

# **Geospatial Investment Definitions for Tracking and Reporting Geospatial Investment Costs**

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- Appendix A: Detailed Examples of Geospatial Costs and Investment Types
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# 1 Background

Providing an accurate overview of Federal government geospatial investments, as well as resources expended on individual National Geospatial Data Assets (NGDA) is extremely difficult due to the use of inconsistent investment definitions and budget coding schema across Federal government organizations. Concern over this inability to clearly and consistently articulate Federal government geospatial expenditures has been the subject of both a GAO report<sup>1</sup> and Congressional inquiries which articulate a clear need for improvement. In response to these analyses, the Federal Geographic Data Committee (FGDC) is focusing on engaging leaders and stakeholders from across the Federal government to analyze and address the concerns with accurate and consistent reporting of geospatial expenditures.

In December 2013, FGDC issued the National Spatial Data Infrastructure (NSDI) Strategic Plan 2014-16. This Plan contains three goals each with objectives and actions describing how to address findings in the 2012 GAO report. Goal 2 of the Plan focuses on accountability and effective management of Federal geospatial resources, and reflects the consensus of the FGDC community and its stakeholders that a standard definition of a geospatial investment across the A-16 NGDA Portfolio would facilitate more accurate reporting of geospatial expenditures as well as better data for budget planning and execution.

The direction to accomplish this goal is provided under Objective 2.1, Advance the portfolio management process for National Geospatial Data Assets (NGDA), Action 2.1.3, Finalize and Implement the Circular A-16 Portfolio Implementation Plan to include reporting investments and defining investment requirements. The approach for achieving Goal 2 objectives and actions were further outlined in the March 2014 “National Geospatial Data Asset Management Plan” under Objective 1E: Codify the Definition of a Geospatial Investment and associated, Action 1E.1: Review/Revise the Definition of Geospatial Investment and Budget Reporting. This objective and action in the Management Plan are the basis for the activities of the Geo Investments Interagency Team which developed this document.

The Team’s work builds on and updates definitions outlined in the document titled, “Geospatial Line of Business Geospatial Investment Definitions” (December 2006) that was developed in response to the Office of Management and Budget’s (OMB’s) Fiscal Year 2008 (FY 2008) budget guidance. OMB directed member agencies of the Geospatial Line of Business (Geospatial LoB) to:

- Work with the Department of Interior (DOI) to define a common set of investment definitions by December 30, 2006; and
- Update and report to OMB by March 30, 2007, their inventories of geospatial data and systems to develop a more comprehensive and accurate summary of Agency investments in geospatial data and systems.

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<sup>1</sup> November 2012 GAO report “Geospatial Information: OMB and Agencies Need to Make Coordination a Priority to Reduce Duplication”

## 2 Scope

The purpose of this document is to describe a standard set of geospatial definitions with specific examples for each definition. This is a reference document and does not specify the scope or implementation process for government-wide portfolio management of geospatial investments. Because all types of geospatial investments are defined in this document, it can support a variety of portfolio management scenarios ranging from the tracking of only one asset type to tracking the full array of geospatial investment types made across the Federal government. A separate implementation guide will need to be developed to explain how investments should be mapped to the various investment definitions once the scope of which Federal geospatial investments are to be tracked is agreed upon by the FGDC Steering Committee. The intent is to assist budget staff in implementing a Federal geospatial coding framework whose scope may expand over time as determined by the FGDC Steering Committee. The implementation will need to be phased so that agencies can take a realistic approach to fully implementing this geospatial investment reporting.

The definitions are designed to provide agencies a foundation for identifying and planning geospatial investments in future budget formulation processes and tracking expenditures in the budget execution phases. The definitions and any additional implementation processes and procedures would be harmonized with other budget planning and reporting processes such as the CPIC OMB Exhibit 300 and 53.

All definitions identified in this document are geospatial centric. Pure IT costs that are not associated with geospatial tools, services, and products, or costs associated with usage of geospatial data, tools, services, and products by customers and end users, should not be considered as geospatial costs.

Security considerations, actions and expenditures, such as FedRamp (Federal Risk and Authorization Management Program) compliance based on Federal Information Security Management Act (FISMA), are critical. However, unless the IT system under evaluation is defined as a dedicated GIS or Geospatial system, the costs associated with maintaining a valid systems security posture may be accounted separately under the system boundary of other non-geospatial systems or agency-wide infrastructure cost. As part of defining the scope of security activities for any particular geospatial information system, there needs to be an assessment of controls in order to delineate and summarize security responsibilities for cloud service providers (CSP) and agencies based on information system categorization and service level provided.

The long-term goal of this document and the subsequent implementation guide would be to cover all agency geospatial investment, not solely on geospatial data acquisition, processing, dissemination, or investments related to NGDA datasets. For any geospatial related IT investment, including IT hardware and software that are used for both IT and geospatial activities, if a usage percentage can be decided between IT and geospatial, the geospatial portion of the cost needs to be captured. An example: is the cost of the Oracle Spatial component within an Oracle database software purchase.

Cost of Federal government employees and contractors who perform geospatial data, tools, services, and products development and maintenance activities including research and

development, should be considered as geospatial costs, this includes agency geospatial personnel who do not work in a GIS organization, but perform GIS work. Identification of these personnel can be done by occupational series/job code (e.g., GIS Developer, GIS Analyst, GIS System Engineer, GIS Specialists) or by the specific work the personnel perform (e.g., personnel costs for staff directly involved in GIS data/system analysis, project management, and application development activities).

Mission related costs that involve the use of geospatial technology and activities typically should not be tracked and reported, unless the mission is purely of a geospatial nature. For example, geospatial analytical activities in scientific or land management mission accomplishment should not be tracked and reported. However, a mission that is geospatial in nature such as the creation, development, and distribution of national geospatial data sets should be tracked and reported.

### **3 Purpose**

The purpose of this document is to partly address Goal 2 in the NSDI Strategic Plan that calls for Federal Agencies to “Ensure Accountability and Effective Development and Management of Federal Geospatial Resources.” This strategic goal describes the actions the Federal geospatial community will take to implement portfolio management to more effectively plan geospatial data collection efforts, assess the status of NGDAs, and minimize duplicative investments.

A key tool to reaching this goal is establishing and defining a common set of geospatial resource investment definitions for use by the FGDC community for planning, budgeting, execution, and reporting of geospatial expenditures. The definitions presented in this document build upon and update definitions contained in earlier documents developed under the Geospatial LOB to facilitate an inventory of federal geospatial investments. The Geospatial LoB defines “investment definitions” as a common framework and vocabulary for describing important geospatial investments and activities. Use of a common framework and vocabulary for describing geospatial investments and activities will enable cross-agency analysis and identification of potentially duplicative investments, and opportunities for collaboration and leveraging of resources across the Federal Government and its partners.

This document starts to build that common framework and vocabulary by providing detailed examples of geospatial investments. An implementation guide will be developed to explain how the examples should be mapped to various investment types to assist budget staff in implementing a detailed Federal geospatial coding framework over time. The focus is on trying to capture by investment type the total cost of ownership for the purchase, development, and maintenance geospatial investments that provide capabilities to end users, not the costs associated with usage of the geospatial tools, services, and products by customers and end users. It applies to the costs associated with the purchases of geospatial products and services as well as the contractor and Federal government employee labor costs expended in providing and delivering these geospatial capabilities.

## 4 References

To develop this common framework and vocabulary for describing geospatial investments and activities, the Team has leveraged several key reference documents.

- The Federal Enterprise Architecture (FEA) Consolidated Reference Model (CRM)<sup>2</sup>

The FEA presents an overall approach to developing and using Enterprise Architecture in the Federal Government. The Common Approach promotes increased levels of mission effectiveness by standardizing the development and use of architectures within and between Federal Agencies. This includes principles for using EA to help agencies eliminate waste and duplication, increase shared services, close performance gaps, and promote engagement among government, industry, and citizens. The FEA Framework v2 describes a suite of tools to help government planners implement the Common Approach. At its core is the Consolidated Reference Model (CRM), which equips OMB and Federal agencies with a common language and framework to describe and analyze investments. It consists of a set of interrelated “reference models” that describe the six sub-architecture domains in the framework:

- Strategy
- Business
- Data
- Applications
- Infrastructure
- Security

These are designed to facilitate cross-agency analysis and the identification of duplicative investments, gaps and opportunities for collaboration within and across agencies. Also, by applying all six reference models, agencies can establish a line of sight from the strategic goals at the highest organizational level to the software and hardware infrastructure that enable achievement of those goals. Collectively, the reference models comprise a framework for describing important elements of federal agency operations in a common and consistent way.

- The Environmental Protection Agency’s Instructions to National Programs and Regional Offices for the June 2006 Geospatial LoB Cost Data Call

EPA developed detailed geospatial investment type definitions that were shared and used to categorize costs by type across the group of responding Federal agencies in hopes of promoting consistency and accuracy during a government-wide cost data call.

- The FEA Geospatial Profile Version 2

The FEA Geospatial Profile has been collaboratively developed, is maintained, and provides a taxonomy that facilitates consistent use of geospatial vocabulary, including specific geospatial term and service definitions. The Geospatial Profile also provides a framework for

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<sup>2</sup> Detailed information on the FEA can be found via the following url: <https://www.whitehouse.gov/omb/e-gov/FEA>

extending each of the FEA reference models (to include Consolidated RM, Performance RM, Business RM, Data RM, Application RM, Infrastructure RM, Security RM) to geospatial business activities. It also includes a Geospatial Business Statement describing the role of geospatial data, services and technologies in support of business activities. It is envisioned that future Geospatial LoB portfolio management activities will leverage the remaining reference models resulting in a better understanding of the geospatial data and services requirements of the Geospatial LoB.

- OMB Circular A-16 Coordination of Geographic Information and Related Spatial Data Activities

OMB Circular A-16 affirms and describes the NSDI and includes standard definitions and descriptions of each of the 34 data themes.

- OMB E-Gov Integrated Data Collection (IDC) Common Definitions

Contains standard definitions for numerous terms used in the OMB FEA and related IT investment review and management publications/circulars.

## 5 Investment Type Definitions

This section provides guidance on how to classify geospatial investments by type to assist Agencies and Departments in creating their own geospatial cost coding framework per OMB’s request. Additionally, this section provides examples of what costs would be classified as a geospatial cost and what costs would not be classified as geospatial costs.

The investment type definitions in Table 5.1 below have been developed with a focus on geospatial activities and investments, and are intended to assist managers and budget personnel in properly and consistently coding geospatial costs<sup>3</sup>.

