen by a management team comprised of the NGPO Director (Chair), Geospatial Information Integration and Analysis (GIIA) Chief, GIIA Deputy, Partnership and External Coordination Chief, Emergency Operations Chief, NGTOC Director, and The National Map Project Chief. This team has the following responsibilities:

- Set goals
- Establish priorities
- Approve the addition or retirement of products and services
- Approve significant budgetary changes
- Provide general oversight of the plan
- Participate in the configuration and change management processes

The following activities will be completed by September 2009:

- Staff the functional roles matrix
- Compile detailed plans by technical leads
- Ensure that partnerships are aligned with The National Map priorities
- Inventory commitments
- Prepare a directory of products and services
- Prepare an inventory of services
- Introduce configuration and change management

Establishing Priorities

Priorities for The National Map have been established for those activities most important to the short- and long-term success of TNM. These priorities help to focus work, management, and distribution of resources within the project. Priorities will be adjusted as necessary to respond to emerging changes in the project's overall environment that may impact resources, constrain time, or change customer needs. Priorities are set and adjusted on the basis of a collaborative process involving leadership, management, technical leads, customers, partners, and others. That process involves identifying a driver (need for a change); an assessment of impact; identification of cost, risk, and requirements; and establishment of responsibility and timeframes for deliverables. The collaborative process results in the submission of a proposal to a Change Management Board. Any changes require final management approval and are fully documented.

Introduction

The National Map is one of the cornerstones of the National Geospatial Program (NGP). Other cornerstones include The National Atlas of the United States, Geospatial One-Stop, and the Federal Geographic Data Committee. This planning document focuses on The National Map, which provides base geospatial data to the Nation through a portfolio of products and services that focus on eight data themes: elevation, geographic names, hydrography, land cover, orthoimagery, boundaries, structures, and transportation. This Tactical Plan is primarily for use as a document to guide The National Map program develoment, production, and metrics monitoring for Fiscal Years 2008 and 2009.

The success of The National Map (TNM) depends on integrated planning, collaboration, and execution of this Tactical Plan, which with The National Map Reengineering Project (TNMRP), bridges the strategic National Geospatial Program Office Plan for Action (2005) (available at http://pubs.usgs.gov/of/2005/1379/) and the detailed plans for each project and activity, as shown in figure 1.

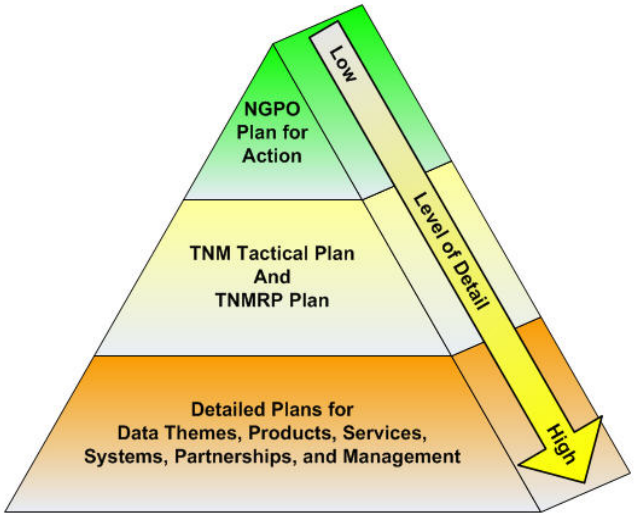

Figure 1. Relation of plans within the NGP.

At the start of the planning process for the Tactical Plan, the NGP management team identified goals, set priorities, and provided known constraints such as assuming FY07 funding levels and using a 2-year timeframe for the plan. The management team efforts resulted in early successes before completion of the plan; the product and services leads are now working closely together and are working with the systems leads; a formal change-control process has been established for the plan; and a process for metrics tracking is in place.

Demand for national geospatial data and map products comes from a broad array of customers and stakeholders. Demand has been periodically assessed by the Geospatial Information Office (GIO). In 2007, the NGP commissioned a federal customer/stakeholder survey to determine needs and preferences of over 400 entities identified by Partnership Liaisons, Product Leads, management, staff, and stakeholders. Several stakeholder groups surveyed their constituencies about The National Map as well. While findings will not be complete until November 2008, preliminary results are so compelling that management will put them to use immediately in designing graphic products and data acquisition. (See Key Customers and Partners, below.) The USGS will continually monitor customer responses and preferences to improve products and services of The National Map. A comprehensive Strategic Plan in the future will include more on the demand for products and services.

Goals

The National Map's 2-year goal is to provide a range of geospatial products and services that meet the basic goals of the original vision for The National Map while furthering the National Spatial Data Infrastructure that underpins U.S. Geological Survey (USGS) science. To accomplish this goal, the National Geospatial Program (NGP) will acquire, store, maintain, and distribute base map data.

Priorities

The NGP management team sets priorities for The National Map in three primary areas: Products, Services, and Management. Priorities within these areas were established for those activities most important to the short- and long-term success of TNM. These priorities help to focus work, management, and distribution of resources within the project. Priorities will be adjusted as necessary to respond to emerging changes in the project's overall environment that may impact resources, constrain time, or change customer needs. Priorities are affected by budget and operational capacity constraints; thus, they will be set and adjusted on the basis of a collaborative process involving leadership, management, technical leads, customers, partners, and others. That process involves identifying a driver (need for a change), an assessment of impact, identification of cost, risk, and requirements, and establishment of responsibility and timeframes for deliverables. The collaborative process results in the submission of a proposal to a Change Management Board. Any changes require final management approval and are fully documented.

Priorities for data inventory, acquisition and ingestion are (1) current data for all eight themes to the degree possible given data availability and program resources, (2) collaboration with other programs and support for the USGS Science Strategy, (3) DOI high priority geospatial information needs, (4) emergency response, (5) homeland security and natural hazards, and (6) graphics products delivery.

Products

- Data collection and maintenance
    - 7.5-minute quadrangle data on the East Coast and Gulf Coast States, two counties (50 miles) deep from the coastline; 50 miles on the U.S. side of the international boundaries with Canada and Mexico, for the 33 largest cities, DOI lands, and USGS science initiatives.
    - Collaborate on strategic science base data priorities and requirements through deliberations with the collaborative science committee.
    - Image map coverage with selected overlays.
    - High resolution scans of the most recent topographic maps.
    - Next generation 7.5-minute digital topographic maps that will evolve over time with stakeholder input.
    - Customer-focused requirements for products.

Services

- Systems that support priority products and services and that are customer focused
- Planning for next generation systems that support priority products and services
- Serving data and products through Web services
- Customer-focused requirements for services
- Status graphics

Management

- Meet existing commitments
- Align workforce with priorities
- Align Partnership and priority TNM activities

- Ensure production and management capacity and processes to support TNM activities
- Revise and develop policy, guidance, standards, protocols, and procedures to support TNM priorities

Enablers

The NGP management team identified 8 enablers that make it possible and practical for The National Map to achieve its desired state:

- Standards
- Liaisons/Partnerships (including professional organizations)
- National Geospatial Technical Operations Center (NGTOC)
- Center for Earth Resources Observation and Science (EROS)
- Systems/Technology
- Governance
- Outreach
- Integration of data themes

Drivers

The NGP management team identified 7 drivers that motivate The National Map activities and projects:

- DOI Strategy, Geospatial Blueprint, and Geospatial Line of Business
- USGS Science Strategy
- Partner data availability and gaps
- Matters and places of national importance
- Common needs and requirements
- Multiple constituencies
- Partner and customer needs

Products and Services

Finally, the NGP management team identified customer-focused products and services of The National Map that are shown in Table 1. The products and services approach embraces branding similar to what has been done with The National Atlas and emphasizes satisfying customer needs. Planning and management activities direct the development and delivery of these products and services.

Table 1. Products and Services of The National Map.

Data Products	Graphic Products	Services
USGS A–16 Theme Lead Elevation Geographic Names Hydrography Land cover (Geography) Orthoimagery Non-A–16 Lead Boundaries Structures Transportation	Scanned maps 7.5-minute digital topographic maps Image maps with selected overlay Custom maps on-the-fly	Data download Web Mapping Services, Web Feature Services, Web Coverage Services Data Catalogs Marketplace Status Graphics

General Information

A diverse writing team developed the Tactical Plan. The team includes the NGP management, the products and services leads, system leads, Partnership Office and Partnership Regional Management, and NGTOC management. See Appendix A for the complete list of writing team members. These people are close to the actual work and have direct contact with those doing the work. At the same time that the Tactical Plan was developed, the NGP was changing the way that the organization does business within a fiscal year to ensure that fiscal planning will take into consideration variations in Congressional appropriations and the likelihood of continuing resolutions. These planning processes and resulting budgetary allocations are documented separately by the NGP. The budgetary information is available separately. This approach ensures that the plan is practical, realistic, and achievable.

The purpose of the Tactical Plan is to focus and calibrate NGP's near-term implementation efforts as a requisite step toward the basic goals of the original vision for The National Map. Integration, consistency and seamlessness of data are aspects of the vision that the plan aims to make a reality through the alignment, direction, and management of NGP's workforce and resources. The products and services leads and geospatial liaisons will work to engage and collaborate with partners to ensure the availability of the needed data; the NGTOC will support data integration and stewardship and produce and deliver the products and services for the customers. The primary changes represented by the plan are a concentrated focus on delivering well-defined products and services as the outputs of The National Map, together with a renewed commitment to the needs of USGS science for a reliable geospatial data foundation.

Information about key customers and partners, a high-level work breakdown structure, and general risks, dependencies, and issues that apply to all products and services follow in this section.

Key Customers and Partners

The USGS collaborates with a broad range of customers and partners who are essential to the success of The National Map, including the science community, State and Federal agencies involved in homeland security, planners and emergency responders at the local level, and private companies. Some of these groups are customers or users of TNM, others are partners or contributors to TNM, and many of them are both.

State, local, Tribal, and Federal entities produce and maintain a vast array of current, accurate geospatial data. In recent years, a significant objective and investment focus of NGP has been the development of mutually beneficial partnerships with these organizations to coordinate data acquisition, development, integration, maintenance, and stewardship. To illustrate the quantity and variety of TNM partnerships, a list of partners for FY07 agreements coordinated by the USGS Geospatial Liaisons is

provided in Appendix B. Partner contributions and data remain a primary input and foundation of TNM. Partnership strategies for each of TNM's component data themes are outlined in this plan.

NGP also recognizes the critical role of the partners and customers in defining and developing TNM products and services. User input and feedback are necessary in identifying existing and potential uses of TNM, defining data and software requirements, developing system designs, and testing prototypes and deliverables. Prior assessments of customer and stakeholder needs are over 3 years old, and the marketplace has seen many new suppliers and technologies that may impact the focus for TNM. Thus, NGP will complete a reassessment of its TNM customers' primary needs by July 2008. A team will be formed to oversee the following customer assessment activities:

- Determine customer segments and primary customers for TNM products and services.
- Establish a meaningful dialog with these customers via surveys, workshops, focus groups, usability studies, and other methods of customer information gathering.
- Initiate an in-reach program to the other USGS disciplines to asses internal needs.
- Use results and findings to prioritize product design decision.
- Use continuous assessment techniques as a primary means to manage product life cycle.

TNM customer focus will include the following objectives:

- Create new capabilities to understand and meet or surpass customer requirements and expectations.
- Deploy the geospatial liaisons as key facilitators for both obtaining feedback and developing partnerships and gathering data for TNM.
- Focus priority efforts on satisfying the needs of our customers for access to current framework data and map products.
- Provide information that clearly explains the program focus and activities over the next 2 years, including representative products and specifications.
- Develop product and service branding to clearly identify and ensure recognition of TNM.

Work Breakdown Structure Chart

The work breakdown structure chart for The National Map, shown in figure 2, uses products and services as its organizing principle. It shows the scope of TNM work.

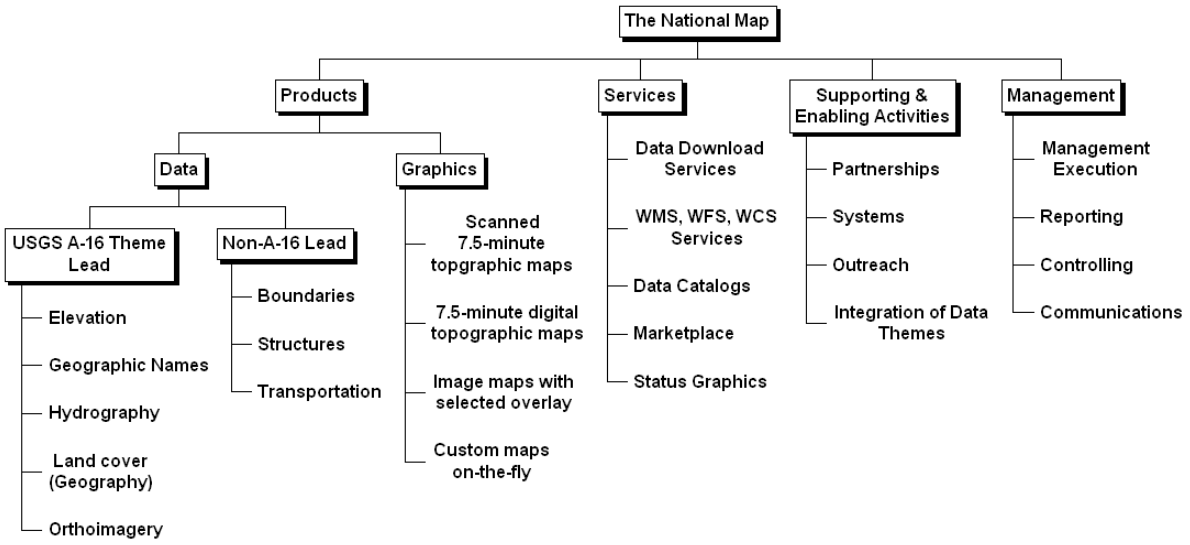

Figure 2. The National Map work breakdown structure.