**Table 5.1 - Investment Type Definitions**

Investment Type	Definition/Description
<b>Hardware</b>	Acquisition and maintenance of computer hardware, including vendor/contractor maintenance contracts used for geographic information systems. Includes the following:(1) PCs: desktop PCs, workstations, laptops and associated components such as memory upgrades, memory, hard drives, other associated storage devices, video and sound cards, cables, keyboards, mice, monitors, etc. (2) Servers: file, print, application, web, virtualized, database and any other types of servers and associated components such as hard drives, back up units, memory, equipment, cables, adapters, etc. (3) Printers/scanners: Printers, plotters, digital scanners, barcode readers (4) Handheld Devices: GPS units, Smartphones, tablets, cameras, and other mobile devices. (5) Other Storage devices: removable hard drives, jump drives, etc. (6) Telecom services

<sup>3</sup> Geospatial costs are not to be included with general IT infrastructure acquisition tracking; they should be tracked and reported separately.

<b>Investment Type</b>	<b>Definition/Description</b>
	<p>specifically supporting geospatial information systems and program operations, including: Cabling - purchase and/or installation of facility wiring and related components to support data communications; Maintenance - maintenance/repair of LAN/WAN telecom hardware and Private Branch Exchanges (PBXs); and Services - provided by a vendor/contractor to supply LAN/WAN connectivity, in total or any part, including telecom support for network infrastructure. (7) Non-Cloud Hosting: database and application hosting costs. (8) Any other related components or costs not specifically mentioned.</p> <p><i>Note: this includes the Federal government FTE costs associated with the purchase and maintenance of geospatial hardware.</i></p>
<b>Software</b>	<p>Geographic information systems and software for all types of computers including desktops, laptops, servers, mobile devices, etc., including: operating systems, application software, data base management software, software development suites, application programming interface (APIs), mobile device applications, and any ongoing software maintenance/upgrades. Software can be either commercial off the shelf software or custom developed software (i.e., developed by a vendor/contractor). Specifically, includes acquisition, development, and maintenance of computer software used for geographic information systems, including, but not limited to spatial database software, spatial data viewers, 3D visualization software, software used for map development, and the associated software licenses and maintenance plans/contracts for this software. This also includes research and development costs for evaluating software and implementation procedures. Does not include web-based geospatial services (see definition of Services below), or software as a service that is hosted and provided via a cloud-based solution (see definition of Cloud Computing Services below).</p> <p><i>Note: this includes the Federal government FTE costs associated with the development, purchase and maintenance of geospatial software.</i></p>
<b>Geospatial Services</b>	<p>A self-contained business process or technology that: performs a specific, well-defined function; produces specific, well-defined outcomes, such as geocoding, geoprocessing or geospatial web services; has a well-defined interface; is composable; is invariant under use; is location-independent; and which (a) consumes, processes, or produces geospatial data, (b) combines geospatial data with other data to add meaning or enhance understanding, or both (see definition of Services below). Costs are associated with developing, maintaining, and sustaining services independent of hardware and software (infrastructure) accounted for in other categories in proportion to that part of the investment which is geospatial. Does not include professional services.</p> <p>Cost should include expenses incurred for O&amp;M associated with maintaining the geospatial services operational status. The actions could include performing data synchronization with external systems, maintenance and QA/QC of</p>



Investment Type	Definition/Description
	<p>data/geo processing service, providing maximum uptime ensuring that end users can reliably connect to and consume the geospatial service offerings. Often these types of services are public and require minimal disruption or are integrated into operational business processes in which geospatial processing services are used to provide value add to data stored or displayed within systems or repositories external to geospatial data holdings.</p> <p>Examples of Geospatial Services include:</p> <p>OGC Standard web services</p> <ul style="list-style-type: none"> <li>• Web Map Service (WMS) - provides a “simple HTTP interface for requesting georeferenced map images”</li> <li>• Web Feature Service (WFS) - use with vector data to return the actual features for analysis and editing</li> <li>• Web Coverage Service (WCS) - used to deliver raster data over the internet</li> <li>• Web Processing Service (WPS) - intended to be a standardized means of performing geoprocessing tasks over the internet</li> <li>• Web Map Tiling Service (WMTS) - used to request a rendered, projected, cartographically styled map image from a service in the form of image tiles</li> <li>• Table Joining Service (TJS) - perform a table join for spatial data, where attributes housed on one server are join to a spatial framework housed on another server.</li> </ul> <p>OGC Standard non web based services</p> <p>Proprietary services or non-standard services, example GeoJson – service for encoding geographic data and formatting that can be called for use in custom applications within the application code.</p> <p><i>Note: this includes the Federal government FTE costs associated with the development, purchase and maintenance of geospatial services.</i></p>
<p><b>Cloud Computing Geospatial Services</b></p>	<p>Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models (NIST Special Publication 800-145). <b><i>Only those portions of activities directed at, dedicated to, or specifically for geospatial efforts; such as research and development, mapping services, or analytic services, should be counted in the total.</i></b></p>

Investment Type	Definition/Description
	<p><b>Service Models:</b></p> <ul style="list-style-type: none"> <li>• <u>Infrastructure as a Service (IaaS)</u>. The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).</li> <li>• <u>Platform as a Service (PaaS)</u>. The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.</li> <li>• <u>Software as a Service (SaaS)</u>. The capability provided to the consumer is to use the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., GIS software), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.</li> <li>• <u>Data as a Service (DaaS)</u>: Digital delivery of data as a product, either purchased or provided to meet mission specific requirement, in an on-demand request generated by the end user or application. Implies that the data service is changing dynamically and has high availability (cloud based platforms hosting data or applications required to process and deliver the data) to ensure that data delivery is not interrupted. In the context of Geospatial data this may be a highly available data or data product derived from an input with geographic attribution included as a value added product, such as data returned from a geoprocessing service where an input was originally provided by the end user or as a secondary source. Examples would be geocoding data attribution appended to and address table.</li> </ul> <p><i>Note: this includes the Federal government FTE costs associated with the development, purchase and maintenance of geospatial cloud computing services.</i></p>
<b>Security</b>	<p>GIS Security encompasses two major functions: compliance and assurance. Compliance includes Assessment and Authorization (A&amp;A) and Continuous Monitoring according to FISMA and FedRAMP standards and assurance includes both information assurance and software assurance to ensure appropriate security and privacy controls are built into the GIS applications and</p>

Investment Type	Definition/Description
	<p>systems. Specific security activities that would fall under this investment type include:</p> <ul style="list-style-type: none"> <li>• <u><i>Prevent Malicious Cyber Activity to Protect Networks and Information.</i></u> Activities include: Intrusion Prevention, Trusted Internet Connections, Identity Management and Authentication, Supply Chain (Specific to Cyber), Network and Data Protection, Counterintelligence (directly related to cybersecurity), and Insider Threat Mitigation.</li> <li>• <u><i>Detect, Analyze and Mitigate Intrusions.</i></u> Activities include: Federal Incident Response Centers, Cyber Threat Analysis, Law Enforcement - Prosecution and Investigation of Cyber Intrusions, Law Enforcement - Incident Response, Cyber Continuity of Operations (COOP), Incident Response and Remediation, Forensics and Damage Assessment, and Computer Emergency Response.</li> <li>• <u><i>Continuous Monitoring.</i></u> Activities include: IT Security Monitoring, Anti-Virus and Anti-Malware, Intrusion Detection and Prevention, Web and E-mail Filtering, SIM/SIEM, Data Leakage Protection, Annual FISMA Testing, and Network Penetration.</li> <li>• <u><i>Shaping the Cybersecurity Environment - Planning, Policy Development, Workforce Training and Management, and Public-Private Partnerships.</i></u> Activities include: The National Initiative for Cybersecurity Education (NICE), Workforce Development, Security Awareness Training, Federal Government Outreach, Advisory Committee Activities, Standards Development and Propagation, Risk Management, International Diplomacy, and Research &amp; Development.</li> </ul> <p><i>Note: this includes the Federal government FTE costs associated with providing security for geospatial investments not provided as part of Agency-wide security and infrastructure support services.</i></p>
<b>Sensors</b>	<p>The acquisition and/or development of a device that detects and responds to a variety of input types from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a number of other environmental phenomena. The output is generally a signal that is converted to human-readable display at the sensor location or transmitted electronically over a network for reading or further processing. Examples of geospatial sensors include LiDAR, radar, hyperspectral, GPS-enabled camera, etc. Sensors are conveyed via numerous modes of transportation such as satellites, aircraft, motor vehicles, and water vessels. For the purposes of this definition cost of the specific mode of transportation is not included.</p> <p><i>Note: this includes the Federal government FTE costs associated with the</i></p>

<b>Investment Type</b>	<b>Definition/Description</b>
	<i>purchase and maintenance of sensors that provide geospatial data.</i>
<b>Obtaining Data</b>	<p>Activities and costs associated with obtaining geospatial data include: 1) researching data sources and quality, 2) data acquisition, 3) data collection, and 4) geo-enabling data that is not inherently geospatial. Data acquisition refers to the purchase, lease, or free acquisition of existing geospatial data or services from commercial, governmental, or non-governmental entities, including states, tribes, local governments, other Federal Agencies, and non-governmental organizations for use in geospatial systems and software. This also includes acquisition of existing data and services in partnership with other agencies and entities in which the agency expends funds and receives a data product or service in return.</p> <p>Data collection refers to activities and costs associated with the creation of new data (e.g. data not available commercially, from other governmental or non-governmental entities). This includes data that currently does not exist (new data), updated data (changes to existing data), and generation of additional data (supplemental data) in a manner that requires the federal agency's resources such as sensors or field data collection operations. Data collection also includes the costs associated with joining a data consortium that collects/develops new data.</p> <p><i>Note: this includes the Federal government FTE costs associated with obtaining geospatial data.</i></p>
<b>Data Distribution</b>	<p>Activities and costs associated with providing access and distributing geospatial data include: Any data dissemination for use, manipulation, or application that is not specifically part of a web-based geospatial service (as described in the definition of Services). Can include a wide variety of formats and mechanisms including standards-based exchange protocols (e.g., XML), FTP sites, web sites, data portals, application programming interfaces (APIs), CD-ROMs, and DVDs. Can also include a variety of different types of files including shapefiles, coverages, geodatabases, Keyhole Markup Language (KML), spreadsheets, and relational database files. Research and development of data distribution mechanisms is also included.</p> <p><i>Note: this includes the Federal government FTE costs associated with distributing geospatial data.</i></p>
<b>Data Management and Processing</b>	<p>Geospatial data management and processing encompasses several types of activities: research and development, conversion of data, data integration into geospatial information systems, data analysis, and data maintenance. Conversion refers to transforming source files from one format to another such as the conversion of existing hard copy materials (e.g. engineering or CAD drawings, site maps, aerial photographs), and conversion of non-GIS digital format such as spreadsheets and tables, into GIS-ready input or output (i.e. geocoding). Data integration involves combining different sources of data into</p>

<b>Investment Type</b>	<b>Definition/Description</b>
	<p>one product. Data analysis applies defined operations to a set of geospatial data inputs and generates new information. Data analysis ranges from common GIS operations, such as overlay, buffer, and data management, to more advanced operations for raster and imagery processing, topology creation, and schema definition. Data maintenance includes data stewardship activities and involves updating and improving data, error correction, as well as activities to version and preserve data.</p> <p><i>Note: this includes the Federal government FTE costs associated with processing geospatial data.</i></p>
<b>Program Management</b>	<p>Includes a suite of activities that support the overall management of geospatial data within an Agency including: Planning and development of geospatial data, policies, guidance, Enterprise Architecture (e.g., business process to geospatial component mapping), Governance (e.g., creation of Geospatial Steering Committee and associated charter and standard operating procedures), Standards (e.g., FGDC standards), Strategic Plans, and Securing any needed budget or contractual resources in support of the program (potentially to include Contracting Officer's Representatives (CORs) duties). It also includes portfolio management, scheduling responsibilities, management of agreements, and program management coordination across operating units performing geospatial activities.</p> <p><i>Note: this includes the Federal government FTE costs associated with geospatial program management activities.</i></p>
<b>Outreach</b>	<p>Includes activities such as communication, publishing, developing promotional materials, training, and help desk support focused on providing education and assistance to Program staff for purposes of enabling increased usage of geospatial data and tools in day-to-day business operations. Also includes support provided to internal and external customers for purposes of facilitating use of geospatial data and tools in decision making or program evaluation efforts.</p> <p><i>Note: this includes the Federal government FTE costs associated with geospatial outreach activities.</i></p>

Table 5.2 provides some examples of what would and would not be classified as a geospatial cost, why, and what investment type they fall under.

**Table 5.2 – What is and what is not a Reportable Geospatial Cost**

<b>Cost Example</b>	<b>Reportable as Geo Cost (Y/N)?</b>	<b>Explanation of Classification</b>	<b>Investment Type</b>
Costs for purchase, operation and maintenance of aircraft, motor vehicles, and watercrafts used to collect geospatial data	N	Costs of sensors on these vehicles could be reported, but not the costs for purchase, operation, or maintenance of the vehicles.	N/A
Costs for operation of remote sensing satellites	N	General operations and maintenance of the satellites themselves should not be reported. Costs are currently tracked through programmatic methods not involving geospatial expenditures.	N/A
Costs for penetration testing and intrusion detection activities for the overall Agency General Support System or Infrastructure upon which a geospatial system, service, or client/application sites	N	Only security activities specific to a geospatial system, service, or client/application should be included as geospatial costs	N/A
Costs for development of Agency data exchange capabilities that geospatial systems, services, and clients/applications leverage to exchange and transmit data	N	Only costs for development of geospatial-specific data exchange capabilities or networks should be included as geospatial costs	N/A

<b>Cost Example</b>	<b>Reportable as Geo Cost (Y/N)?</b>	<b>Explanation of Classification</b>	<b>Investment Type</b>
Costs associated with developing and maintaining datasets that may contain geospatial data but are not inherently geospatial datasets (e.g., HUD database with property location data along with other detailed non-geospatial data)	N	Only the costs associated with maintaining geospatial data within these data sets or geocoding data in these datasets would be considered a geospatial cost	N/A
Cost associated with inherently geospatial data – National Hydrography Dataset, Government Unit boundaries, Soils	Y		Obtaining Data  Data Management and Processing  Program Management
Costs associated with software that is part of an Agency's IT infrastructure ELA and is considered to be a commonly used application suite or operating system	N	Common software that is made available as part of an ELA (e.g. Microsoft SQL, Oracle, REHL, MS Office). This would be a cost accounted for under an Agency's OAIT budget – there may be cost sharing or pass back depending on how the agency chooses to fund the ELA.	N/A
Cost of purchasing or operating Unmanned Aircraft Systems (UAS)	N	Costs of sensors on a UAS could possibly be reported, but not the costs for purchase or operation of the UAS.	N/A
Costs of Federal government FTEs (e.g., land managers) using geospatial tools to develop a fire management plan for the Rocky Mountain West region	N	Usage of geospatial tools by Federal government FTEs for mission-specific business of fire management would not be considered a geospatial investment/cost.	N/A

Cost Example	Reportable as Geo Cost (Y/N)?	Explanation of Classification	Investment Type
Costs of Federal government FTEs (e.g., environmental scientists) using a mapping service to create a cleanup plan for an inadvertent discharge into a waterway	N	Costs associated with the consumption of a service by Federal government FTEs for mission-specific business would not be considered a geospatial investment/cost.	N/A
Cost of procuring desktop hardware used for obtaining geospatial data, geospatial data geospatial distribution or data processing	Y		Hardware
Cost for basic office functions like email, word processing etc., for a geospatial desktop	N		N/A
Costs associated with purchase, operation, and maintenance of servers used to host geospatial data, services, and clients/applications in a non-cloud environment	Y		Hardware
Costs for handheld GPS units used exclusively for geospatial data collection	Y		Hardware
Data collection device that contains GPS functionality that is primarily used for general tabular data collection versus geotagging <i>*See Software for geospatial apps that could run on these devices for geo-locating</i>	N		N/A
Enterprise license costs for GIS desktop and server software or add-ons to IT infrastructure such as Bing with Microsoft or Oracle Spatial	Y		Software



<b>Cost Example</b>	<b>Reportable as Geo Cost (Y/N)?</b>	<b>Explanation of Classification</b>	<b>Investment Type</b>
Costs associated with development, operations, and maintenance of a geospatial database or client/application that is not provided via a cloud-based solution.	Y		Software
Costs associated with the development, maintenance, and operation of geospatial services, e.g. web mapping, geoprocessing	Y		Geospatial Services
Costs of developing, operating, and maintaining a geospatial database in a cloud environment	Y	Portion of cloud environment that is used specifically for geospatial would be reported	Cloud Computing Services
Costs associated with development, operation, and maintenance of geospatial widgets that are provided to users in a cloud environment	Y	Portion of cloud environment that is used specifically for geospatial would be reported	Cloud Computing Services
Costs for application hosting in a cloud environment	Y	Portion of cloud environment that is used specifically for geospatial would be reported	Cloud Computing Services
Costs associated with development of security plans for geospatial investments	Y		Security
Costs associated with annual NIST certification for a geospatial information system	Y		Security
Cost for geospatial data masking for PII and/or SBU protection	Y		Security
Costs associated with the collection of LiDAR data	Y	Portion of the overall costs collecting the LiDAR data in order to create models and maps, but not the transportation of or the hardware itself involved.	Sensors

<b>Cost Example</b>	<b>Reportable as Geo Cost (Y/N)?</b>	<b>Explanation of Classification</b>	<b>Investment Type</b>
Costs associated with collecting data from passive optical sensors such as those from Landsat, SPOT or Quickbird for example	Y	Portion of the overall costs collecting the remotely sensed data, but not the satellite operation costs of these sensor types.	Sensors
Costs for managing and distributing remote sensed data from satellites and ground-and water-based sensors.	Y	Costs for managing and distributing remote sensed data from satellites and other sensors could be reported. General operations and maintenance of the sensor and sensor networks themselves should not be reported.	Sensors
Annual subscription costs for obtaining a commercial data set	Y		Obtaining Data
Costs associated with collection of new geospatial data for use in a geospatial database	Y		Obtaining Data
Costs of Federal government FTEs developing, and maintaining a new geospatial data set or service	Y		Obtaining Data
Costs associated with monthly updates to a web site that provides geospatial information to the public, but not via an automated geospatial service	Y		Data Distribution
Costs associated with monthly update and publication of geospatial shapefiles	Y		Data Distribution
Costs of Federal government FTEs distributing data to other Agency partners via a data portal	Y		Data Distribution
Costs associated with geocoding lat/long coordinates for regulated facilities from a spreadsheet	Y		Data Management and Processing

<b>Cost Example</b>	<b>Reportable as Geo Cost (Y/N)?</b>	<b>Explanation of Classification</b>	<b>Investment Type</b>
Costs associated with analyzing data from a dataset and correcting errors to improve accuracy and quality	Y		Data Management and Processing
Costs of Federal government FTEs conducting data stewardship activities, such as geospatial data improvement or error correction.	Y		Data Management and Processing
Costs associated with promulgating new geospatial data publishing policies/guidance	Y		Program Management
Costs associated with development of processes and procedures used exclusively to evaluate and prioritize geospatial investments within an Agency or Department	Y		Program Management
Cost of developing geospatial standards, policy and regulations	Y		Program Management
Cost of developing geospatial data exchange agreement, SLAs with internal/external providers (obtaining geospatial data)	Y		Program Management
Cost to run geospatial management office, or geospatial governance branch	Y		Program Management
Costs of Federal government FTEs developing and overseeing the activities of a Configuration and Control Board exclusively for a geospatial investment	Y		Program Management
Costs for participating in and responding to requirements associated with the FGDC	Y	These are FTE and associated costs for meeting FGDC requirements.	Program Management

<b>Cost Example</b>	<b>Reportable as Geo Cost (Y/N)?</b>	<b>Explanation of Classification</b>	<b>Investment Type</b>
Costs associated with training staff on the benefits and usage of Geospatial Platform or other related geospatial technology	Y		Outreach
Costs associated with publicizing and promoting re-use of a geospatial data service across multiple additional Federal Agencies	Y		Outreach
Costs of Federal government FTEs providing outreach to users on new geospatial services offerings available through the Agency Working Capital Fund	Y		Outreach
Cost of training, conference attendance, etc. related exclusively to GIS or geospatial approaches	Y		Outreach
Costs of Federal government FTEs (e.g., DBAs, Requirements Analysts, Developers) planning, developing, maintaining, and enhancing a geospatial information system	Y		Hardware Software Geospatial Services Cloud Computing Geospatial Services Security

**Geospatial Investment Definitions for Tracking  
and Reporting Geospatial Investment Costs**

**Appendices**

**August 2015**

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## Appendix A: Detailed Examples of Geospatial Costs and Investment Types

The four tables presented in this Appendix all provide more detailed examples of specific types of geospatial investments and their associated investment types. There is also additional guidance on how to understand and categorize security costs for geospatial in the evolving world of computing services at the end of this Appendix.<sup>1</sup>

Table A.1 – Types of Geospatial Services provides some examples of geospatial services along with a detailed description of those services for help in understanding and categorizing the various types of geospatial service costs.