Performance Milestone Matrix

The Performance Milestone Matrix contains the full list of the milestones, major deliverables, and major tasks for each of the areas shown in the work breakdown structure for the 2-year period covered by the Tactical Plan. The matrix forms the basis for reporting on accomplishments and issues. The Tactical Plan and matrix are synchronized through the change control process. Each lead will develop detailed plans to accomplish these milestones and will report any exceptions to the milestones. The performance milestones provide a comprehensive view of the work being done in The National Map.

General Risks, Dependencies, and Issues

Because the USGS is not the Circular A–16 (2002) lead for boundaries, transportation, and structures, The National Map may not be able to get the information needed for minimal data layer requirements. The USGS is not funded to maintain the needed data in these three themes at a level that ensures the content and quality necessary for 1:24,000-scale mapping. It is possible that these themes of data will continue to be inadequate for USGS data delivery, map products, and GIS for the foreseeable future.

The year-to-year funding model complicates long-term planning, acquisitions leveraging, multi-year projects, and long-term partnerships with State and Federal agencies.

Risks include:

- Availability of sufficient and sustainable funding.
- Incongruent Federal, State, and local government funding timetables.
- Changing priorities due to natural disasters and other unforeseen events.
- Numerous and conflicting customer and other stakeholder requirements.
- Availability of a Federal workforce with subject matter, quality assurance and quality control, load, and processing expertise complemented by contracts and industry expertise.

Mitigation to reduce risks includes:

- Collaboration with State, Federal, and local partners to leverage available funding, assist with data collection, and perform data integration to USGS specifications.
- USGS will work with the Geospatial Line of Business leads throughout government to develop or coordinate funding strategies and timetables.
- The NGP staff will assess risks throughout the nation and prioritize areas to pre-stage map products in areas of high probability/vulnerability to natural hazards and emergency operations.
- Clearly and openly communicate internally and externally (with customers and stakeholders) regarding The National Map plan and particularly expectations for product and services.

Integration of Data: An Overview

The integration of data is critical to the success of The National Map. The term "data integration," as it presently relates to The National Map, pertains to processes that ensure proper positional registration and attribute consistency of spatial features across and within each of TNM's eight data themes.

Cross-theme relationships represent another type of data integration. These relationships can be defined within a data model using vertical topology or references. For example, the USGS might incorporate into its data model a vertical topological link modeling the real world connections between roads and waterways at boat ramps or ferry terminals. Scientists could also tie data from other sources to The National Map framework through spatial or logical linkages: for example, pollution source information spatially linked to streams within the National Hydrography Dataset (NHD) or soil chemistry data containing references to corresponding watersheds in the NHD.

Horizontal data integration has typically been addressed during data production, database load, or processing of a single theme of data. Vertical data integration has traditionally taken place when producing a product consisting of multiple data themes, such as a graphic map. The approach depended in the past on product priorities, available technologies, and available resources.

Successful integration of TNM themes requires, first and foremost, the reestablishment of project planning operations for assessing the present state of accuracy and currency for all themes on a project-by-project basis. To be of value for topographic map generation, project assessments need to take place at least a year in advance of map production. Automated methods will be investigated and implemented where possible to minimize human effort, cost, and delays in the integration process. Strategies, procedures, and plans can then be developed to address the most prevalent and severe problems. A Graphic Product study has been proposed to define and assess various levels of data integration and to determine costs associated with each.

Finally, an integration team will be established to plan for and coordinate the integration of data. The implementation of an acceptable data integration process will require development of efficient interactive data editing tools. The edited data must be preserved, and mechanisms must also be established to pass corrections made by the USGS back to the authoritative source for any particular dataset. Current expectations are that requirements for cartographic offsets will be greatly reduced over past practices and these edits will be stored and distributed solely as characteristics of the graphic map file.

Products and Services

The term "Products and Services" is used to describe all business goods and services provided to a customer. Products are bundles of attributes (features, functions, benefits, and uses) and can be either tangible, as in the case of physically delivered goods, or intangible, such as service benefits, or a combination of the two.

In the context of The National Map, products are information assets with specified characteristics and qualities delivered in electronic formats to consumers. Services are functional capabilities provided to TNM consumers that support a sustained interaction with TNM data and computing assets.

TNM products and services are designed to satisfy consumer-initiated geospatial or mapping requests or inquiries. The product and service directory can be found at http://www.usgs.gov/ngpo/ (Click on “Reading Room”).

Product and service families group similar products and services together. For each of the product and service families, the plan addresses the following:

- Two-year deliverables.
- Description of the product/service family.
- Product/service list (listing the products or services in the family). (Detailed information about a specific product or service is held separately from this plan.)
- Location of the specifications for the products or services.
- Integration and Registration issues and practices.
- Risks and consequences.

The management team intends to put costs and level of effort estimates into the plan during the FY 2008 planning process and the development of the detailed plans.

Products

Elevation

Two-Year Deliverables

- 10-meter gridded elevation data over 100% of the priority areas by September 30, 2008.
- Finer than 10-meter, gridded elevation data over the priority areas, where available, by September 30, 2009.
- 10-meter or finer elevation in NED from agreements for all areas.
- Working with the Graphics Program and Common Systems, develop a plan, specifications, and service for automated contour generation in support of the graphics program.
- Revise the USGS Elevation Specifications by June 30, 2008.

Elevation Product Family Description

Elevation data consists of (1) gridded terrestrial digital elevation data with 10-meter or finer resolutions, and (2) raw and processed data that can support 10-meter or finer gridded elevation data. The data may be derived photogrammetrically or processed from LIDAR, IFSAR, or other technologies. The data may be obtained from any collection sensor platform: aircraft-based, satellite-based, or ground-based. Downloads are available at *http://ned.usgs.gov*

Elevation Product List

- The National Elevation Database (NED), an online, multi-resolution seamless web service for viewing and downloading the available elevation data.
- 1-arc-second (30-meter Groundcover Saple Distance (GSD)) from the NED for the conterminous United States, Hawaii, and Puerto Rico.
- 2-arc-second (60-meter GSD) from the NED layer for Alaska.

- 1/3- arc-second (10-meter GSD) from the NED for the conterminous United States, Hawaii, and Puerto Rico, and the island territories.
- 1/9-arc-second (3-meter GSD) from the NED.

Specifications

- USGS Standards for Digital Elevation Models (August 1997).
- Federal Geographic Data Committee (FGDC) Content Standards for Framework Land Elevation Data (January 1999).
- National Digital Elevation Program Elevation Guidelines, Version 1.0 (March 2004).
- FGDC Content Standard for Digital Geospatial Metadata (FGDC-STD-001-1998).

Integration and Registration

Newer and finer resolution elevation data are rapidly replacing the first generation digital elevation data which will impact how new contours generated for topographic, image, and shaded relief graphics will register with the other layers of The National Map. The same issue will occur for the integration of contours with other data theme layers on the digital version.

Risks and Consequences

- New technologies for acquiring high resolution elevation result in higher costs for smaller areas.
- Higher resolution data increase processing and storage costs.

Geographic Names

Two-Year Deliverables

- Collect names for administrative features along the East Coast by September 30, 2008.
- Maintain Louisiana, Montana, Missouri, Idaho, and New Mexico data through stewardship agreements during the 1-year contract period.
- Have agreements in place for Google Earth to use and credit USGS Geographic Names by December 31, 2007.

Geographic Names Product Family Description

The Geographic Names Information System (GNIS) serves as the name layer for The National Map. GNIS functions as the U.S. Board on Geographic Names' vehicle for promulgating the standard form and spelling of geographic feature names to be used on all Federal products. GNIS is designated as the A–16 authoritative database for geographic names. Downloads are available at http://geonames.usgs.gov.

Geographic Names Product List

- State file downloads.
- Populated Places download—Named features with human habitation: cities, towns, villages, etc.
- Historical Features download—Features that no longer exist on the landscape.

- Concise Features download—Large features that should be labeled on maps with a scale of 1:250,000.
- All Names download—All names, both official and nonofficial (variant), for all features in the Nation.
- Antarctica Features download—Features in Antarctica approved for use by the U.S. Government.
- Web Mapping Services and Web Feature Services for feature extraction.
- State file with FIPS 55 download—FIPS 55 place code to GNIS ID number crosswalk.

Specifications

Data are accurate to Phase I and Phase II compilation specifications, and Board on Geographic Names (BGN) policies. (These are the base standards.)

Integration and Registration

Data are accurate to Phase I and Phase II compilation specifications, and BGN policies. The Phase I and II specifications are available in hard copy in the Names office and the BGN policies are available at http://geonames.usgs.gov/docs/pro_pol_pro.pdf . When the National Hydrography Dataset (NHD) was conceived, it was agreed that only the hydronyms that were in GNIS would be stored in NHD. GNIS is also integrated with Structures in that before data are loaded into the Best Practices database, they are first sent to GNIS to be loaded and given a GNIS ID number which is then stored in the Best Practices Database. Improvements in integration with other themes will be through stewardship activities.

Risks and Consequences

- Partners and contractors provide some of the data.
- NGTOC provides personnel to keep The National Map server and processes running.
- Contractors provide IT support.

Hydrography

Two-Year Deliverables

- 100% national coverage at 1:24,000 scale available by August 31, 2007
- 100% of the Nation upgraded to interim design standard by September 30, 2008
- 25% of the Nation upgraded to final design standard by December 31, 2008
- 50% of the Nation covered by stewardship agreements by December 31, 2008
- 25% of the Nation upgraded by maintenance by December 31, 2008

Hydrography Product Family Description

The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that represents the surface water of the United States using common features such as streams, rivers, canals, ponds, lakes, and oceans. These data are designed to be used in general mapping and in the analysis of surface water systems using geographic information systems. In mapping, the NHD is used with other themes of data to produce general reference maps. The NHD is also often used by scientists specifically in the analysis of surface water using GIS technology. This takes advantage of a rich set of embedded

attributes that can generate specialized information portrayed in specialized maps. These analyses of hydrography are largely possible because the NHD contains a flow direction network that traces the water downstream or upstream. It also uses an addressing system to link to other water databases such as water discharge, water quality, and fish population. Using the basic water features, flow network, linked information, and other characteristics, it is possible to study cause-and-effect relationships, such as how a source of poor water quality upstream might affect a fish population downstream. The NHD program will work in partnership with a broad range of clients in the Federal, State, and local governments, as well as industry, academia, and conservation communities. This will include close coordination with USGS disciplines with particular emphasis in water resources. Downloads are available at http://nhd.usgs.gov.

Hydrography Products List

The National Hydrography Dataset is available as

- ESRI Geodatabase, (Access and File based)
- ESRI Shapefile
- GML in the future
- Web Mapping Services
- Web Feature Services in the future.

The data are also available in two separate datasets

- derived from 1:24,000-scale sources, and
- derived from 1:100,000-scale sources.

The 1:24,000-scale dataset will be increasingly populated with 1:4,800-scale type data as stewards upgrade the NHD to better meet their business needs.

Specifications

The National Hydrography Dataset is defined by Standards for National Hydrography Dataset—High Resolution, and Standards for National Hydrography Dataset—Geodatabase Implementation.

Integration and Registration

Based on The National Map Accuracy Standard compliance for 1:24,000-scale mapping, improvements will be accomplished by (1) resolution upgrades, (2) maintenance upgrades, and (3) map product generation. GNIS will be integrated into the NHD from (1) initial production, and (2) maintenance upgrades. The Watershed Boundary Dataset will be integrated as part of the Final Design standard Two-Year goal.

Risks and Consequences

- Failure to keep pace with technological improvements will cause the product to become obsolete and services inadequate.
- Stewardship may not be widely adopted due to (1) lack of interest in the NHD product, (2) State funding limitations, and (3) legislative action required to identify an authoritative steward in State government.
- NHD maintenance processes may be too complex, resulting in a low level of stewardship activity.

- States may spin off the NHD and create their own datasets, resulting in fragmentation of the national program if the product does not keep pace with customer requirements.
- Mitigating the above risks largely depends on good management to adequately plan The National Map, gain support at all levels, secure funding, manage personnel, control processes, and other best management practices.

Land Cover (Geography)

Two-Year Deliverables

- NLCD 2006 update products including percent canopy and percent impervious surface for NGP high priority areas completed by September 30, 2009.
- NLCD 2006 processed data update beginning in 2009 and completed by March 31, 2010.

Land Cover Product Family Description

The National Land Cover Database (NLCD) is created and funded by the Multi-Resolution Land Characteristics Consortium (MRLC) (consisting of 13 programs across 10 Federal agencies), led by the USGS. This consortium has produced land cover data for the conterminous United States based on nominal 1992 Landsat data (NLCD 1992). It has completed a land cover database for all 50 States centered on nominal 2001 Landsat data called NLCD 2001. Downloads are available at http://landcover.usgs.gov.

Land Cover Product List

- NLCD 1992—Land cover data for the conterminous United States based on nominal 1992 Landsat data.
- NLCD 2001 database—The National Land Cover Database 2001 contains a 19-class land cover classification scheme applied consistently over the United States, from Landsat ETM+ data at 30-meter resolution. In addition, the NLCD 2001 database includes a percent tree-canopy layer, and a percent impervious layer. The percent tree-canopy layer will be the source for generating a "woodland tint" for The National Map graphics. The percent impervious surface may also be a useful source for urban tint on The National Map graphics. These layers are complete for the entire United States (except Alaska, which still has some areas with incomplete tree canopy). A minimal amount of processing may be needed to supply the graphics program with the data needed to generate The National Map graphics using a map-on-demand technology.
- NLCD 2006 Update—Beginning in FY09, the Land Cover program will begin production of the NLCD 2006 update. Production will take 18 to 24 months, depending on MRLC member contributions. To assure timely production of NLCD 2006 data layers over high priority areas, production costs may to be covered by the NGP.

Specifications

Product specifications come from mutually agreed-upon requirements and land cover parameters developed through the MRLC Consortium. All NLCD data products, imagery, descriptions, and publications are available for download at http://www.mrlc.gov.

Risks and Consequences

NLCD accomplishments are directly related to (1) the availability of sufficient and sustainable funding from the MRLC Federal partners, (2) ensuring future NLCD requirements are compatible with available satellite imagery, and (3) maintaining a Federal workforce with the appropriate knowledge base to support both production and/or contracting, as well as quality assessments.

Orthoimagery

Two-Year Deliverables

- 10% of the Nation (5,500 quads) acquired/updated from October 1, 2007 to September 30, 2008
  - 2% high resolution orthoimagery (24-inch, 18-inch, 1-foot, 6-inch, and 3-inch orthoimagery)
  - 8% 1-meter resolution orthoimagery
- 10% of the Nation (5,500 quads) acquired/updated October 1, 2008 to September 30, 2009
  - 2% high resolution orthoimagery (24-inch, 18-inch, 1-foot, 6-inch, and 3-inch orthoimagery)
  - 8% 1-meter resolution orthoimagery

Orthoimagery Product Family Description

The orthoimagery data theme is digital orthorectified imagery of 1-meter GSD resolution or better, acquired in a 5-year cycle for the United States and its territories and possessions, and digital orthorectified imagery of 1-foot GSD resolution or better, acquired in a 2- to 4-year cycle for the 133 urban areas as defined in the HSIP Tiger Team Report, first released in September 2002, for official use only. Imagery type may be natural color, color infra-red, or panchromatic. All imagery must be accompanied by FGDC-compliant metadata, must be in the public domain, must be served via a WMS in The National Map, and must be discoverable through Geospatial One-Stop. Downloads are available at http://gisdata.usgs.net/website/Orthoimagery.

Orthoimagery Product List

- 1-meter resolution digital orthophoto quad (DOQ) for the conterminous United States, and portions of Hawaii, Alaska, and Puerto Rico from National Aerial Photography Program (NAPP) imagery.
- 1-meter resolution digital orthophoto quarter quad (DOQQ) for the conterminous United States, from first cycle National Agriculture Imagery Program (NAIP) imagery.
- 1-foot resolution orthoimagery for 133 urban areas in the United States for the HSIP.
- 24-inch, 18-inch, 1-foot, 6-inch, and 3-inch orthoimagery for select areas of the United States from State and local partnerships and vendor purchases.

Specifications

- American National Standards Institute, Information Technology—Geographic Information, Framework Data Content Standard Part 2: Digital Orthoimagery (September 12, 2005).
- Digital Orthoimagery Quarter Quadrangle Specification (revised draft January 17, 2007).

- High Resolution Imagery Product Specification (April 10, 2003).

Integration and Registration

Imagery will be used to produce a graphic Image Map with Selected Overlays, an interim product utilized for emergency purposes in lieu of an up-to-date Topographic Map. In addition, much as it was used by USGS in the past, orthoimagery will be a quality assurance tool to verify the Integration and Registration of other data layers of the 7.5-Minute Digital Topographic Map products or as a means for extracting data for other layers for The National Map. An orthoimage may be included as a layer of the topographic map as well.

Risks and Consequences

- The main challenge for the orthoimagery project is maintaining the acquisition cycle as planned. Often the USGS appropriation is not allocated before the flying season (December through May) and partnership agreements cannot be completed.
- Another challenge is the weather over acquisition areas during the flight season. Failing to close a partnership or complete acquisition can delay work for an entire year.
- Accurate orthoimagery is dependent on having a good elevation model available to use during processing.
- A second dependency is having sufficient storage space to store large orthoimagery files for archiving and dissemination. Orthoimagery projects' data acquired one year are usually delivered the next year, so in planning for the next year, equipment purchases must match or exceed expected deliveries from these projects.

Boundaries (Governmental Units)

Two-Year Deliverables

- 80% national coverage at 1:24,000 scale through application of Census 2007 updates by June 30, 2008.
- 100% national coverage at 1:24,000 scale through application of Census 2008 updates by December 31, 2008.
- 100% national coverage at 1:24,000 scale of major Federal boundaries by December 31, 2008.

Boundaries Product Family Description

The boundaries data theme depicts administrative and jurisdictional information. The data represent the start of a national data inventory of consistent, seamless, integrated data that are continuously improved through the incorporation of data updates from the data community. In addition to the geospatial characteristics, the data design supports change management, lineage tracking, and feature-level metadata. The initial data have been built through the best available data from the Census Bureau and from other Federal agencies. Downloads are available at http://bpgeo.cr.usgs.gov.

Product List

Data available for viewing, application, and download in the USGS Best Practices Database in both geodatabase and open interoperability data formats.

Specifications

Available at http://bpgeo.cr.usgs.gov/model.

Integration and Registration

Many sources for boundaries data are not horizontally integrated within the data theme. For example, U.S. Forest Service boundaries may overlap those from the National Park Service. Additionally, there are issues related to planimetric and topographic registration of data, particularly of parcel data which are outside the scope of The National Map. Much of the effort in developing the boundaries data theme over the 2-year planning period will not only tie to creating and maintaining a national inventory but also to assessing and partially resolving these integration and alignment registration issues.

Risks and Consequences

- *A–16*: The USGS is not designated as a lead agency in Circular A–16 (2002). The Census Bureau is designated as the lead for overseeing the representation of Federal, State, local, and Tribal governments for the purpose of reporting statistics; the Bureau of Land Management is designated as the lead for Federal land ownerships; and the Department of State is designated as the lead for both land and maritime international boundaries. Most agencies have limited mandates and therefore limited data, whereas the USGS can bridge these differences into a unified approach.
- *Partnerships*: Data development is heavily dependent on the participation of external partners in providing data and in working with the USGS to develop common approaches and data improvements.
- *Schedule*: Dependent on data deliveries of complete, accurate, and timely data from partner organizations.
- *Budget*: While familiar with the requirements of maintaining vector National Spatial Data Infrastructure (NSDI) datasets, from our experience with the NHD, we are working with new data, and with issues that do not allow us to easily estimate costs.
- *Technical*: Developing a data model that supports most user requirements usually requires some compromise on technical capabilities.
- *Integration*: In principal, most boundary data are defined as discrete units that should agree with adjacent or overlapping units. However, definitions of adjacent or overlapping units often have discrepancies that lead to a best fit solution rather than a resolution of the boundary locations. The process of investigating definitions and discrepancies is extremely resource intensive and potentially irresolvable outside of the courts. The USGS will focus primarily on reconciling the major Federal boundaries and accept the Census Bureau's determinations for other data.
- *Scope*: The boundaries data theme potentially encompasses a very broad scope of administrative, jurisdictional, and ownership data involving numerous agencies and legal concerns. The initial scope is limited, but requirements could increase significantly.
- *Access:* Military boundaries can be considered sensitive at the 1:24,000 scale and may not be available for incorporation into The National Map.

Structures

Two-Year Deliverables

- 100% national coverage at 1:24,000 scale of essential facilities, including hospitals, schools, police stations, and fire stations by December 31, 2008.

Structures Product Family Description

The structures data theme comprises the geospatial location, classification, and other characteristics of manmade facilities. These requirements are primarily driven by the homeland security and disaster response communities, but also have application in graphics and in resource planning. Data include the form, function, name, reference location, and selected contact and extended detail information on the included features. The data represent the start of a national data inventory of consistent, seamless, integrated data that is continuously improved through the incorporation of data updates from the data community. In addition to the geospatial characteristics, the data design supports change management, lineage tracking, and feature-level metadata. The initial data are being built through the best available data from public domain data sources of Federal, State, and other cooperating agencies. The USGS role is to broker, facilitate, and integrate both the requirements and the data into a sustainable national structures dataset and model that meets the needs of the broad community. Most agencies have limited mandates and therefore limited data, whereas the USGS can bridge these differences into a unified approach. Downloads are available at http://bpgeo.cr.usgs.gov.

Product List

Data available for viewing, application, and download in the USGS Best Practices Database in both geodatabase and open interoperability data formats.

Location of Product Specifications

Available at http://bpgeo.cr.usgs.gov/model/acrodocs/Poster_BPStructures_03_01_2006.pdf

Integration and Registration

Many government and commercial organizations are involved in developing structures and facilities data. The potential exists to link many of these related datasets in a federated approach. The initial data development pass is to link the NGA HSIP, FEMA HAZUS, USGS GNIS, and the State geospatial references to a common geospatial base with the USGS structures dataset. Additional investigations into formal linkages with external, non-geospatial datasets will also be undertaken. For example, the geospatial data may not hold the details of a hospital facility, but the geospatial feature could be linked to records at HHS that contain the details. This logical integration of data sources has been applied in the NHD and has significant potential in structures data.

A major vertical data integration concern with structures is the location of features relative to roads. If the structures data are not vertically integrated with the roads, the buildings may fall on the roads or on the incorrect side of the road. For the essential facilities data that are the primary priority for structures data development, the USGS and its cooperators are meeting requirements from both FEMA and NGA that the physical location of a structure be placed on the center point of the feature. With geospatially accurate roads and geospatially accurate structures, many of these vertical integration issues will be addressed. Additional concerns will exist with regard to structure and address attributes relative to road address range locations. These concerns will be assessed with some potential quality checks submitted to either structures data sources or to transportation data sources.

Risks and Consequences

- *A–16*: The USGS is not designated as a lead agency in Circular A–16 (2002), nor does the definition of the A–16 match the scope of data being developed. GSA is designated as the lead A–16 agency, but only with regard to Federal assets. Homeland Security requirements, as defined through HSIP, have vastly expanded this scope of features.
- *Partnerships*: Data development is heavily dependent on the participation of external partners in providing data and in working with the NGP to develop common approaches and data improvements. Major data providers include NGA HSIP, FEMA HAZUS, State Emergency Operation Centers, and volunteer data efforts.
- *Commercial Data*: NGP will explore a Request for Proposal (RFP) for structures data to fill the gaps where updates to critical infrastructure are not yet available. This option provides ready access to updated data, but with significant restrictions and liabilities with regard to others accessing the data. Also, much of the commercial data are developed through geocoding methods with a generally high degree of error.
- *Schedule*: Largely dependent on NGA's HSIP contracts and the willingness of States to share NGA updates to select critical infrastructure.
- *Budget*: While familiar with the requirements of maintaining vector NSDI datasets, from our experience with the NHD, we are working with new data and issues that do not allow us to easily define costs.
- *Technical*: Developing a data model that supports most user requirements usually requires some compromise on technical capabilities.
- *Legislative*: No known risks. The Census Bureau plans to collect all address points in the United States, but is legally prevented from sharing these data due to concerns about the willingness of the public to share information that could be used by law enforcement, branding companies, and others.
- *Integration*: As data improve with the advent of very high-resolution imagery and with LIDAR-based elevation data, it is likely that some existing data will be out of registration with these sources. It remains to be seen whether this misalignment would be an issue with users requiring resources for development or for data updates.
- *Data Security*: Structures and facilities data often contain data characteristics that some providers consider sensitive. These providers may be unwilling to allow the USGS access to the data in either a filtered form or through secure data management at the USGS.
- *Scope*: Current data are primarily limited to emergency facilities, a very small scope relative to the full definition of government, commercial, banking, industrial, and other facilities. The scope of required data will likely expand during the 2-year plan.

Transportation

Two-Year Deliverables

- 80% national coverage at 1:24,000 scale through application of Census 2007 updates by June 30, 2008.
- 100% national coverage at 1:24,000 scale through application of Census 2008 updates by December 31, 2008.
- 20% of Nation under active stewardship for roads data by December 31, 2008.