**Table A.1 – Types of Geospatial Services**

Service Type	Description	Investment Type(s)
Map Visualization Service	A web-based mapping tool that allows users to view and query data without the use of Geographic Information Systems (GIS) software	Geospatial Services, Cloud Computing Geospatial Services
Geospatial Data Exchange and Translation Services	The ability to import/export, manipulate and convert geospatial data, through standard data exchange and transformation services. Services to transform geospatial data schemas between disparate systems.	Geospatial Services, Cloud Computing Geospatial Services
Coordinate Transformation Service	The ability to transform geospatial data between different coordinate reference systems, datums and units. Support map re-projections on-the-fly for map viewing, as well as permanent coordinate transformations that result in a transformed output data set.	Geospatial Services, Cloud Computing Geospatial Services
Feature Update Service	An application and supporting services for selection, browsing, extraction, transformation, integration and update of a feature database. Assures that requestor credentials are sufficient for requested changes and that changes requested do not violate validation rules.	Geospatial Services, Cloud Computing Geospatial Services

<sup>1</sup> Though not within the scope of this document, efforts should be made to fully map geospatial technologies to the Federal Enterprise Architecture (FEA), as was done previously in the Federal Geospatial Profile. It is critically important to show how geospatial technologies integrate into these reference models and demonstrate how they support the business and activities of the Federal government.

<b>Service Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Coverage Update Service	An application and supporting services for selection, browsing, transformation, integration and update of a coverage (e.g., imagery) database. Assures that requestor credentials are sufficient for requested changes and that changes requested do not violate validation rules.	Geospatial Services, Cloud Computing Geospatial Services
Gazetteer Update Service	An application and supporting services to support browsing, data entry, transformation, integration and update of a gazetteer database. Supports adding, changing, and deleting gazetteer records. Assures that requestor credentials are sufficient for requested changes and that changes requested do not violate validation rules.	Geospatial Services, Cloud Computing Geospatial Services
Geospatial Resource Metadata (Catalog) Update Service	An application and supporting services for querying, browsing, data entry, transformation, integration and update of the metadata for geospatial resources, and optionally, update of associated geospatial resource records. (Geospatial resources include maps and data from which maps may be derived, and may include ancillary products and services. A Geospatial Catalog includes various ways by which geospatial resources are characterized and associated.) Assures that requestor credentials are sufficient for requested changes and that changes requested do not violate validation rules. Accesses one or more Resource Catalog Servers.	Geospatial Services, Cloud Computing Geospatial Services
Geospatial Service Metadata (Catalog) Update Service	An application and supporting services for querying, browsing, data entry, integration and update of the metadata for geospatial services. Assures that requestor credentials are sufficient for requested changes and that changes requested do not violate validation rules. Accesses one or more Service Catalog Servers.	Geospatial Services, Cloud Computing Geospatial Services



Service Type	Description	Investment Type(s)
Geocoder/ Reverse Geocoder Service	Able to determine geospatial coordinates or related geographic entity codes, given an address (Geocoder), or determine address, given geospatial coordinates (Reverse Geocoder). A Geocoder transforms a description of a feature location, such as a place name, street address or postal code, into a normalized description of the location, which includes coordinates. A Geocoder Service receives a description of a feature location as input and provides a normalized address with coordinates as output. The feature location descriptions are any terms, codes or phrases that describe the features and that are well-known to the Geocoder Service, such as a street addressing or postal coding scheme. These services are very important across many enterprises, as they enable enterprise users to exploit the geospatial-temporal context of the wide diversity of business data that contain Location References, such as address, building name, census tract, etc. They are also key to correlating, integrating and fusing dissimilar data on the basis of geospatial-temporal characteristics.	Geospatial Services, Cloud Computing Geospatial Services
Geolocate Service	The capability to use GPS or some other means to determine a geospatial location for a fixed or mobile object of interest (e.g., geospatial feature, person, asset, conveyance, goods, cargo, device, etc.) Mobile Objects must be equipped with GPS, Radio Frequency ID (RFID), and/or other position determination technologies.	Geospatial Services, Cloud Computing Geospatial Services
Gateway Service	Determines the geospatial position of a known mobile terminal from a wireless network. Position is expressed in geographic coordinates. Mobile terminals (cell phones, PDAs, etc.) must be equipped with GPS or some other position determination technology. An important service used in LBS, in the wireless realm.	Geospatial Services, Cloud Computing Geospatial Services

<b>Service Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Route Service	Able to determine (or fetch a predetermined) route and navigation information for autonomous or semi-autonomous navigation between two or more points on a network. An important service used in LBS, in the wireless realm.	Geospatial Services, Cloud Computing Geospatial Services
Navigation Service	An enhanced version of the Route Service, which determines routes between two or more points with enhanced navigation information. An important service used in LBS.	Geospatial Services, Cloud Computing Geospatial Services
Monitoring Service	Able to determine (or fetch a predetermined) location/time/identity/ status/ activity series for a Location.	Geospatial Services, Cloud Computing Geospatial Services
Tracking Service	Able to determine (or fetch a predetermined) location/time/velocity/identity/status/activity series (track) for a mobile object (e.g., persons, goods, assets, devices, etc.)	Geospatial Services, Cloud Computing Geospatial Services
Weather Service	The means to access weather conditions for an area of interest or location for a specified time period.	Geospatial Services, Cloud Computing Geospatial Services
Traffic Service	The means to access traffic information regarding incidents and/or conditions for a specified area of interest, road, or road segment, for a specified time period. Also, the means to access traffic information regarding incidents and/or conditions for a designated route (that has been determined by a Route Service or Navigation Service) for a specified time period.	Geospatial Services, Cloud Computing Geospatial Services

<b>Service Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Model Service	<p>Able to determine and access the extent and nature of a geospatial model (e.g., Toxic Dispersion Model -- plume for a chemical or biological event in air or water). The model output is characterized by features. "Toxic Dispersion" refers to the effects of introducing a chemical, radioactive or biological agent into the atmosphere or a water supply at a point source. Simulation is employed to understand the effects of a toxic agent within its medium. The objective of the simulation is to ascertain contamination levels in a geospatial-temporal context, and thus, to understand the nature of toxic plumes, danger zones, warning zones, and related features, and to be able to view or analyze the output from a simulation run in conjunction with any other geospatial data, e.g., as plumes or danger/warning zones within a geospatial decision support tool. Also, the ability to determine and access weather, hydrographic and other environmental parameters through environmental simulation. The simulation output is characterized by observations.</p>	<p>Geospatial Services, Cloud Computing Geospatial Services</p>
Geoparser Service	<p>Geoparsing refers to the capability to scan and parse a textual document, identifying key words and phrases that have geospatial-temporal context. A Geoparser Service works in the context of two bodies of information: a reserved vocabulary (a dictionary of place names, a gazetteer or a directory of points of interest (POIs) and a text source (e.g., a newspaper or cable.). The Geoparser returns all occurrences of the use (in the text source) of any term in the reserved vocabulary. Each occasion establishes a geolinks (geospatial/temporal-aware hyperlink) between text terms and the geospatial location associated with the reserved word. That result is an annotated text document with geolinks.</p>	<p>Geospatial Services, Cloud Computing Geospatial Services</p>

<b>Service Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Sensor Planning Service	A service by which a client <sup>2</sup> can determine sensor collection feasibility for a desired set of collection requests for one or more mobile sensors/platforms, or the client may submit collection requests directly to these sensors/platforms.	Geospatial Services, Cloud Computing Geospatial Services
Sensor Observation Service	A service by which a client can obtain observations from one or more sensors/platforms (can be mixed types). Clients can also obtain information that describes the associated sensors and platforms.	Geospatial Services, Cloud Computing Geospatial Services
Sensor Alert Service	The SASs produce alert messages when given observation conditions are met by a sensor. Provides the means for client services/users to specify and register user profiles that contain user information, applicable sensors/observations, alert conditions (e.g., maximum/minimum values), and alert actions (what happens if conditions are met). Also, the means for client services/users to update user profiles. Clients are able to control the nature of alerts. For example, a client is able to activate/deactivate an alert capability. Also provides the means to support push/pull capabilities, e.g., to wait for observation input from associated sensors (for on/off sensors like a detector), or to actively poll for (current/historical/predicted) sensor observations.	Geospatial Services, Cloud Computing Geospatial Services
Topology Service	The ability to detect topology errors (e.g., overshoots and undershoots of common linear and polygonal features within a definable tolerance), automatically correct errors, if possible, and define topological relationships between connected/collocated linear, polygon, and point features.	Geospatial Services, Cloud Computing Geospatial Services

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<sup>2</sup> Client, as used here, means any software component or application that invokes a service.

<b>Service Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Style Management Service (SMS)	The means to create update and manage styles and symbols. The SMS must manage distinct objects that represent styles and symbols and provide the means to discover, query, insert, update, and delete these objects. Styles provide the mapping from feature types and feature properties and constraints to parameterized Symbols used in drawing maps. Symbols are bundles of predefined graphical parameters and predefined fixed graphic "images".	Geospatial Services, Cloud Computing Geospatial Services
Annotation Service	A service that accesses map/image annotations. Annotations are useful for any activity that requires linking or tagging geospatial data in order to present and discuss it with others, to make joint decisions, collaborate or to communicate spatially.	Geospatial Services, Cloud Computing Geospatial Services
Map Publication Service	A lightweight application for publishing maps. Able to automatically generate and publish Maps of interest for inclusion in a plan, report, or other document, with select content and symbolization (map template). E.g. To produce a Map for inclusion in a word or graphic document.	Geospatial Services, Cloud Computing Geospatial Services
Resource Catalog Server (or Registry Service)	Responds to client requests for geospatial resource metadata. (Geospatial resources include maps and data from which maps may be derived, and may include ancillary products and services. A geospatial catalog includes various ways by which geospatial resources are characterized and associated.)	Geospatial Services, Cloud Computing Geospatial Services

Table A.2 - Types of Geospatial Servers, provides some examples of geospatial servers along with a detailed description of those servers for help in understanding and categorizing the various types of geospatial server costs.