- Work with providers of other transportation data, including airports, pipelines, trails and railroads, to develop nationally maintained and integrated geospatial data inventories.
- Develop pilots in five States to test and implement data exchange workflows between states implementations and The National Map.
- Incorporate Emergency-911 and evacuation route content in support of disaster response capabilities.

Description

The transportation data theme consists of the geographic locations, interconnectedness, and characteristics of roads, railroads, airports, and other associated transportation features. The data represent a national data inventory of consistent, seamless, integrated data that is continuously improved through the incorporation of data updates from the data community. In addition to the geospatial characteristics, the data design supports change management, lineage tracking, and feature-level metadata. The initial data set is being built through the best available data from the Census Bureau with the incorporation of coordinated updates from Census, the U.S. Forest Service, States, and other cooperating agencies. Basic geospatial elements from cooperators will be expanded to include transportation model requirements for Emergency-911, routing (including evacuation routes), and linear referencing. Additionally, the NGP purchased commercial data in FY07 for image map production to fill gaps in updated data until completion of the Census MTAIP improvements in 2008. Downloads are available at http://bpgeo.cr.usgs.gov.

Product List

Data available for viewing, application, and download in the USGS Best Practices data model in both geodatabase and in open interoperability data formats.

Location of Product Specifications

Available at http://bpgeo.cr.usgs.gov/model.

Risks and Consequences

- *A–16*: The USGS is not designated as a lead agency in Circular A–16 (2002). The U.S. Department of Transportation is the lead agency, although the agency does not consider geospatial data as a core capability and does not inventory national data.
- *Partnership*: Most data are provided by cooperating agencies. The USGS is leveraging the improved Census geospatial roads data used for their enumeration activities while starting work on cooperative efforts with States to update the Census data.
- *Commercial Data*: Commercial transportation data sources are a potential alternative to the content being developed in The National Map. However, the severe licensing restrictions of these data are inconsistent with the public domain objectives of The National Map. This issue and potential collaboration of private transportation data in the public domain will continue to be explored through NSGIC's Transportation for the Nation initiative.
- *Schedule:* Dependent on U.S. Census Bureau for initial completion of updated 1:24,000-scale equivalent data by 2008 (as of November 30, 2007, 61% of updates were complete). Dependent on State and local partners to provide most updates subsequent to Census improvements.

- *Budget:* While familiar with the requirements for maintaining vector NSDI datasets, from our experience with the NHD, working with new data and issues does not allow for easily defining the costs.
- *Technical:* Developing a data model that supports most user requirements usually requires some compromise on technical capabilities.

Scanned 7.5-Minute Topographic Maps

Two-Year Deliverables

- Approximately 3,000 7.5-minute quadrangles covering the East and Gulf Coast States will be scanned and converted to high resolution geopdfs by the end of December 31, 2008. The project area is being worked on in coordination with the production of TNM products by the NGTOC and the Science Information and Education Office. The intent is to provide overlapping data that provide both a current and a historical perspective.
- Approximately 250 additional 7.5-minute high resolution geopdfs will be created across the United States to support print-on-demand for low selling quadrangles that are nearing an out-of-stock inventory.
- All replacement high resolution geopdfs will support print-on-demand and also be "geomark enabled" to allow users the capability of providing annotation. This is a valuable tool for emergency responders as well as for all map users.
- As high resolution geopdf quadrangles are produced they will be uploaded to the USGS on-line store.
- It is anticipated that the USGS's Reston library will begin scanning its inventory of historic topographic maps in early FY08 and will create high resolution geopdfs that will also be made available in the USGS online store.

Scanned Image Maps Product Family Description

This product line contains images produced by scanning previously published (printed) versions of USGS primary base series topographic maps. The resulting image files are converted to high resolution, "geomark-enabled" geopdfs. The scanned maps are available through the USGS Store at http://store.usgs.gov/locator/ .

Scanned Image Maps Product List

This product line is described as previously published versions of USGS primary base series topographic maps produced primarily at the following scales:

- 1:20,000
- 1:24,000
- 1:25,000
- 1:63,360 (Alaska)
- 1:100,000
- 1:250,000

The scales may vary in some historic maps.

Specifications

The specifications will be contained in the metadata file(s) associated with each map file. Integration and Registration issues: Not applicable.

Risks and Consequences

The risk is that the project will require an extensive amount of time to complete based on the current resource allocation. The consequence is that it will delay transition to a distributed print-on-demand business model and extend the timeframe for achieving a reduced paper warehouse.

7.5-Minute Digital Topographic Maps

Two-Year Deliverables

- Develop standard specifications for the product.
- Acquire customer input on prototype product using the working specification by March 31, 2008.
- Develop a streamlined production process.
- Produce topographic maps based on quality and currentness of available data.
- Publish maps as digital files and distribute through the USGS store at http://store.usgs.gov.

Description

As presently envisioned, the 1:24,000-scale topographic map product produced from The National Map data will portray contours, hydrography, transportation, boundaries, Public Land Survey grids, structures, geographic names, and land cover in the customary 7.5-minute by 7.5-minute tile-based format. The quality of the map products is directly affected by the accuracy and currentness of the data.

Specifications

The map will include full line National Grid, latitude, and longitude ticks, State plane ticks, and all customary marginalia. The credit information will explain the data sources and dates. The original source metadata will give the most specific information on the data. The topographic product specifications will be updated based on customer input and availability of funds.

Risks and Consequences

- There are significant gaps in the coverage of suitable data.
- Data integration processes of the eight data themes are not defined or implemented.
- Lack of systematic user involvement in the design of prototype products may require additional changes to product specifications and timely communication to keep interested parties informed.
- The automated contour generation process has not been finalized.
- There is no procedure for supplying ”corrections” (corrections as the result of an integration process) back to the partner.

Image Maps with Selected Overlays

Two-Year Deliverables

- Produce 1:24,000-scale image maps two counties deep (50 miles) along the Atlantic (Florida to Delaware) and Gulf (Florida to Texas) Coasts in preparation for hurricane and storm response needs.
- Develop full automation of image map production so that image maps can be rapidly produced for emergency response needs.
- Write specifications for image maps.

Image Maps Product Family Description

The orthoimage map will be a 1:24,000-scale product based on the best available orthoimage. The image will either be natural color or false color infrared. Ground pixel resolution can vary from 6-inch to 1-meter ground pixel resolution of the source image. The image will be framed with a 7.5-minute by 7.5-minute projection line. After release to the public, the image maps will be available through the USGS Store at http://store.usgs.gov.

Image Maps Product List

Currently planned components include

- Natural color orthoimage; 1-meter or better ground resolution
- National Grid with UTM labels
- Roads and road name layer
- Selected structure symbol and/or name
- Selected hydrographic names.

The final file format will be a georeferenced layered PDF file.

Specifications

"Image-Based 7.5-Minute Quadrangle Maps" Draft USGS standard, still in work. Version 0.0.6 (October 2007).

The image map contains a full line National Grid with UTM labels shown outside the projection line at the intersection of every 1,000-meter grid line and the projection. Geographic coordinates are shown at every 2.5-minute tick and the map corners. State plane ticks and coordinates are also shown along the projection line. Map margin information includes map elements needed to use the image map, such as a road legend, bar scale, quadrangle location diagram, adjoining quadrangle diagram, National Grid reference box, north arrow, and accuracy statement. Credit notes include metadata about data sources (with dates), magnetic and grid declination, and projection. Feature names will be placed for lakes, rivers and streams, populated places, and major physical features. Map users will have to refer to the original source metadata for the datasets to obtain the most specific source information on the data or to obtain the data itself.

Integration and Registration Issues

Risks and Consequences

- Image availability

- Map design with added enhancements—do we really need all the roads and road names?
- Not being able to automate image map production if complexity is increased
- Not being able to cover the country due to increased complexity
- Printing a readable image map
- Product is still "beta," not yet vetted to customers
- Some customers still expect lithographic, low-cost products.

Custom Maps Service On-the-Fly

Two-Year Deliverables

- Systems Phase II—Evaluation in the second quarter of FY08

Custom Maps Service On-the-Fly Product Family Description

Custom maps are essentially user customized versions of standard TNM datasets—topographic and image maps. They adhere to the same basic product standards and are available in the same formats. The customizations available to the user are to recenter, resize, and add layers to the map. This service will need to be developed following the successful deployment, proven production methods and rollout of the 7.5-Minute Digital Topographic Maps and Image Maps with Selected Overlay products.

Custom Maps Service On-the-Fly Product List

Specifications

The specifications will be developed using the 7.5-Minute Digital Topographic Maps and Image Maps with Selected Overlay standards and adjusted with user selectable parameters. Customer requirements will provide the basis for the design of the service. These requirements will be evaluated during the Common Systems Phase II development cycle and assessed against the existing funding and resources and priorities.

Integration and Registration Issues

The development of a custom maps creation service is a natural follow-on to TNM initial activities to improve the current TNM data inventory, its qualities of currentness and integration, and the internal graphics production processes. Completing the systems development for the graphics production processes and ensuring successful rollout of the 7.5-Minute Digital Topographic Maps and Image Maps with Selected Overlay will provide the basis for the future Maps On-the-Fly service. Core capabilities will be developed in the graphics production process that will provide a foundation that can be migrated and integrated with an end user driven business model during subsequent phases of TNM development efforts.

Risks and Consequences

Developing the Custom Maps Service On-the-Fly prior to a successful deployment of the internal graphics production systems for 7.5-Minute Digital Topographic Maps and Image Maps with Selected Overlay would introduce numerous risks concerning proven methods, customer support, and data quality. Staggering the development of this service to follow the development of proven production functions will reduce errors.

Services

Data Download Services

Two-Year Deliverables

- Systems Phase II—Evaluation in the second quarter of FY08

Data Download Service Family Description

The data downloading services will be standard-based portlets available to TNM and GOS portal environments. They will provide the capability to download a variety of user-selected geospatial data layers for a user-defined region of interest. The user will be able to reproject, format, and compress the selected data to a predetermined set of specifications. These download services will be designed to work from TNM national datasets and approved partner datasets that conform to the industry standards. To date, a number of existing services are performing this functionality, but not in accord with the full suite of vector and raster themes or through standardized methods.

Data Download Service Product List

Specifications

The specifications for downloading services will be developed during phase II of The National Map development cycle.

Integration and Registration Issues

Numerous integration issues will need to be coordinated prior to the phase II development. There are a variety of existing methods from the raster, vector, and names program areas where functionality will need to be assessed and potentially reengineered.

Risks and Consequences

The program needs to establish the baseline requirements using the results of the customer assessment to be done in early FY08. Product and service leads need to drive the re-engineering of existing functional capabilities and identification and resolution of the existing download gaps. The program needs a concerted plan to reconcile its diverse current approach to an enterprise function.

Web Mapping, Feature, and Coverage Services

Two-Year Deliverables

The National Map will roll out the respective mapping, feature, and coverage services for respective data themes and layers—Evaluation in the second quarter of FY08.

Web Mapping, Feature, and Coverage Services Family Description

The USGS will offer a series of Web map and data services that will provide system developers and Web application users with high-speed access to TNM geographic data content. This migration to a standards-based online service provider will mitigate the traditional barriers associated with accessing and manipulating geospatial information. This model will provide real-time access to TNM content that will enable users to focus on value-added applications and processes. The services will include Web Mapping Services (WMS), Web Feature Services (WFS), and Web Coverage Services (WCS). Through these services, the USGS will be able to provide its user community with a standards-based interoperability

solution for data access and use. These services will guarantee speed and reliability of data access that will eliminate the need for users to make local copies of data to perform mapping and analysis. The Web services will be a mixture of open or published proprietary service implementations, thus allowing access to data for users building their own applications or using proprietary Web tools. The available resources will determine the full suite of service models to be engineered and published. This effort will be sequenced following the development of the downloading services.

WMS, WFS, and WCS Services List

- Web Mapping Services
  - Elevation
    - 1 arc second NED shaded relief
    - 1/3 arc second NED shaded relief
    - 1/9 arc second NED shaded relief
  - Orthoimagery
    - USGS Urban
    - USGS NAIP
    - USGS DOQQ
    - USGS State and local
  - Land Cover
    - NLCD 1992
    - NLCD 2001
  - Hydrography
    - 1:100,000
    - 1:24,000
  - Transportation
  - Structures
  - Boundaries
  - Graphics
    - 1:100,000 DRG
    - 1:24,000 DRG
    - 1:24,000 Orthophoto
    - 24,000 Topographic
  - Geographic names
- Web Feature Services
  - Hydrography
    - 1:100,000
    - 1:24,000

    - Transportation
    - Structures
    - Boundaries
- Web Coverage Services
    - Elevation
        - 1 arc second NED
        - 1/3 arc second NED
        - 1/9 arc second NED
    - Orthoimagery
        - USGS Urban
        - USGS NAIP
        - USGS DOQQ
        - USGS State and local
    - Land Cover
        - NLCD 1992
        - NLCD 2001

Specifications

We will offer the services using implementations of the Open Geospatial Consortium specifications. Some proprietary services will be offered, as appropriate.