**Table A.2 – Types of Geospatial Servers**

<b>Server Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Native Geospatial DBMS Server	The capabilities for an Enterprise DBMS to provide native support for storing and managing all types of geospatial data. Capabilities should include geospatial indexing, open SQL and data manipulation query support with geometry and topology operators, geospatial analytics, geospatial data mining, coordinate transformation and linear referencing.	Hardware, Cloud Computing Geospatial Services
Geospatial Imagery Processing Server	Composed of one or more bundled geospatial imagery processing services that support the generation, revision, management, processing, and output of geospatial imagery. Server-based Imagery Processing System.	Hardware, Cloud Computing Geospatial Services
GIS Server	Composed of one or more bundled geospatial processing services that support the generation, revision, management, processing, and output of geospatial data. Server-based GIS.	Hardware, Cloud Computing Geospatial Services
Tile Server	Produces a cache of pre-rendered map or image tiles to accelerate client-side mapping, reduce wait times and server load.	Hardware, Cloud Computing Geospatial Services
Feature Server	Responds to requests from a feature client for detailed information pertaining to a particular feature within a map. Optionally supports coordinate transformation from a source coordinate reference system to a target coordinate reference system.	Hardware, Cloud Computing Geospatial Services

<b>Server Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Native Geospatial DBMS Server	The capabilities for an Enterprise DBMS to provide native support for storing and managing all types of geospatial data. Capabilities should include geospatial indexing, open SQL and data manipulation query support with geometry and topology operators, geospatial analytics, geospatial data mining, coordinate transformation and linear referencing.	Hardware, Cloud Computing Geospatial Services
Coverage Server	Responds to requests from a coverage client to deliver a rendered orthoimage/map. Optionally supports coordinate transformation from a source coordinate reference system to a target coordinate reference system. May act as a proxy to multiple remote coverage services to return a single composite orthoimage/map.	Hardware, Cloud Computing Geospatial Services
Map(ping) Server	The means to render 2D views of geospatial data. Responds to requests from a map client to deliver a rendered map. Supports coordinate transformation from a source coordinate reference system to a target coordinate reference system. Supports the specification of remote layer styles. May act as a proxy to multiple remote map services to return a single composite map.	Hardware, Cloud Computing Geospatial Services
Terrain Server	The means to render 3D views of geospatial data. Responds to requests from a Terrain Simulator to deliver a rendered 3D data. Supports coordinate transformation from a source coordinate reference system to a target coordinate reference system. Supports the specification of layer styles. May act as a proxy to multiple remote terrain services to return a single composite view.	Hardware, Cloud Computing Geospatial Services

<b>Server Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Native Geospatial DBMS Server	The capabilities for an Enterprise DBMS to provide native support for storing and managing all types of geospatial data. Capabilities should include geospatial indexing, open SQL and data manipulation query support with geometry and topology operators, geospatial analytics, geospatial data mining, coordinate transformation and linear referencing.	Hardware, Cloud Computing Geospatial Services
Gazetteer Server	Responds to Gazetteer Client requests for place geographic entity names by a given location or for locations by a given entity name (e.g. counties, county subdivisions, urban areas, congressional districts, Tribal areas, tract, counties, places, school districts, state legislatures districts, or ZIP code tabulation areas.	Hardware, Cloud Computing Geospatial Services
Location Server	A service with multiple functions that responds to Location Client requests for a) geo-coding an address, yielding a coordinate; b) reverse geo-coding a coordinate, returning an address; c) routing from a start point to and end point (perhaps with intervening via points); d) a point of interest given a coordinate or an address (either precisely or within a proximity). Normally implemented as wireless, Location-based Services (LBS).	Hardware, Cloud Computing Geospatial Services
Resource Catalog Server (or Registry Service)	Responds to client requests for geospatial resource metadata. (Geospatial resources include maps and data from which maps may be derived, and may include ancillary products and services. A geospatial catalog includes various ways by which geospatial resources are characterized and associated.)	Hardware, Cloud Computing Geospatial Services
Service Catalog Server	Responds to client requests for geospatial service metadata.	Hardware, Cloud Computing Geospatial Services



Table A.3 – Types of Geospatial Clients provides some examples of geospatial clients<sup>3</sup> along with a detailed description of those clients for help in understanding and categorizing the various types of geospatial client costs.

**Table A.3 – Types of Geospatial Clients**

<b>Client Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Coverage Client	An application that provides the means to visualize and interact with Coverages (e.g., geospatial imagery and raster data). Provides tools to select Coverage data for viewing, enhancement, annotation layer control, setting view window, display chosen view, coordinate transformation, measure and pinpoint, navigate through view with pan and zoom, etc. Usually associated with one or more Coverage Servers.	Software, Cloud Computing Geospatial Services
Map(ping) Client	An application that provides the means to visualize and interact with geospatial data in rendered map form. Provides tools to select base map/image data for viewing, layer control (e.g., Features, locations, structures, routes, observations, and mobile-objects), set view window, display chosen view, coordinate transformation, measure and pinpoint, navigate through view with pan and zoom, etc. Optionally choose symbology, map display template or select previous views. Usually associated with one or more Map Servers.	Software, Cloud Computing Geospatial Services
Feature Client	Sends requests to one or more Feature Servers for detailed information pertaining to a particular feature within a map. Provides the means to visualize Feature information. Provides tools to query Feature data, display chosen view, and designate target coordinate transformation system. Often combined with Map Client.	Software, Cloud Computing Geospatial Services

<sup>3</sup> Client, as used here, means any software component or application that invokes a service.

<b>Client Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Geospatial Client	An application that provides the means to visualize and interact with a variety of geospatial data, including Maps, Features and Coverages. Provides tools to select data for viewing, enhancement, annotation layer control, setting view window, display chosen view, coordinate transformation, measure and pinpoint, navigate through view with pan and zoom, etc. Usually associated with one or more geospatial data servers.	Software, Cloud Computing Geospatial Services
Location Client	Sends requests to one or more Location Servers for a) geo-coding an address, yielding a coordinate; b) reverse geo-coding a coordinate, returning an address; c) routing from a start point to and end point (perhaps with intervening via points); d) a point of interest given a coordinate or an address (either precisely or within a proximity). Provides the means to visualize location information. Provides tools to query location data and display chosen view, often on a map. Normally implemented as wireless, Location-based Services (LBS).	Software, Cloud Computing Geospatial Services
Gazetteer Client	Sends requests to one or more Gazetteer Servers for place names by a given location or for locations by a given place name. Provides the means to visualize gazetteer information. Provides tools to query gazetteer data and display chosen view. Often combined with other clients.	Software, Cloud Computing Geospatial Services
Services Catalog Client	An application that sends requests to one or more Service Catalog Servers for geospatial service catalog records. Includes tools to select and view this information.	Software, Cloud Computing Services

<b>Client Type</b>	<b>Description</b>	<b>Investment Type(s)</b>
Resources Catalog Client	An application that sends requests to one or more Resource Catalog Servers for geospatial resource catalog records. Includes tools to select and view this information. (Geospatial resources include maps and data from which maps may be derived, and may include ancillary products and services. A geospatial catalog includes various ways by which geospatial resources are characterized and associated.)	Software, Cloud Computing Geospatial Services
Location Client	Sends requests to one or more Location Servers for information about a point of interest (e.g., store) and associated products and services. Provides capabilities to support a) geo-coding an address, yielding a coordinate; b) reverse geo-coding a coordinate, returning an address; c) routing from a start point to and end point (perhaps with intervening via points); d) a point of interest given a coordinate or an address (either precisely or within proximity). Provides the means to visualize point of interest information. Provides tools to query point of interest data and display chosen view, often on a map. Normally implemented as wireless, Location-based Services (LBS).	Software, Cloud Computing Geospatial Services

Table A.4 – Other Geospatial Systems and Components, provides some examples of other geospatial systems or components along with a detailed description of those systems or components for help in understanding and categorizing the various types of other geospatial system and component costs

**Table A.4 – Other Geospatial Systems and Components**

<b>Geospatial System or Component</b>	<b>Description</b>	<b>Investment Type(s)</b>
Property - Asset Management System	A GIS-based Property - Asset Management System.	Hardware, Software, Security, Cloud Computing Services
Geospatial Information Broker	A key component used in moving geospatial data between systems. Involved in data sharing and collaboration operations. Involved in Geospatial Data Roll-up/Roll-down Operations.	Data Distribution
Geospatial Information System	An integrated system for creating, collecting, storing, accessing, sharing, disseminating, integrating, manipulating, visualizing, analyzing and otherwise exploiting Geospatial Information. GIS focuses on producing and exploiting “digital maps” that convey Geospatial Information in graphical form. It is used widely in government, education and business. Also, a general-purpose collection of tools for processing geospatial data. Normally consists of one or more applications with one or more databases. May be configured as a desktop application and/or as a collection of client and server components.	Includes all investment types

<b>Geospatial System or Component</b>	<b>Description</b>	<b>Investment Type(s)</b>
Imagery Processing System (IPS)	<p>An integrated system for collecting, storing, accessing, sharing, disseminating, integrating, manipulating, visualizing, analyzing and otherwise exploiting Geospatial Imagery. IPS focuses on producing and exploiting “digital orthoimagery” that conveys Geospatial Information in raster image form. It is used widely in government, education and business.</p> <p>Also, a general-purpose collection of tools for processing geospatial imagery. Normally consists of one or more applications with one or more databases. May be configured as a desktop application and/or as a collection of client and server components.</p>	Includes all investment types
Terrain Simulator	<p>The application and supporting services for viewing 3D geospatial information. Many specialized types of this service. Accesses one or more Terrain Servers.</p>	Hardware, Software
Location Report Generator	<p>The application and supporting services for composing a report based upon location-based (geospatial) information. Many specialized types of this service, e.g., situation reports, after action reports, alert/warning reports, incident reports, activity reports, etc.</p>	Software, Geospatial Services, Cloud Computing Geospatial Services
Situation Awareness	<p>An application and associated services for viewing an area of interest, incident or event in a geospatial context. May include related geospatial services for selection, analysis, manipulation, reporting, collaboration, etc.</p>	Software, Geospatial Services, Cloud Computing Geospatial Services
Personal Map Software	<p>Personal Map Software includes a variety of tools for viewing, annotating and manipulating map data. Typically include map data for standalone operations. Often includes Global Positioning System (GPS) capability for mobile applications. Commercial map software for desktop or mobile devices.</p>	Software

<b>Geospatial System or Component</b>	<b>Description</b>	<b>Investment Type(s)</b>
Specialized Geospatial Business Components (Various)	Geospatial-based business applications and associated services that provides visualization and interaction with geospatial data. Provides access to underlying Business Components and Geospatial Services. Many such Specialized Geospatial Business Components will exist within enterprises, each which may have a client application and one or more Business Components and/or Geospatial Services.	Software, Geospatial Services, Cloud Computing Geospatial Services, Security
Style Management Service (SMS)	The means to create, update, and manage styles and symbols. The SMS must manage distinct objects that represent styles and symbols and provide the means to discover, query, insert, update, and delete these objects. Styles provide the mapping from feature types and feature properties and constraints to parameterized symbols used in drawing maps. Symbols are bundles of predefined graphical parameters and predefined fixed graphic "images".	Software, Geospatial Services, Cloud Computing Geospatial Services, Security

## Appendix B: Example of Current Government-wide Data Call for Geospatial Financial Data

It is important to understand what other efforts are being made across the government to collect financial data on geospatial related investments. Appendix B includes the Integrated Data Collection (IDC) August 2015 data call instructions from the Office of Management and Budget (OMB) to complete a template for Geospatial Software spending from FY 2014 to FY 2017. This is part of a quarterly effort to update Departmental PortfolioStat reporting to the OMB. Geospatial Software is a new section as of August 2015, whereas in the past reporting would be in areas ranging from Cost Savings and Avoidance Decisions to Open Data Progress, Use, and Impact. The elements and descriptions in this example should be analyzed and aligned with other existing budgetary reporting processes.