Integration and Registration issues

Data integration processes will be defined and implemented

Risks and Consequences

TNM's movement towards an online interactive service provider will require a greater degree of enterprise planning to include improvements in system redundancy, managed services, performance monitoring, capacity planning, managed availability, and stronger customer support. TNM will model its services rollout on the Information Technology Infrastructure Library (ITIL) Best Practices for services support to ensure a robust mitigation of the risks associated with service delivery.

Data Catalogs

Two-Year Deliverables

- Geospatial One-Stop (GOS) Catalog Version 2.2 released by October 31, 2007.
- Geospatial One-Stop (GOS) Catalog Version 2.3 released by September 30, 2008.
- TNM WMS Catalog Alignment with New Business Model Requirements by March 31, 2008.
- Assessment of integration with TNM Planning functionality—Common Systems Phase 1—Agreements/Status Development Activity.

Metadata Catalog Service Family Description

The National Map data acquisition and distribution systems will contain interconnected open catalogs of metadata (data about the data) which will be used to track, manage, and publish TNM data holdings and services for the program and external consumers of metadata. These data and services will be used in conjunction with agreements, partnership inventories (such as Statewide Clearinghouses and the State Inventory System "RAMONA"), and status graphics to support TNM production/acquisition planning. The catalogs will be exposed using the OGC Catalog Service for the Web (CS-W), and other open protocols where appropriate, to provide internal access for documentation on "status" and "availability". TNM data and service holdings will be harvested by the GOS metadata harvester and made available through the GOS portals and other applications. The current role of the TNM catalog model is being re-evaluated as a part of TNM's business movement towards creation of map products. The proposed solution is to employ GOS to act as the metadata catalog record and service access to "partner" data that is available online and relegate the TNM catalog to manage its national layers. Partners will be recognized in both systems and their data contributions will be as valuable as ever. This will clarify the roles of the GOS and TNM catalogs and elicit efficiencies in data management.

Data Catalog Service List

Specifications

- OGC product specifications are located at http://www.opengeospatial.org/.
- GOS product specifications are defined in the original statement of work and subsequent enhancement tasks developed by the Design Team. These are maintained at the GOS Quickplace site.
- TNM Catalog Specifications are located at http://mcmcweb.er.usgs.gov/catalog/.

Integration and Registration Issues

The appropriate integration of TNM data and service catalogs, and serving metadata to the public through the GOS catalog, requires a unified production approach to avoid duplication of records and overall efforts. Most likely, the interconnection of several production catalogs through harvesting and OGC open protocols will be required. The GOS portal and catalog currently depends on The National Map Web map service as its primary base map to overlay other services registered in GOS. TNM production catalogs and GOS will play a key role in facilitating the discovery and use of selected framework 'Authoritative Data Sources.'

Risks and Consequences

- The content, speed, accuracy, and reliability of TNM Web map service directly impact GOS.
- The registration, cataloging, and quality control of live map services, and data from partners into TNM and GOS need to be streamlined and established as an efficient production process.
- GOS is also an OMB e-government initiative and has legislative, budget, and schedule risks associated with this designation that can pose a challenge to meeting integration requirements.

Marketplace

Two-Year Deliverables

- Integrate Marketplace with Status Graphics Tool by October 30, 2008.

- Data type filter and Publisher filter (Version 2.2) released by October 31, 2007.
- Download to spreadsheet (Version 2.2) released by October 31, 2007.
- Enhanced visualization and linkage of plans (Version 2.2) released by October 31, 2007.
- Assessment of integration with TNM Planning functionality—Common Systems Phase 1—Agreements/Status Development Activity.

Marketplace Service Family Description

The "Data Partnership Marketplace" is an application on the GOS portal that provides the ability for intergovernmental notification of planned geospatial data buys and requests for data. An interactive map displays areas where government agencies are conducting data-collection activities. The marketplace can be used to discover and facilitate a connection between partners in a particular area of interest or for a particular data type.

OMB has mandated that all Federal agencies submit their data acquisition plans to the GOS Marketplace to help ensure appropriate efforts are undertaken to leverage funding and avoid duplication of efforts.

The records to the Marketplace are also harvested from the National Digital Orthophoto Program and National Digital Elevation Program tracking systems and Geography's Commercial Remote Sensing Data Requirements tool, CIDR.

Marketplace Service List

- Data Type Filter—Ability to reduce the number of visible Marketplace entries shown on the map by data type or key word.
- Download to Spreadsheet—Ability for user to download Marketplace search results to a spreadsheet.

Specifications

OGC product specifications are located at http://www.opengeospatial.org/. GOS product specifications are defined in the original statement of work and subsequent enhancement tasks developed by the Design Team. These will be maintained at the GOS Quickplace site.

Integration and Registration Issues

The marketplace should use the TNM Status Graphics Map as its base map and build on the new status graphics functionality.

Risks and Consequences

- Primary dependency is for USGS liaisons to encourage publication of planned data buys by State and local partners in conjunction with State approaches, including the Random Access Metadata tool for Online National Assessment (RAMONA) inventory and status system.
- In addition, USGS needs to adopt publishing to the Marketplace as a standard business procedure. This will need to be coordinated with the reengineered planning business practices.

Status Graphics

Two-Year Deliverables

- Development of standards-based inventory metadata around TNM data holdings

- Development of status map visualization and performance metrics capabilities
- Development of basic planning queries and reports

Status Graphics Services Family Description

Status graphics and reporting depict The National Map's respective data theme and product inventories with supporting metadata that are used to communicate availability and degrees of currency or data quality. These views will be used to support the presentation of performance measures to management and availability of data content to planners and consumers. These views will be portrayed on a variety of base and index maps of the United States and its territories. The suite of status graphics includes those produced on a set schedule (annual, quarterly, monthly) and those produced on an ad hoc basis. Each primary data and graphic product group produces a standard coverage status graphic that shows availability of data and products that conform to the thematic working unit and/or the graphic requirements of the 7.5-minute topographic map. Each data and graphic product group will be used in conjunction with other theme or product status graphics to drive efficient planning, customer awareness, and performance accountability.

Product-Specific Dependencies and Risk List

- Each product or data theme needs to maintain sufficient metadata to support status graphics.
- Varying extract dates of information can make overlay/comparisons inaccurate.
- Data are collected in a variety of collection or production work units.
- Status attributes currently have different meanings for different products and services.
- Databases containing status graphic information have not been consistently updated in the recent past.
- Dates identified in the Performance Milestones Matrix may be too aggressive.
- Need an analysis of what status information exists, where it exists, and how to bring it all together to serve individual themes as well as graphic map production.

Specification

Under development.

Supporting and Enabling Activities

Supporting and enabling activities make it possible to produce the products and services. These activities include partnership activities, systems (previously called common systems), outreach, and integration of data themes.

Customer Survey

Prior assessments of customer and stakeholder needs are over 3 years old, and the marketplace has seen many new suppliers and technologies that may impact the focus for TNM. Thus, NGP will complete a reassessment of its TNM customers' primary needs during 2008. A team has been formed to oversee the following customer assessment activities:

- Determine customer segments and primary customers for TNM products and services.
- Establish a meaningful dialog with these customers via surveys, workshops, focus groups, usability studies, and other methods of customer information gathering.

- Initiate an in-reach program to the other USGS disciplines to asses internal needs,
- Use results and findings to prioritize product design decisions.
- Use continuous assessment techniques as a primary means to manage product life cycle.

TNM customer focus includes the following objectives:

- Create new capabilities to understand and meet or surpass customer requirements and expectations.
- Deploy the geospatial liaisons as key facilitators for both obtaining feedback and developing partnerships and gathering data for TNM.
- Focus priority efforts on satisfying the needs of our customers for access to current framework data and map products.
- Provide information that clearly explains the program focus and activities over the next 2 years, including representative products and specifications.
- Develop product and service branding to clearly identify and ensure recognition of TNM.

The NGP will evaluate the results of this study to determine how changes in the marketplace, the role of government, geospatial data requirements, and technologies should influence the focus of TNM.

Partnerships in Support of Products and Services

Two-Year Deliverables

- USGS Geospatial Liaisons will develop a business plan focused on data discovery and acquisition for each State.
- Data acquisition efforts, footprint, specifications, and work priorities will be aligned with a joint schedule and plans for The National Map.
- Products and services feedback will be collected from partners and customers.
- USGS Geospatial Liaisons will provide outreach and support to the other USGS disciplines on The National Map Tactical Plan and products and services.

The National Map depends on distributed development and stewardship of geospatial information at Federal, State, regional, and local levels. The network of Geospatial Liaisons serves as a conduit to discover, document, and provide linkages to partner datasets and partnership opportunities. Liaisons also play a role in promoting the implementation of best practices and supporting the development of the NSDI in their respective statewide communities. Promoting these best practices among partners will lead to long-term improvements to base data and development of long-term solutions to maintaining data between the USGS and partner institutions.

Within this context, the liaisons will define, document, and implement a plan for developing TNM in each State. To build the plans, liaisons will rely on as input the FGDC 50 States Initiative Strategic and Business Plans where available, and will work with their statewide communities to define a pathway for developing TNM products and services.

In addition to the liaison network, the Partnership Leadership will serve to support The National Map Tactical Plan by engaging partners to provide feedback and decision making about the products and services. Partnership Leadership will also work with data theme leads to define responsibilities for coordination at the Headquarters level with other appropriate Federal agencies and national organizations.

Further, USGS Geospatial Liaisons will systematically communicate with and engage the other disciplines in each of the regions on the plan, as well as the products and services.

Dependencies

- Timely access to detailed TNM plans.
- Internal coordination between the data theme leads, NGTOC, and Partnership Leadership through weekly calls.
- Consistent message from all parts of the NGP to show a unified, positive approach to our partners and customers.
- Identifying and developing appropriate partner incentives to encourage participation in the development of TNM products and services that will be beneficial to both parties.
- Provide data updates back to the States as appropriate.

Risks and Issues

- Ongoing commitments and partner expectations may not be met, opportunities to leverage data funding may be missed, and so on, due to incomplete documentation and communication of existing commitments and tasks.
- Changing aspects of projects or procedures without understanding the effects on partners may alienate partners or damage long-term relationships.
- A significant and underlying issue is how to balance the long-term NSDI development activity with the near-term priority of serving current data coverage and providing products and services.
- Need to have a systematic, consistent method for liaisons to provide partner feedback to the program.
- Making the incentives and benefits of the products and services worth the effort of Federal, State and local participation.

Partnership Strategies by Data Theme

Elevation Partnership Strategy

High resolution data for the National Elevation Database will be obtained through leveraging of funds or in-kind work with State, local, and other Federal agencies.

National

Participate in the National Digital Elevation Program Steering Committee (current chair).

Explore “Lidar for the Nation” initiative (in collaboration with the Geography Discipline) as a way to develop a systematic, national means to acquire higher resolution elevation data.

Statewide

Elevation acquisition from July 2007 through December 2008 will initially focus on 10-meter or finer data over the East Coast and Gulf Coast States and then expand to a national scope.

Support will also be provided for partnerships in Alaska and for selected USGS Hazards and Science projects throughout the United States.

Consideration will also be given to emerging projects with high returns for leveraging partner funding and/or for significantly increasing coverage; for example, statewide LIDAR acquisitions or opportunities to complete statewide 10-meter coverage.

Hydrography Partnership Strategy

The high level of success of the National Hydrography Dataset (NHD) is in large measure due to a significant expenditure of USGS funds and substantial partnership contributions in the development and production of the dataset. Roughly, about half the resources necessary to produce the NHD came from other agencies partnering with the USGS. Now, partnerships and expansion of stewardship are essential to the continued success of the NHD. Training and technical support from NGTOC are required for continuing success for stewards.

National

- The USGS works closely with the USEPA, USFS, BLM, and NPS to cooperatively manage the program and develop technical direction. These agencies use the NHD extensively in their scientific work and provide valuable feedback to guide the program. A joint teleconference is held weekly.
- Partnerships are extended in efforts such as the USEPA NHDPlus program that provides value-added data for scientific analysis projects related to the Clean Water Act.
- Partnerships are developed within USGS science programs, particularly in surface- water resource projects such as StreamStats for streamflow prediction.

Statewide

- Liaisons promote and seek to coordinate NHD stewardship on a statewide level through coordinating bodies where possible, to ensure that the appropriate partners at all levels are plugged in to the process. A partnership goal of 10 States with stewardship agreements was set for 2007, with an additional 15 in 2008, and 10 more in 2009 (all States and territories by 2011).
- Identify partner interests, such as requirements for higher resolution data.
- Engage State water agencies to promote the NHD and offer it as a solution to State project activities.
- Incremental improvements to NHD data resulting from the stewardship process are directly applied and available through transactional updates to the dataset.
- Promote use of NHD by USGS science projects on a State and regional basis, and
- explore the potential to develop NHDPlus on a State-by-State basis.

Orthoimagery Partnership Strategy

Maintain refresh cycles as funding opportunities allow.

National

- Continue to seek NGA funding for urban area partnerships.
- Support NAIP projects as outlined in the detailed plans.
- Continue to help support the concept of Imagery for the Nation (IFTN).

Statewide

- Continue to develop local partnerships for urban areas funded by NGA.
- Coordinate NAIP projects.
- Promote IFTN among partners.
- All data from partnerships will be ingested into Seamless Server and TNM.

Geographic Names Partnership Strategy

National

- Under the Memorandum of Understanding with NGA and the Department of Homeland Security (DHS), pursue a partnership with NGA to align their contractors (TGS and others) to contribute geographic names to GNIS as they update or create critical infrastructure data.
- Continue collaboration with Federal agencies such as the U.S. Forest Service and others to maintain the names under their jurisdiction.
- Data theme lead will coordinate efforts at the national level.

Statewide

- Working with the Headquarters names staff, the partnership leadership group and liaisons begin to explore the development of a stewardship activity for geographic names with statewide coordination bodies. The goal is to develop one or two examples that can be used as a model for development in other States.
- Enhancements to names resulting from stewardship efforts will be entered into GNIS.

Land Cover Partnership Strategy

National

- The national land cover dataset is NLCD and the partner is the Geography Discipline.

Statewide

- A variety of land cover datasets are available at the State and local level; however, for the 2-year implementation period, partnerships for these data will not be pursued.

Boundaries Partnership Strategy

National

- Continue to obtain the best available data from the Census Bureau and other Federal agencies.

Statewide

- Liaisons identify high-return partnership projects for boundaries to the project for potential funding in the 2-year implementation period.

Structures Partnership Strategy

National

- Develop and document a partnership with NGA to obtain updated structures data from its contractors and include an agreement to update geographic names.
- Under the Program Partnership Working Group (PPWG), continue talks with DHS and NGA regarding "HSIP Freedom" and the role of the USGS in distributing the data via TNM, with the understanding that the PPWG includes the vector theme lead, Emergency Operations, and Partnership headquarters lead.
- Continue working with FEMA to collaborate on structures improvements in the HAZUS dataset.
- Design partnerships to support processes to integrate structure data improvements into GNIS.

Statewide

- Work with States that are collaborating with NGA/TGS and other contractors to ensure State partner buy-in for including revised data in The National Map.
- Identify accessible State and local structures data sources for registration in The National Map catalog until a systematic process for integrating partners is established and implemented.
- Identify high-return partnership projects for boundaries to the project for potential funding in the 2-year implementation period.

Transportation Partnership Strategy

National

- Continue partnering on best available data from the Census Bureau and the U.S. Forest Service.

Statewide

- Support and seek statewide transportation datasets and inventories of data that will support updated Census data for registration in The National Map catalog until a systematic strategy for integrating the data is established and implemented.
- Work with the theme lead to create partnerships to ingest statewide data into the national data set.
- Liaisons identify high-return partnership projects for potential funding in the 2-year implementation period.

Systems in Support of Products and Services

Two-Year Deliverables

Have operational the following:

- Agreements Management System by December 31, 2008
- Performance Management and Status System by September 30, 2008
- Portal and User Interface Improvements (GOS and TNM) by December 31, 2008
- Data Integration Strategy and Technical Approaches by September 30, 2008
- Make improvements to TNM Architecture by September 30, 2008

- Business Case Analysis of Hosting Original Partner Data by March 31, 2009

Common Systems priorities have been established through a business-driven prioritization process. The National Mapping Program established the following functional areas as the priorities to allocate the limited IT resource investment and maintenance resources.

- Graphics Product Creation
- Agreements and Planning Capabilities
- Data Integration

Working with product and service leads, TNM management, and the operation centers (NGTOC and EROS), the Systems Team and Enterprise Architect reviewed over 30 development requests and rated them based on relevance to program priorities and support for functional areas. The development requests were prioritized, resulting in a phased development strategy aligned with the highest business priorities. The Systems Core team will evaluate additional functional requests with the operation centers, product and service leads, and the program. These items are identified in the Systems schedule as Phase II and will require evaluation of core requirements and issues within a Statement of Need, followed by and approval process.

Even with the prioritization of new development activities by The National Map Reengineering Project, systems consist of numerous legacy systems and functions that had been used to produce data and distribute products. The Reengineering Project has also funded the enhancements and operation of these environments to ensure a continuity of services to the end customers. Common systems will continue in this capacity with the goal of identifying efficiencies in the operation and management through data normalization, eliminating redundant functionality, identifying best-of-breed solutions and improved business processes.

Legacy Systems that Require Enhancements or Steady-State Support

There will be a systematic review and evaluation of all legacy systems and capabilities to determine whether to keep, retire, or transition each system or capability.

Legacy systems include:

- National Hydrography Dataset (NHD)
- National Elevation Dataset (NED)
- Geographic Names Information System (GNIS)
- Seamless Server (data dissemination capabilities)
- Geospatial Data Architecture (GDA) (serves as a metadata index, storage and retrieval system for geospatial data files).

Development of new Phase I capabilities

- Improvements to Graphics production processes.
- Improved management of data and map services. This activity will include providing shared capabilities and integration points with GOS and TNM.
- Agreements System (including ACIS retirement)—System to support the development and management of partnership agreements, agreements lifecycle management, use of agreement data to support thematic production, partnership status, and overall program performance monitoring.

- Improvement to the production management and control functionality to include inventory and production to support program planning, data acquisition, and product and service availability to customers. (Performance status and reporting capabilities are often called status graphics.)
- A Business Case Analysis for TNM hosting of partner data will be performed. This task will provide feasibility study evaluating alternatives, cost estimates, and the impact of hosting partner data in their native format as part of the suite of TNM Partner incentives and possible enabling services offered by The National Map.

Contracts have been awarded for gathering requirements for the Agreements System and the Performance Status and Reporting Capabilities as well as the Graphics Production.

The new capabilities will improve the Web user experience through a common, unified, and consistent presentation that draws on legacy system and organizational model structures that support the user's interactions. The product generation and dissemination capabilities will be driven by the approved product and services catalog. Instead of each data theme and location pursuing its own portfolio of product generation and dissemination capabilities, a common Web-based system will provide access to these capabilities. This will reduce user confusion and costs associated with maintaining multiple interfaces. Similarly, the program will begin the migration to online data and map services to provide efficiencies for Web-based customers required to view or access data online.

Over the next 2 years the common systems activity will complete new work and continue to support the existing system components as they all move to steady-state funding.

Specifications

Software and performance specifications will be developed (identified in the detailed project plan). Requirements and use cases are documented in digital form using IBM Rational Tools, Microsoft Visio, and Microsoft Word.

Risks and Consequences

- The system reduces risk by capitalizing on commercial off-the-shelf (COTS) products where possible and building on existing services and technology platforms and tools.
- User requirements are based on 3-year-old research. Requirements must be refreshed for all tools that are custom designed and built for this project.
- COTS software or tools may reduce reliance on updated user requirements.
- Schedule limits ability to complete R&D and usability tests.
- System is designed to meet widely varying user communities; therefore, there is an increased risk of complexity in the tools and interface as well as the ability of the USGS to involve all types of users in design and testing.
- Past performance issues will require effective branding and communication to rebuild user confidence.
- Steady-state costs for the completed systems may be underestimated because fewer systems have been retired than were anticipated.
- GIIA will develop a detailed project.
- Resource costs for providing partner data-hosting sources should be carefully weighed against the potential incentive to stimulate participation.

Outreach in Support of Products and Services

Two-Year Deliverables

- Work with each data theme lead to establish criteria for comprehensive and specific training, workshop, focus group, fact sheet, and promotional item (giveaway) requirements.
- Coordinate the theme-driven outreach activities with the broader NGP activities.
- Ensure outreach efforts, as appropriate, are coordinated with the USGS Office of Communications to identify bureau-wide internal communication, congressional updates, and external communication with our diverse audiences.
- Through partnering efforts, USGS Geospatial Liaisons gather timely, accurate, and nationally consistent basic geospatial data from partners' current geospatial information. Key partners are States, counties or local governments, Federal partners, and private sector companies. In order to support this activity, conduct outreach needs assessments from data theme leads and the liaison community to ensure more effective outreach tools.
- Develop an individual life cycle for all TNM fact sheets.
- Craft specific messages targeted to specific audiences.

Outreach Description

Accurate and clear communication is important so that the geospatial data community will support the building, maintenance, and use of The National Map through partnerships. Since message communication is imperative to the success of The National Map over the next 2 years, outreach and communication activities will run in tandem on several levels.

Outreach List

Training sessions, workshops, focus groups, fact sheets, and promotional items (giveaways).

Challenges, Risks, and Dependencies:

Lack of an adequate budget will greatly restrict our ability to communicate with existing and potential partners. As a result, the benefits of The National Map will be diminished by our inability to engage partners.

Outreach Activities in Support of The National Map:

Presentations will be made at the following conferences:

- AAG (Association of American Geographers)
- AASG (Association of American State Geologists)
- NSGIC (National States Geographic Information Council)
- NACo (National Association of Counties)
- IMTA (International Map Trade Association)
- ESRI Annual and Federal User Conference
- URISA (Urban and Regional Information Systems Association)
- AutoCarto (Automated Cartography)

- ASPRS (American Society of Photogrammetry and Remote Sensing)

TNM targeted workshops that are focused on TNM objectives and that support the conference themes will be developed for the following conferences:

- AAG
- AASG
- ESRI
- IMTA
- NARC
- NLC
- NSGIC

Integration of Data Themes in Support of Products and Services

The scope of this integration of data section of the Tactical Plan is the integration of data within The National Map. Horizontal integration within The National Map is defined as nationwide seamlessness and consistency within each data theme. Some examples of horizontal integration are: feature position and topology are continuous (no breaks at arbitrary positions, such as source tile boundaries), feature attributes are consistent across such boundaries, and relationship to other features within that theme are consistent with ground phenomena. Vertical integration is defined as the spatial relationship of features across TNM's data themes having the same relationship that the features have in the real world or on the ground. For national data sets to be readily suited for producing integrated data products or for performing sound scientific studies, they must be reasonably current and complete, nationally consistent, and properly integrated.

Justification for Integrating TNM Data

Justification for why the USGS should integrate the data in TNM is (1) the need of data users to have geospatial data from TNM integrated as a base for geospatial or geographic analysis with other data, and (2) the need for the USGS to produce derivative products from TNM's data. Examples of derivative products are topographic maps, computer displays of data, and downloaded datasets.

Factors to be Considered when Integrating TNM Data:

Horizontal integration should take place as new data are loaded into national datasets. It will be the responsibility of the individual Product Leads to ensure proper horizontal integration for the data themes for which they are responsible across the Nation. Horizontal integration processes are fairly mature compared to vertical integration processes; however, additional process and system improvements are required over the near term and will be addressed in the normal course of business.

Because the USGS is just now coming to grips with vertical integration issues brought about by the business process of leveraging existing data from many different sources, a substantial amount of investigation into vertical integration problems, causes, and efficient solutions must be performed over the next 1 to 2 years. Vertical integration of all themes should take place as dictated by geographic priorities within the Nation and as expeditiously as resources will allow. Vertical integration should, at a minimum, be performed prior to graphic product generation.

In order to make map products this fiscal year, the graphics project will need to incorporate a level 1 integration process. Level 1 is defined as a logical vertical and horizontal registration by a qualified cartographer or technician using only metadata and historical topographic maps. It is estimated that a level

1 process will add approximately 5 to 10 hours per map, depending on the complexity of the data. Until the data integration plan is mature, this plan proposes over the next 2 years that a level 1 integration process be implemented at the graphic generation stage and the data themes—NED, DOQ, NHD, Structures, Transportation, Boundaries (Governmental Units), and GNIS—to address the higher level integration process.

Data integration is easier to implement and manage when USGS controls the data and the data reside in centralized data holdings instead of in distributed databases owned and maintained by multiple stewards. Thus, the data themes must have a common coordinate system, data model (for vector data), projection, horizontal and vertical datums, and scale (spatial resolution) for ease of data integration. This approach is not without risk or without a significant commitment by the NGP because it puts greater burden on the USGS to maintain data modifications necessary to ensure proper integration, thereby complicating data interactions between the USGS and data suppliers/authorities.

Potential Issues with Integrating TNM Data

- How must TNM's data be integrated to accommodate USGS's use of the data for science initiatives and interoperability with other USGS or DOI datasets?
- What data model characteristics are required to accommodate USGS's use of the data for science initiatives and interoperability with other USGS or DOI datasets?
- What partners' data will be included in the centralized database?
- To what degree will USGS modify data from another agency, covering lands administered by that agency, to make integration possible?
- To what level of effort will the USGS provide its modifications back to the data authority?
- Once data themes have been integrated, how will integration be maintained as data modifications to those themes occur, especially with respect to updates from external data authorities?
- What criteria will be used to determine which feature representation is correct when integrating data from multiple sources?
- How will data of varying spatial resolution be held and integrated by USGS?
- What are the best approaches, or methods, to integrating TNM data?
- What are the resources, costs, and amount of time needed to integrate TNM data?
- What methods will be used to feed modifications back into TNM and other data sources?
- Once data themes have been integrated, how will integration be maintained as data modifications to those themes occur, especially with respect to updates from external data authorities?
- What are the integration problems to overcome?
- Can integration, or aspects of integration, be automated?