**Table 1: Integrated Data Collection (IDC) August 2015 (Section 13, Quarterly IDC Instructions, OMB)**

### Geospatial Software

Status: New

<b>Contract PIID</b>	Enter the contract number as reported in FPDS
<b>Referenced Contract PIID</b>	Enter the referenced contract PIID as reported in FPDS, if applicable. If the contract is stand-alone, leave this field blank.
<b>Software Publisher</b>	Enter the name of the geospatial software publisher (e.g. Esri)
<b>Contract Effective Date</b>	Enter the contract effective date
<b>Contract Completion Date</b>	Enter the contract completion date
<b>Number of Option Years</b>	Enter the number of option years
<b>Start Date of Base Year or Option</b>	Enter the start date of the current base year or option year
<b>End Date of Base Year or Option</b>	Enter the end date of the base year or current option year
<b>Contract Coverage</b>	Select from the following: <ul style="list-style-type: none"> <li>• Multi-agency</li> <li>• Single Agency</li> <li>• Component</li> <li>• Sub-Component</li> </ul> <p>“Agency” is defined as the CFO Act agency (plus NARA and USACE). “Component” is defined as the primary organizational division within a department/agency and is often referred to as a bureau. A sub-component is an office, unit, or other entity beneath the component level.</p>
<b>Government-wide Availability</b>	Identify whether this contract is available to other agencies and components. Enter Yes or No.
<b>Vendor DUNS</b>	Enter the DUNS number of the vendor or reseller
<b>Ceiling</b>	Enter the ceiling in dollars
<b>FY2014 Spend</b>	Enter the spend for FY2014 under this contract
<b>FY2015 Spend</b>	Enter the expected spend for FY2015 under this contract
<b>FY2016 Spend</b>	Enter the expected spend for FY2016 under this contract (if contract extends through FY16)
<b>FY2017 Spend</b>	Enter the expected spend for FY2017 under this contract (if contract extends through FY17)

## **Appendix C: EPA Example of Geospatial Cost Coding Frameworks<sup>4</sup>**

Below is an example of EPA's geospatial coding requirements. The document provides additional clarification on several key changes in the geospatial coding requirements for FY 2008, including definitions for numerous new cost codes.

### **Addendum: Geospatial Resource and Expenditure Coding Requirements and Changes for FY 2008 January 4, 2007**

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Section 3.2.1. New Coding Requirements

Section 3.2.1.1. IT Coding Requirements

Section 3.2.1.2. Non-IT Coding Requirements

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<sup>4</sup> EPA is revising the content in this example and will provide revised version when available.



## **Section 1. Purpose**

This document serves as an addendum to the “Instructions for Preparing the FY 2008 Annual Performance Plan and Congressional Justification, Attachment I, Identifying Information Technology Resources,” issued by the Office of the Chief Financial Officer (OCFO) on December 12, 2006. It provides additional clarification on several key changes in the geospatial coding requirements for FY 2008, including definitions for numerous new cost codes.

## **Section 2. Background**

### **Section 2.1. IT Costs**

IT costs are defined by OCFO as, “computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources. IT is any equipment or interconnected system or subsystem of equipment used in the automatic acquisition, storage, manipulation, management, movement, control display, switching, interchange, transmission, or reception of data or information.”<sup>5</sup> This includes hardware, software, salaries for employees, associated employee benefits, travel, training, and outside consultants.

### **Section 2.2. Non-IT Costs**

The following costs are not IT costs as defined by OCFO<sup>6</sup>:

- Personnel Costs for the following:
  - System users who are not directly involved in the development or technical administration of Agency IT systems or projects;
  - Administrative personnel and other support staff who execute and process IT related transactions; and
  - Non-IT personnel attending IT training or IT conferences;
- Data, files, or records management (but does include system development activities, and maintenance costs for electronic records management systems);
- Entering and retrieving data from databases or other sources;
- Website content development or management, report generation, mathematical or statistical modeling;
- Photocopy paper used in printers;
- Preparing spreadsheets, graphs and charts;
- Libraries or library services (but does include planning, development, and maintenance costs for on-line/electronic libraries);
- Scientific Equipment (e.g., a Gas Chromatographer);
- Calculations performed using IT equipment such as statistical modeling;
- Office Equipment (e.g., calculators, typewriters, photocopy machines); and
- Other activities typically performed only by users of systems.

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<sup>5</sup> OCFO Policy Announcement No, 05-01, Accounting for Information Technology, December 15, 2004 (<http://intranet/ocfo/policies/policy/pa05-01atta.pdf>).

<sup>6</sup> OCFO Policy Announcement No, 05-01, Accounting for Information Technology, December 15, 2004 (<http://intranet/ocfo/policies/policy/pa05-01atta.pdf>).

### Section 2.3. IT Project Code<sup>7</sup> Format

The field used to collect information on geospatial IT costs *and related non-IT costs* is called the IT Project code in Agency financial systems. It is composed of 8 characters. The table below details what information is captured in each of the positions of this field.

Code Position	Description of Code Element
1st	Unique character identifying the type of costs – always “L” for IT costs and “Y” for non-IT costs
2nd & 3rd	Unique two character identifier of each major project/system (e.g., GA – Headquarters National Geospatial Program, GB – Regional National Geospatial Program) and many small projects/systems; also used to capture Agency-wide enterprise architecture (EK) and technology infrastructure (SL) investment costs, and small project/system IT expenses that are not associated with any other unique project/system code (SM)
4th	Indicator of the phase of the system life-cycle of the investment (i.e., Preliminary Design - P, Development - D, or Maintenance - M) for IT investments <sup>8</sup> , or, an indicator that the cost is a non-IT cost (value of “N” for non-IT).
5th & 6th	Allows for capture of additional IT cost area details/specifics. In particular, there are several separate Geospatial IT cost codes, several non-IT cost codes, and all security costs must be separately coded here with a value of “SC” in the 5th and 6th character positions.
7th & 8th	Used for special needs only with OCFO approval (e.g., used to indicate that an investment is part of an e-Gov project or initiative, such as the Geospatial One-Stop initiative – “EC” – or the Geospatial Line of Business – “BQ”).

<sup>7</sup> The IT Project code – in spite of its name – is used to capture both IT and Non-IT costs associated with an IT project.

<sup>8</sup> See OCFO Policy Announcement No. 05-01, Accounting for Information Technology, December 15, 2004, Appendix A, pages A-11 and A-12 for more information on system life cycle phase definitions and costs that would typically fall under each system life-cycle phase (<http://intranet/ocfo/policies/policy/pa05-01atta.pdf>).

## **Section 2.4. Geospatial Resources Tracked via the National Geospatial Program Exhibit 300**

As part of the annual CPIC process, OEI prepares an Exhibit 300 submission for the National Geospatial Program that covers the following costs:

- OEI Geospatial costs for contracts, general expenses, travel, Working Capital Fund (WCF) contributions (specifically for geospatial subscriptions) and EPA FTE costs
- Central Regional GIS Office costs for each of the 10 regions for contracts, general expenses, travel, Working Capital Fund (WCF) contributions (specifically for geospatial subscriptions) and EPA FTE costs

Resources reported by OEI and the Central Regional GIS Offices have included both IT and related non-IT expenditures made in support of the National Geospatial Program.

These resources have been reported in Agency financial systems per OMB and EPA requirements for several years.

## **Section 2.5. Geospatial Resources Outside of the Scope of the National Geospatial Program Exhibit 300**

In May and June 2006, detailed resource information was collected from this segment of the EPA geospatial community for the first time to support the OMB Geospatial Line of Business data call. However, this collection effort was done in a manual fashion, outside of the Agency financial systems.

The Agency-wide goal is to institutionalize the tracking of all geospatial resources within EPA financial systems so the process can be fully automated in FY 2008 and beyond. This will help EPA better meet the OMB reporting requirements associated with the Geospatial Line of Business and Geospatial One-Stop efforts.

## **Section 2.6. Changes to IT and Non-IT Resource Coding Requirements for Geospatial Expenditures**

There have been several changes made for FY 2008 that impact the way geospatially-related resources and associated financial transactions will have to be coded going forward. These changes impact both the portion of the geospatial community that has traditionally reported information via the National Geospatial Program Exhibit 300, as well as those Headquarters and Regional Program Offices that have not been a part of the Exhibit 300 process, but will be expected to provide cost information to support the new Geospatial Line of Business.

Section 3, Financial Reporting Requirements for Geospatial Resources, details the new requirements. details the new requirements for these two separate reporting groups within the EPA geospatial community – (1) the National Geospatial Program Exhibit 300 community, comprised of OEI and the 10 Central Regional GIS Office and (2) all other NPMs and Regional Program Offices that invest resource in geospatial technologies, tools, and related services but are not part of the National Geospatial Program Exhibit 300 process.