Options for Improving the Vertical Integration of The National Map

As stated previously, the most significant integration challenge facing the USGS is the understanding and resolution of vertical integration problems. Substantial resources will be required to accomplish these tasks. The following approach would gain an understanding of the problems and determine how those problems should be prioritized for resolution.

- Form one team for a full-time effort to identify and document the major data integration issues, degree of unacceptability, and costs to correct the problems. The team will focus on integration issues for priority regions of the United States (assume data integration problems may vary from region to region.) The team should consist of employees from Rolla and Denver and include representation from the vector team and graphics.
    - First determine, for each theme on a 7.5-minute tile basis, where currency, content, consistency, and spatial accuracy are unacceptable for meeting minimum standards. No further integration studies are required for these areas. The data must be revised—pursue partnerships or data acquisition projects. The team should identify innovative and more cost-effective methods/technologies for data acquisition and determine viability through data acquisition pilots.
    - For more isolated integration issues, list/describe the major integration issues and probable causes.
    - Rank issues by degree of unacceptability
        - Single instance
        - Threshold of occurrences per 7.5-minute tile
    - Rank by current LOE (level of effort) to correct.
    - Combine "unacceptability" and "LOE" rankings to determine "significance" ranking (most egregious and most costly to fix = high significance).
    - Determine potential for automated fix and cost/benefit.
        - Initiate a second team to prioritize and document requirements for automation
        - Develop and implement automation process or software
    - Where automation is not feasible, identify partnerships to help correct the problems (focus on highest priority regions first).
- Visit results from USGS research:
    - "Automated Data Integration in Support of The National Map" 2003–2005.
    - Conduct literature search for work and research.
    - Automated feature conflict detection and resolution research—Jill Cress, circa 1998.
- Benchmark with other organizations.
- Ensure that USGS quality-assured TNM data will be in a centralized database(s), residing on USGS servers.
- Determine the priority order that the integration problems in TNM will be addressed for integration within the next 2 years. Focus on the most egregious problems that can be fixed relatively efficiently and cost effectively, rather than focusing only on the least costly or easiest fixes. Determine levels of data integration effort based on degree of unacceptability and cost to correct (cost/benefit).
- Ensure that newly developed databases, such as the vector databases, are designed to facilitate data integration.

Other Topics of Interest

Aligning The National Map with the Federal GeoLoB and the DOI Geospatial Blueprint

The DOI Geospatial Blueprint aligns with the Federal Geospatial Line of Business (GeoLoB) architecture framework and conforms to the goals and objectives of the NSDI, Circular A–16 (2002), and FGDC metadata and data standards and associated best practices. The Blueprint aligned the DOI system, data, and technology assets in the context of the established Federal stewardship responsibilities. As a result, the DOI Geospatial Blueprint contains several key recommendations that affect the National Geospatial Program Office's data and infrastructure assets.

The first DOI recommendation is designed to establish target State Authoritative Data Sources (ADS) for DOI-wide use. The Blueprint analysis identified a DOI-wide demand for select thematic information that would be more cost effective and efficient to share among organizations and support a reduction in maintenance costs and improve data quality and reuse. Currently, there is not a DOI mechanism to support this recommended practice. In the DOI target State, the ADS would assume the responsibility of data lifecycle management for the thematic data for the DOI. An additional responsibility of the ADS is to become a data and Web map service provider of first resort. The Web service provider is obligated to provide the managed information to DOI consumers, individuals, applications, systems, and exchange partners using standards-based technology, data, map, and exchange services. The newly defined products and services of The National Map align very effectively with the objectives of the DOI Geospatial Blueprint. The National Map has been recommended as an ADS and service provider for the following thematic datasets:

- High Resolution Orthorectified Imagery (multiple resolutions)
- Elevation datasets (3 resolutions)
- National Hydrography Dataset (2 resolutions)
- Geographic Names
- Digital Raster Graphic (Seamless Color Balanced DRG data)
- Transportation Theme - (Commercial Streets Dataset, licensing)
- Existing Land Cover datasets
- Boundaries
- Structures

The National Map Tactical Plan has identified these themes within its product and service maturity framework to implement over the next 2 years. TNM plans to provide the data lifecycle management and service provisioning that will align its data and systems infrastructure to the objectives of the DOI. During this timeframe, TNM will be focusing its resources on select geographic regions that will support a limited number of DOI programs and organizations. Although this is not optimal, it is a practical strategy that will position TNM as the service provider while DOI transitions its organizational processes to support TNM as the Authoritative Data Source.

The second DOI Geospatial Blueprint recommendation involves improving the positioning of the GOS portal and catalog to improve the access, usefulness, and quality of its metadata catalog. The Tactical Plan has identified several key access-type improvements to the GOS and how it will interact with TNM. The initial GOS system development plan addresses the upgrades necessary to support the Authoritative Data Source concepts. The detailed design will be addressed while executing the Tactical Plan.

The third DOI Geospatial Blueprint recommendation involves the development product and data delivery services. The Tactical Plan will extend TNM data and theme production into a data download or

service delivery model. It is planned that these services will be engineered as standard (OGC) Web service-based components. This effort will need to be designed with extensibility in mind to support the numerous additional data themes within DOI and support component reuse.

Lastly, the DOI Geospatial Blueprint requires the participation of the ADS and Service providers in a DOI governance and portfolio management model for its enterprise geospatial assets. The DOI governance model is still being formed. Once established, it will be critical to have a senior manager participate.

The National Map Supports the USGS Science Strategy

Today, our growing and expanding society faces many pressing issues that science, information and data can and must help address. Many of these issues transcend geographical boundaries; they are global in nature. Many of these issues also transcend traditional boundaries of academic disciplines. Such multi-faceted challenges can rarely be addressed by a single discipline. A USGS Science Strategy has recently been completed that will help the USGS address the data and science required to understand many of these pressing issues. The strategy is based on a systems approach to evaluate broad causes and consequences of the use and management of natural resources and earth processes. There are six interrelated thematic directions in the science strategy.

- Understanding ecosystems and predicting ecosystem change
- Climate variability and change
- A water census of the United States
- A national program to assess hazards, risk, and resiliency
- The role of environment and wildlife in human health
- Energy and minerals for America's future

The seventh direction, Data Integration, is a cross-cutting component within the Science Strategy that will provide the means to bring the various science disciplines together to create an integrated approach to USGS' science mission. The most fundamental aspect of the Data Integration direction is The National Map, which will provide the trusted, base geospatial information for science investigations.

The National Map will accelerate science investigations resulting from the Science Strategy. We can use ecosystem mapping as an example. At USGS, we believe that the starting point to understanding the complexity of earth systems is the concept of ecosystems. Ecosystems constitute the Earth's biosphere and support human existence. The plants, animals, microbes, and physical products from ecosystems provide people, as well as other ecosystem components, with the energy, water, biomass, medicine, and mineral resources needed to sustain human societies. Understanding ecosystems and predicting ecosystem change require robust scientific assessments and modeling of ecosystem conditions as climate and human-induced land changes occur. Ecosystems are inherently "interdisciplinary," with geographical, biological, geological, hydrological, and other components. Ecosystems are also inherently "multi-scalar," spatially and temporally. Geographically standardized ecosystem inventories—such as maps or databases—enable scientists to pursue conservation planning (through gap analysis), resource management, and predictive forecasting of ecosystem conditions. A vibrant The National Map will promote this type of science—and many others—by providing nationally consistent, trusted geospatial data and establishing a consistent national geographic context.

USGS Director Mark Myers recently stated, "The National Map is a vital, essential program to provide a trusted, nationally consistent geospatial framework. Its development at USGS continues our heritage of national mapping begun by John Wesley Powell. As we improve the way The National Map works—through improved data standards, accessibility, and consistency; through improved understanding of customer needs; and, perhaps most importantly, through more robust partnerships—these advances will

promote a synergy of geospatial information that will benefit counties, states, and the nation." This Tactical Plan is one of the initial steps in improving "the way The National Map works" and in supporting the USGS Science Strategy.

NGTOC Reengineering

Reengineering the NGTOC has been necessitated by the results of the Circular A–76 (2003) study initiated in 2005, two center closings, loss of government workforce, and subsequent cancellation of the A-76 study in June 2007. At that time, there were a total of 188 full-time permanent government employees located in Denver, Colo. and Rolla, Mo. After June 13, 2007, when the A–76 study for the NGTOC was canceled, the USGS decided, with DOI and OMB concurrence, to embark on a process of managed reengineering with the remaining workforce in the two NGTOC locations.

The process of managed reengineering leverages the work conducted during the A–76 study to develop an efficient, world-class organization prepared to meet the challenges of the future. In June 2007 an NGTOC Reengineering Steering Committee was formed along with numerous sub-teams, including:

- Workload Analysis Sub-Team—define current and future NGTOC functions and document workload (quantity).
- Staffing Analysis Sub-Team—characterize the existing NGTOC workforce, including both government and on-site contract staff; includes a skills assessment and gap analysis study.
- Technology Analysis Sub-Team—characterize existing systems and recommend both near-term and long-term optimal configuration.
- Facilities Analysis Sub-Team—document lease status and cost, as well as current space utilization in the Denver and Rolla sites.
- Synthesis Analysis Sub-Team—review data and information from the above teams and develop a report and implementation plan, to include: future organizational structure; identify functions to be performed by government employees or on-site contractors, or those to be contracted out; define anticipated workload levels; and facility and system configurations.

The following excerpts from the reengineering steering committee's timeline fall within the same timeframe as The National Map Tactical Plan.

- October 10–12, 2007—NGTOC Synthesis Team meeting in Denver, Colo., to review Sub-Team deliverables and define next steps/milestones.
- October 25, 2007—NGTOC Synthesis Team training on Business Process Reengineering. Training will be provided by Management Analysis Inc., a consultant hired to assist in the process of reengineering the NGTOC.
- November 20, 2007—Initial findings and recommendations presented to USGS/GIO Senior leadership.
- By December 31, 2007—Final report with recommendations on organizational structure, workload levels, staffing plan, and timelines for transition.
- January 2008—Concurrence by the Associate Director, Geospatial Information Office, for recommendations in the final report.
- March-August 2008—Begin implementation of plan, beginning with recruiting to fill key technical positions.
- August 2008—Finalize VSIP/VERA plan and submit to Bureau and DOI officials for approval to offer in 2009 to targeted positions.

- First quarter, FY09—Start up new organizational structure and fill key NGTOC management positions.

Management of the Plan

The National Map Tactical Plan is overseen by a TNM management team comprised of the NGPO Director (Chair), GIIA Chief, GIIA Deputy, Partnership Office Chief, Emergency Operations Chief, NGTOC Chief, and TNM Project Chief. This group has the following responsibilities:

- Provide general oversight of the plan
- Set goals
- Establish priorities
- Approve the addition or retirement of products and services
- Approve significant budgetary changes
- Participate in the configuration and change management processes

The National Map Strategic Advisor keeps the TNM management team apprised of possible long-term direction and future product and service changes.

Roles, Responsibilities, and Authorities

To align the workforce with the established priorities, it is important that key players be identified and roles for each be clearly defined. This will enhance communication, establish accountability, and identify the scope of duties. Roles and responsibilities are charted on a matrix that crosswalks roles to scenarios (functions or activities) and shows the level of responsibility (Responsible, Accountable, Supportive, to be Consulted, and to be Informed—RASCI). The RASCI matrix is maintained by NGPO management.

The National Map management framework in figure 3 shows the relationship of the major stakeholders in TNM's value chain.

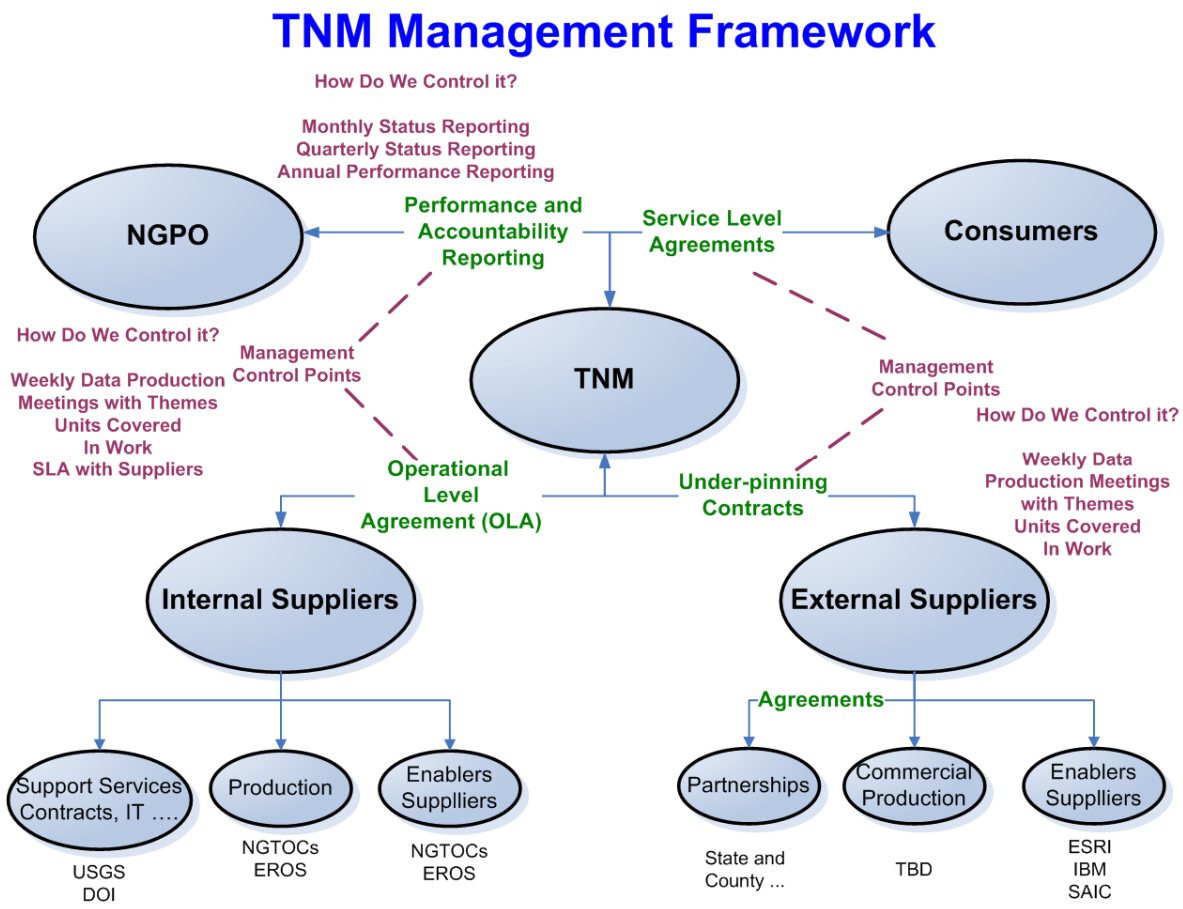

Figure 3. The National Map Management Framework

Establishing Priorities

Priorities for The National Map have been established for those activities most important to the short- and long-term success of TNM. These priorities help to focus work, management, and distribution of resources within the project. Priorities will be adjusted if necessary. These adjustments respond to emerging changes in the project's overall environment that may impact resources, constrain time, or change customer needs. Priorities are set and adjusted on the basis of a collaborative process involving leadership, management, technical leads, customers, partners, and others. That process involves identifying a driver (need for a change), an assessment of impact, identification of cost, risk, and requirements, and establishment of responsibility and timeframes for deliverables. The collaborative process results in the submission of a proposal to a Change Management Board (see "Configuration/Change Management" below in the "Controlling (monitoring and adjusting)" section). Any changes require final management approval and are fully documented.

Execution

During the execution of the plan, management has the following responsibilities:

- Ensure operational and management capacity and processes to support TNM activities.
- Revise and develop policy, guidance, standards, protocols, and procedures to support TNM priorities.
- Provide appropriate training.

- Align the NGPO workforce with TNM priorities.

Contracting out the work is a necessary option for executing parts of the plan. Even with contract dollars available, there will be reliance on NGTOC staff for contract negotiation and maintenance, data preparation, sustained training of contractors in the USGS graphic production processes, and monitoring and quality assurance of the contractors' work.

Reporting

Reporting is the primary means for management and others to understand the status of planned work and become aware of issues as soon as possible. Beginning on July 1, 2007, the product and service leads, NGTOC leads, and others began reporting according to the following schedule:

- Weekly exception reporting
- Monthly status reporting using standardized measures
- Quarterly status reporting using standardized measures
- Annual performance reporting (includes updating the appropriation justification to Congress in the form of the "Greenbook")

The detailed management plan lists the steps that will make the reporting possible.

Controlling (Monitoring and Adjusting)

Weekly Performance Reporting Meeting

Weekly performance reporting meetings of product, service, and system leads are held for these leads to report status and progress, and raise issues. This weekly meeting will result in a weekly exception report for the management team.

Configuration/Change Management

The management team has authorized the establishment of a configuration/change management process for the plan in conjunction with configuration management/change management for the NGP. Items such as the plan, products, services, systems, and outreach materials will be placed under configuration control.

Customer-Focused Product/Service Full Lifecycle Management

The NGP Management will fully document the product and service lifecycle management practices. This process will be overseen and directed by the Director of the NGP. The product and service leads, enterprise architect, and business systems analyst will contribute.

When the need or requirement for a new or revised product or service emerges, the following process will be used:

1. Identify the need or requirement for a new or revised product or service.
2. Assign to a lead.
3. Develop a business case.
4. Approval/Rejection by The National Map Management Team.
5. Revision of The National Map Tactical Plan.
6. Development of a detailed plan for the new or revised product or service.

The NGP will develop a product and services directory that describes TNM products and services in customer and branding terms. The directory will help with branding of TNM. The catalog will be augmented by the technical specifications for each product or service.

Inventory and Capacity Management

In order to plan and operate effectively, the NGP will develop and maintain the following:

- Commitments inventory
- Services inventory
- Products inventory

Communicating the Plan

Upon approval and endorsement of The National Map Tactical Plan by the following, the communication of the planned products, services, and management of the plan will be announced:

- Acting Chief, Geospatial Information, Integration, and Analysis
- Deputy Chief, Geospatial Information, Integration, and Analysis
- Chief, Partnership and External Coordination
- Chief, Office of Geospatial Information and Coordination
- Director, National Geospatial Technical Operations Center
- Lead, Information Solutions Section EROS
- Director, National Geospatial Program Office
- Emergency Operations Chief
- Associate Director for Geospatial Information
- USGS Director

Proposed Internal Communication

- Communications should be provided at a peer-to-peer level throughout the NGPO by January 30, 2008.
- Engage the Bureau Office of Communications to develop an initial communication plan for congressional and media outreach by December 13, 2007.
- Work with data theme leads to assess needs and create a plan for materials (fact sheets, presentations, and other outreach tools) by March 31, 2008. Begin data theme lead meetings by July, 2, 2007.
- Brief the Director and Regional Geographic Information Officers, to establish clarity, priority, cooperation, and support for the plan—task for management team by January 30, 2008.
- Provide leadership-approved briefing materials to NGPO employees in a timely manner—task for management team and outreach staff within 3 weeks of a presentation of briefing.
- Post leadership-approved briefing materials on NGP internal website—task for outreach staff upon approval from management team within 2 weeks of receipt.
- Outreach staff to work with management, product, service, and project leads in coordination with liaisons and others to plan and execute a communications plan. February 29, 2008.

- Post meeting notes to the planning team and those tasked in the plan where key decisions are being made by leadership. Task for GIIA support within 1 week of decision by leadership.
- Provide a feedback mechanism for NGPO employees to decide how to best share success stories - task for outreach staff by January 30, 2008.
- Identify and communicate areas in which TNM Tactical Plan crosswalks with The Plan for Action, Geospatial Line of Business, DOI Geospatial Blueprint, and other Department of the Interior initiatives. Task for management team by January 30, 2008.

Proposed External Communication

External communications will focus on accomplishments, progress, and results, not on the plan itself. Coordinate, as appropriate, with the Office of Communications to implement the following:

- Work with the USGS Geospatial Liaison community to identify partners to act as reviewers of packaged messages.
- Work with NGPO management to furnish USGS Congressional Liaison Office recommendations on key messages going to the congressional audience on major accomplishments.
- Identify external stakeholders and organizations that would endorse and assist in appropriately communicating The National Map message.
- Engage stakeholders and customers whenever possible.
- Post press releases on the external NGPO website and link to the NGPO internal website.
- Provide TNM information at Bureau, regional, and local conferences.
- Distribute surveys at workshops, conference presentations, and listening sessions to assess the effectiveness of communications.
- Use opportunities to celebrate successes.

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Appendix A: Writing Team Members

Jim	Barrett	Consultant
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Chris	Carlson	GIIA Rep
Bill	Carswell	NGP Director
Tom	Connelly	ER GIO NSDI Partnership Office Chief
Eric	Constance	NGTOC Rep. / NGTOC III Chief
Mike	Cooley	Graphics Lead
George	Costantino	TNMRP Lead
Kari	Craun	NGTOC Chief
Rob	Dollison	GOS Rep.
Jay	Donnelly	National Atlas Lead
Robin	Fegeas	Data Standards and Coordination
Jim	Flaherty	Common Systems
Tracy	Fuller	CR GIO NSDI Partnership Office Chief
Kevin	Gallagher	GIIA Chief (Acting)
Joan	Helmrich	Names CS Rep
Pat	Hytes	Communications Rep.
George	Lee	Raster Lead
Vicki	Lukas	WR GIO NSDI Partnership Office Chief
John	Mahoney	GIC
Jim	Mauck	Elevation Lead
Mark	Naftzger	GIO Deputy
Jean	Paulson	EROS Rep.
Donna	Richey Winkelman	Coordinator
Dave	Roberts	Orthoimagery Lead
Jeff	Simley	NHD Lead
Jonathan	Smith	Geography - Land Cover Lead
Paul	Wiese	Vector Lead
Lou	Yost	Names Lead
Carl	Zulick	GIIA Deputy Chief

Appendix B: Partners for FY07 Agreements

Federal

- U.S. Army Corps of Engineers
- NGA
- NPS
- NRCS
- BLM State offices
- USDA FSA
- USGS Multi-Hazards Science Support

State

- Alabama Department of Economic and Community Affairs, Office Of Water Resources
- Arkansas Department of Environmental Quality
- Colorado Division of Water Resources
- Commonwealth of Virginia, VITA
- Delaware Department of Natural Resources and Environmental Control
- Delaware Office of Management and Budget
- Illinois State Department Of Natural Resources
- Illinois State Geological Survey
- Indiana Geographic Information Council
- Iowa Department of Natural Resources
- Iowa Geographic Information Council
- Louisiana Department of Environmental Quality
- Louisiana State University
- Michigan State University Institute Of Water Research
- Missouri Department of Conservation
- Missouri Department of Natural Resources
- Missouri Office of Administration
- Montana Department of Administration
- Montana State Library
- New Mexico Emergency Management Office
- New Mexico Geospatial Information Council

- New Mexico Office of the State Engineer
- New York State Office of Cyber Security and Critical Infrastructure Coordination
- North Carolina NC GCIA
- North Dakota Department of Information Technology
- Ohio Geographically Referenced Information Program
- South Dakota Geological Survey
- South Dakota State University
- State of California, Department of Water Resources, Division of Technology Services
- State of Nevada, Department of Transportation
- State Of New Jersey, Department Of Environmental Protection
- State of Oregon, Geospatial Enterprise Office
- State of Utah, Automated Geographic Reference Center
- State of Washington, Department of Information Services
- State of Washington, Department of Transportation
- Tennessee Department of Finance and Administration
- Texas Natural Resources Information System
- The Florida Department Of Revenue
- The Florida Division Of Emergency Management
- The Florida Fish And Wildlife Conservation Commission
- The Florida Southwest Florida Water Management District
- The Kentucky Commonwealth Office Of Technology, Division Of Geographic Information
- The Maine Office Of GIS
- The Pennsylvania Department of Conservation and Natural Resources
- The State Of Michigan, Center for Geographic Information
- The Vermont Center For Geographic Information
- The West Virginia State GIS Technical Center
- University of Alabama
- University of Denver
- University of Idaho, Office of Sponsored Programs
- University of Missouri
- University of Montana
- University of New Mexico
- University of Wyoming
- Wyoming Game and Fish Department

Local

- Aiken County, SC
- Benton County, AR
- Chisago County, MN
- City Of Augusta, GA
- City Of Fort Wayne, IN
- City of Salem, OR
- Clark County, WA
- Contra Costa County, CA
- County of Kitsap, WA
- County of Kitsap, WA
- County of Los Angeles, CA
- County of Nez Perce, ID
- Dane County, WI
- Florence County, SC
- Indianapolis Mapping And Geographic Infrastructure System (IMAGIS), IN
- Kent County, MI
- McLeod County, MN
- Muskegon County, MI
- Ottawa County, MI
- Richland County, SC
- Sangamon County, IL
- Shelby County, TN
- Snohomish County, WA
- Sumner County, TN
- The Metropolitan Planning Commission For Nashville And Davidson County, TN
- The Rutherford County, TN
- Washoe County, NV
- Williamson County, TN

Other

- Alaska Geographic Data Committee
- Association of Monterey Bay Area Governments, CA
- Avista Utilities Corporation, WA
- Bexar Metro 9-1-1 Network District

- Coeur d' Alene Tribe, ID
- Fort Benning Department Of Public Works/Environmental Management Division/Land Management Division
- Hawaii Geographic Information Coordinating Council
- Houston-Galveston Area Council
- MDA Geospatial Services Incorporated, MN
- Metropolitan Council of Minneapolis, MN
- Mid-America Regional Council
- Mid-Region Council of Governments
- North Central Texas Council of Governments
- Northwest Arkansas Regional Planning Commission
- Omaha-Council Bluffs Metro Area Planning Commission
- San Diego Geographic Information Source, CA
- San Francisco Estuary Institute, CA
- Southern Nevada Water Authority
- Squaxin Island Tribe, WA
- Tri-College University International Water Institute