### **Section 3. Financial Reporting Requirements for Geospatial Resources**

#### **Section 3.1. National Geospatial Program Exhibit 300 Community**

##### **Section 3.1.1. New Coding Requirements**

There are several new coding requirements for the National Geospatial Program Exhibit 300 community for FY 2008. These include the following:

##### IT

- IT costs must now be coded in a different way than Non-IT costs within the 8-digit IT Project field for National Geospatial Program expenditures.
- The 5<sup>th</sup> and 6<sup>th</sup> positions of the IT Project code are now mandatory for all geospatial IT expenditures and must be populated with one of six possible IT cost codes;
- One of the IT codes previously available in the 5<sup>th</sup> and 6<sup>th</sup> positions – ‘GC – GIS Contractor Support’ – is now no longer available for use. More specific coding for contractor expenditures is now required;
- A value of ‘BQ’ must be entered in the 7<sup>th</sup> and 8<sup>th</sup> positions of the IT Project Code now for all National Geospatial Program IT expenditures to facilitate Geospatial Line of Business reporting;

##### NON-IT

- Non-IT costs must now be coded in a different way than IT costs within the 8-digit IT Project field for National Geospatial Program expenditures.
- The 5<sup>th</sup> and 6<sup>th</sup> positions of the IT Project code are now mandatory for all geospatial Non-IT expenditures and must be populated with one of six possible Non-IT cost codes;
- A value of ‘BQ’ must be entered in the 7<sup>th</sup> and 8<sup>th</sup> positions of the IT Project Code now for all National Geospatial Program Non-IT expenditures to facilitate Geospatial Line of Business reporting;

##### **Section 3.1.1.1. IT Coding Requirements**

As was done for the Geospatial Line of Business data call back in May and June of 2006, IT costs must be broken out separately from non-IT costs for all future budgeting and financial reporting. This will be done using the same 8-digit IT Project (Site Project) field that was previously used to record IT costs for the National Geospatial Program. The major differences between the IT coding line and the Non-IT coding line are related to the 1<sup>st</sup> and 4<sup>th</sup> positions of the 8-digit code. More details are provided below by IT Project Code position, including an example of a possible IT coding string for Central Regional GIS Office expenditures.

##### *1st Position*

In the case of IT expenditures, the value entered in the 1<sup>st</sup> position would be an ‘L’.

##### *2<sup>nd</sup> and 3<sup>rd</sup> Positions*

For National Geospatial Program costs tracked through the Exhibit 300 process for OEI and the Central Regional GIS Offices, this should be either ‘GA’ for Headquarters geospatial expenditures or ‘GB’ for Regional geospatial expenditures.

#### 4<sup>th</sup> Position

In the 4<sup>th</sup> position, for IT expenditures, a value of ‘P’ (for Preliminary Design/Planning), ‘D’ (for Development/Acquisition), or ‘M’ (Operations and Maintenance) must be entered to indicate the System Life Cycle Phase the IT expenditures support.

#### 5<sup>th</sup> and 6<sup>th</sup> Positions

There are specific IT cost codes that should be used to capture geospatial IT expenditures in the 5<sup>th</sup> and 6<sup>th</sup> positions of the IT Project Code field. The codes and corresponding definitions for these IT costs are detailed below:

- **GA- GIS - A (Hardware):** Acquisition and maintenance of computer hardware, including vendor/contractor maintenance contracts used for geographic information systems. Includes the following: (1) PCs: desktop PCs, workstations, laptops and associated components such as memory upgrades, memory, hard drives, other associated storage devices, video and sound cards, cables, keyboards, mice, monitors, etc. (2) Servers: file, print, application, web, database and any other types of servers and associated components such as hard drives, back up units, memory, equipment, cables, adapters, etc. (3) Printers/scanners: Printers, plotters, digital scanners, barcode readers (4) Handheld Devices: GPS units and PDAs (5) Other Storage devices: removable hard drives, zip drives, jump drives (6) Telecom services specifically supporting geospatial information systems and program operations, including: Cabling - purchase and/or installation of facility wiring and related components to support data communications; Maintenance - maintenance/repair of LAN/WAN telecom hardware and Private Branch Exchanges (PBXs); and Services - provided by a vendor/contractor to supply LAN/WAN connectivity, in total or any part, including telecom support for network infrastructure. (7) Hosting: database and application hosting costs. (8) Any other related components or costs not specifically mentioned.
- **GB - GIS - B (Software):** Geographic information systems and software for all types of computers including desktops, laptops, servers, etc., including: operating systems, application software, data base management software, software development suites and any ongoing software maintenance/upgrades. Software can be either commercial off the shelf software or custom developed software (i.e., developed by a vendor/contractor). Specifically, includes acquisition, development, and maintenance of computer software used for geographic information systems, including, but not limited to spatial database software, spatial data viewers, 3D visualization software, software used for map development, and the associated software licenses and maintenance plans/contracts for this software. Does not include web-based geospatial services (see definition of Services below), nor software that comes loaded on/with a PC at purchase.
- **GD – Data Distribution (Automated):** Any automated data distribution that is not specifically part of a web-based geospatial service (as described in the definition of GS – Services). Can include a wide variety of formats and mechanisms, including EDI, use of standards-based exchange protocols (e.g., XML), FTP sites, web sites, and data marts/data warehouses.
- **GP – Data Processing (Automated):** Any computer process that converts geospatial data into information in an automated fashion. Applies defined operations to a set of geospatial data inputs and generates new information that answers a spatial question. Geoprocessing

tools range from common GIS operations, such as overlay, buffer, and data management, to more advanced operations for raster processing, topology, and schema definition. Data processing usually occurs prior to usage. Electronic conversion of source files from one format to another (e.g., conversion of existing non-GIS hard copy materials or electronic files - such as, engineering or CAD drawings, site maps, aerial photographs - into digital inputs/outputs, or from MS Excel file to .dbf) would fall under the data processing category, as would geocoding.

- **GS – Services (Automated):** Automated program, interface, application, or engine that performs a defined action that can be found, invoked, and executed over the web. A geospatial web-based service is a service which performs an action on geospatial data or information to transform/translate/convert it to a more usable format, update it, distribute it, or integrate it into an existing database or data set for use.
- **SC – Security:** All IT related security, including security related hardware, software, maintenance, services, background investigations, and all other IT security related spending. Specifically, the following list of activities and expenditures should be coded as security:
  - Security architecture development
  - Determination of sensitivity level of information
  - Development of risk assessments
  - Revisions, review and testing of security plans
  - Disaster recovery
  - Continuity of support, and contingency plans
  - Security program assessment
  - Development of security policies, security training
  - Implementation of technical management and operational controls, including security-related hardware and software
  - Testing of effectiveness of controls, including technical vulnerability assessments and penetration testing
  - Physical security if specifically for IT assets
  - Background checks for Federal and contract IT personnel

**Note:**

One of the codes used previously in the 5th and 6th positions – ‘**GC – GIS - C (Contract support)**’ – is now no longer available for use. Costs that were previously captured under this code should be allocated to one or more of the 6 available IT codes detailed above.

**7<sup>th</sup> and 8<sup>th</sup> Positions**

A value of ‘BQ’ must now be entered in the 7th and 8th positions of the IT Project Code for all geospatial-related expenditures to facilitate Geospatial Line of Business reporting. This code must be entered for all transactions and costs – both IT and non-IT.

The following example helps to illustrate a possible IT coding string for geospatial costs incurred by a Central Regional GIS Office for Geospatial Services:

#1 Designates IT Project	#2 Project Code	#3 Project Code	#4 Life Cycle Phase	#5 Cost Areas	#6 Cost Areas	#7 Special Purpose	#8 Special Purpose
L	G	B	M	G	S	B	Q

- 1st character is ‘L’ = IT Related Cost
- 2nd and 3rd characters identify the IT project: i.e., GB-Regional geospatial activity. Other possible codes could include:
  - GA Headquarters geospatial activity (OEI)
- 4th Character: Non-IT phase
  - M – Maintenance. Other possible values include:
  - P – Preliminary Design/Planning
  - D – Development/Acquisition
- 5th and 6th characters are ‘GS – Services (Automated)’. Other possible Geospatial IT codes include:
  - GA- GIS - A (Hardware)
  - GB - GIS – B (Software)
  - GP – Data Processing (Automated)
  - GD – Data Distribution (Automated)
  - SC – Security
- 7th and 8th characters = BQ, Implementing Geospatial Line of Business (LoB)

### Section 3.1.1.2. Non-IT Coding Requirements

As was done for the Geospatial Line of Business data call back in May and June of 2006, Non-IT costs must be broken out separately from IT costs for all future budgeting and financial reporting. This will be done using the same 8-digit IT Project (Site Project) field that was previously used to record IT costs for the National Geospatial Program. The major differences between the IT coding line and the Non-IT coding line are related to the 1<sup>st</sup> and 4<sup>th</sup> positions of the 8-digit code. More details are provided below by IT Project Code position, including an example of a possible Non-IT coding string for Central Regional GIS Office expenditures.

#### 1st Position

In the case of Non-IT expenditures, the value entered in the 1<sup>st</sup> position would be a ‘Y’.

#### 2<sup>nd</sup> and 3<sup>rd</sup> Positions

For National Geospatial Program costs tracked through the Exhibit 300 process for OEI and the Central Regional GIS Offices, this should be either ‘GA’ for Headquarters geospatial expenditures or ‘GB’ for Regional geospatial expenditures.

#### 4<sup>th</sup> Position

In the 4<sup>th</sup> position, for Non-IT expenditures, this value should always be ‘N’ – to indicate that it is non-IT.

### 5<sup>th</sup> and 6<sup>th</sup> Positions

There are also a set of costs – with corresponding codes and definitions – that have been identified as Non-IT. These two digit codes should be entered in the 5<sup>th</sup> and 6<sup>th</sup> positions of the IT Project Code field. All expenditures that fall under one of these cost categories – as defined – should be classified as Non-IT expenditures. The codes and their corresponding definitions are below:

- **YP – Data Acquisition:** Activities and costs associated with the purchase or lease of data sets from commercial, governmental, or non-governmental entities, including states, tribes, local governments, other Federal Agencies, and non-governmental organizations for use in information systems and software.
- **YC – Data Collection:** Activities and costs associated with the collection of new data (i.e., data not available commercially or from other governmental or non-governmental entities) for use in information systems and software. Includes costs associated with data development and/or the costs associated with joining a data consortium that collects/develops new data.
- **YA – Data Analysis:** Analysis of data contained within an information system or database for purposes of developing a targeted product or for answering a specific programmatic question for EPA staff and/or other EPA stakeholders (e.g., states, tribes, the public). For example, analysis of EPA data for purposes of developing a fact sheet and associated maps on permitted outfalls within a mile of a priority watershed in New Jersey. Data analysis is usually done after initial data collection, data processing, and automated distribution are complete.
- **YD – Data and Information Distribution (non-automated):** Any data or information dissemination that is not truly automated in nature (i.e., not part of an information system or web-based service). Can include a wide variety of formats and mechanisms, e.g., development of static web content, creation of CD-ROMs and DVDs. Can also include the distribution of a variety of different types of files, including shapefiles, coverages, personal databases, spreadsheets, relational database files, outside of an information system or automated web-based service.
- **YM – Program Management:** Includes a suite of activities associated with management of information and related information systems, including policy and guidance development, governance development (e.g., creation of steering committees, work groups, etc. and associated charter and standard operating procedures), standards development (e.g., development of FGDC standards), and strategic planning support (e.g., data acquisition planning, strategic plan development).
- **YO – Outreach:** Includes activities - such as training and help desk support - focused on providing education and assistance to EPA staff and/or EPA stakeholders for purposes of enabling increased understanding and/or usage of data and tools in activities such as decision making or program evaluation efforts.

### 7<sup>th</sup> and 8<sup>th</sup> Positions

A value of 'BQ' must now be entered in the 7th and 8th positions of the IT Project Code for all geospatial-related expenditures to facilitate Geospatial Line of Business reporting. This code must be entered for all transactions and costs – both IT and non-IT.



The following example helps to illustrate a possible Non-IT coding string for geospatial costs incurred by a Central Regional GIS Office for Data Acquisition (Purchase):

#1 Designates Non-IT Cost	#2 Project Code	#3 Project Code	#4 Non-IT Indicator	#5 Cost Areas	#6 Cost Areas	#7 Special Purpose	#8 Special Purpose
Y	G	B	N	Y	P	B	Q

- 1st character is ‘Y’ = Non- IT Related Cost (instead of ‘L’ for IT cost)
- 2nd and 3rd characters identify the Non-IT “mirror” project code: i.e., GB-Regional geospatial activity. Other possible codes could include:
  - GA Headquarters geospatial activity (OEI)
- 4th Character: ‘N’ = Non-IT
- 5th and 6th characters are ‘YP – Data Acquisition (Purchase)’. Other possible Geospatial Non-IT codes include:
  - YC - Data Collection;
  - YA - Data Analysis;
  - YD – Data and Information Distribution (Manual);
  - YM - Program Management; and
  - YO – Outreach
- 7th and 8th characters = BQ Implementing Geospatial Line of Business (LoB)

## **Section 3.2. NPMs and Regional Program Offices that are not a part of the National Geospatial Program Exhibit 300 Community**

### **Section 3.2.1. New Coding Requirements**

NPMs and Regional Program Offices that are not a part of the National Geospatial Program Exhibit 300 community must now report geospatial IT and Non-IT resources and expenditures in Agency financial systems using the 8-digit IT Project field. In the past, neither IT nor Non-IT coding outside of the National Geospatial Program Exhibit 300 community was a mandatory requirement, but as a result of new OMB requirements for the Geospatial Line of Business, entry is now mandatory starting in FY 2008. Geospatial costs to be reported include contracts, general expenses, travel, Working Capital Fund (WCF) contributions (that are specifically for geospatial subscriptions/activities) and EPA FTE costs.

Specific requirements for entry of IT and Non-IT cost information, along with examples of IT and Non-IT coding strings, are detailed in sections 3.2.1.1 and 3.2.1.2 below.

#### **Section 3.2.1.1. IT Coding Requirements**

As was done for the Geospatial Line of Business data call back in May and June of 2006, IT costs must be broken out separately from non-IT costs for all future budgeting and financial reporting. This will be done using the same 8-digit IT Project (Site Project) field that the National Geospatial Program has used for the last several years. More details are provided below by IT Project Code position, including an example of a possible IT coding string for NPM and Regional Program Office expenditures.

##### **1st Position**

In the case of IT expenditures, the value entered in the 1<sup>st</sup> position would be an 'L'.

##### **2<sup>nd</sup> and 3<sup>rd</sup> Positions**

NPMs outside of OEI should not use the code 'GA – Geospatial – Headquarters' for reporting on geospatial costs incurred on their projects.

If the project under which the geospatial costs are to be incurred has been assigned a 2-digit code for use in the Agency financial systems, those geospatial costs should be entered using that 2-digit project code. For instance, geospatial costs associated with the State Water Quality Assessment Database would be reported under its two-digit project code by entering 'TM' in the 2<sup>nd</sup> and 3<sup>rd</sup> positions of the IT Project code.

For geospatial costs that cannot be linked to a particular 2-digit project code, it is recommended that the 2-digit code of 'SM' – which is used to capture costs for small/other systems that have not been assigned a unique 2-digit code – be used in the 2<sup>nd</sup> and 3<sup>rd</sup> positions of the IT project code.

#### 4<sup>th</sup> Position

In the 4<sup>th</sup> position, for IT expenditures, a value of ‘P’ (for Preliminary Design/Planning), ‘D’ (for Development/Acquisition), or ‘M’ (Operations and Maintenance) must be entered to indicate the System Life Cycle Phase the IT expenditures support.

#### 5<sup>th</sup> and 6<sup>th</sup> Positions

There are specific IT cost codes that should be used to capture geospatial IT expenditures in the 5<sup>th</sup> and 6<sup>th</sup> positions of the IT Project Code field. The codes and corresponding definitions for these IT costs are detailed below:

- **GA- GIS - A (Hardware):** Acquisition and maintenance of computer hardware, including vendor/contractor maintenance contracts used for geographic information systems. Includes the following:(1) PCs: desktop PCs, workstations, laptops and associated components such as memory upgrades, memory, hard drives, other associated storage devices, video and sound cards, cables, keyboards, mice, monitors, etc. (2) Servers: file, print, application, web, database and any other types of servers and associated components such as hard drives, back up units, memory, equipment, cables, adapters, etc. (3) Printers/scanners: Printers, plotters, digital scanners, barcode readers (4) Handheld Devices: GPS units and PDAs (5) Other Storage devices: removable hard drives, zip drives, jump drives (6) Telecom services specifically supporting geospatial information systems and program operations, including: Cabling - purchase and/or installation of facility wiring and related components to support data communications; Maintenance - maintenance/repair of LAN/WAN telecom hardware and Private Branch Exchanges (PBXs); and Services - provided by a vendor/contractor to supply LAN/WAN connectivity, in total or any part, including telecom support for network infrastructure. (7) Hosting: database and application hosting costs. (8) Any other related components or costs not specifically mentioned.
- **GB - GIS – B (Software):** Geographic information systems and software for all types of computers including desktops, laptops, servers, etc., including: operating systems, application software, data base management software, software development suites and any ongoing software maintenance/upgrades. Software can be either commercial off the shelf software or custom developed software (i.e., developed by a vendor/contractor). Specifically, includes acquisition, development, and maintenance of computer software used for geographic information systems, including, but not limited to spatial database software, spatial data viewers, 3D visualization software, software used for map development, and the associated software licenses and maintenance plans/contracts for this software. Does not include web-based geospatial services (see definition of Services below), nor software that comes loaded on/with a PC at purchase.
- **GD – Data Distribution (Automated):** Any automated data distribution that is not specifically part of a web-based geospatial service (as described in the definition of GS – Services). Can include a wide variety of formats and mechanisms, including EDI, use of standards-based exchange protocols (e.g., XML), FTP sites, web sites, and data marts/data warehouses.
- **GP – Data Processing (Automated):** Any computer process that converts geospatial data into information in an automated fashion. Applies defined operations to a set of geospatial data inputs and generates new information that answers a spatial question. Geoprocessing tools range from common GIS operations, such as overlay, buffer, and data management, to

more advanced operations for raster processing, topology, and schema definition. Data processing usually occurs prior to usage. Electronic conversion of source files from one format to another (e.g., conversion of existing non-GIS hard copy materials or electronic files - such as, engineering or CAD drawings, site maps, aerial photographs - into digital inputs/outputs, or from MS Excel file to .dbf) would fall under the data processing category, as would geocoding.

- **GS – Services (Automated):** Automated program, interface, application, or engine that performs a defined action that can be found, invoked, and executed over the web. A geospatial web-based service is a service which performs an action on geospatial data or information to transform/translate/convert it to a more usable format, update it, distribute it, or integrate it into an existing database or data set for use.
- **SC – Security:** All IT related security, including security related hardware, software, maintenance, services, background investigations, and all other IT security related spending. Specifically, the following list of activities and expenditures should be coded as security:
  - Security architecture development
  - Determination of sensitivity level of information
  - Development of risk assessments
  - Revisions, review and testing of security plans
  - Disaster recovery
  - Continuity of support, and contingency plans
  - Security program assessment
  - Development of security policies, security training
  - Implementation of technical management and operational controls, including security-related hardware and software
  - Testing of effectiveness of controls, including technical vulnerability assessments and penetration testing
  - Physical security if specifically for IT assets
  - Background checks for Federal and contract IT personnel

**7<sup>th</sup> and 8<sup>th</sup> Positions**

A value of ‘BQ’ must now be entered in the 7th and 8th positions of the IT Project Code for all geospatial-related expenditures to facilitate Geospatial Line of Business reporting. This code must be entered for all transactions and costs – both IT and non-IT.

**Note:** In many cases, this ‘BQ’ value will be the only means of identifying an NPM or Regional Program Office financial transaction or budgeting line as geospatial, so it is crucial that this value be entered accurately.

The following example helps to illustrate a possible IT coding string for geospatial costs incurred by an NPM or Regional Program Office for GIS Software:

#1 Designates IT Project	#2 Project Code	#3 Project Code	#4 Life Cycle Phase	#5 Cost Areas	#6 Cost Areas	#7 Special Purpose	#8 Special Purpose
L	T	M	D	G	B	B	Q

- 1st character is 'L' = IT Related Cost
- 2nd and 3rd characters identify the IT project: i.e., 'TM' State Water Quality Assessment Database. Other possible codes could include:
  - Any 2-digit project codes used by your NPM or Regional Program Office that has/will have geospatial costs
  - SM – Small/Other Systems
- 4th Character: Non-IT phase
  - D – Development/Acquisition. Other possible values include:
    - P – Preliminary Design/Planning
    - M – Maintenance
- 5th and 6th characters are 'GB - GIS – B (Software).' Other possible Geospatial IT codes include:
  - GA- GIS - A (Hardware)
  - GS – Services (Automated)
  - GP – Data Processing (Automated)
  - GD – Data Distribution (Automated)
  - SC – Security
- 7th and 8th characters = BQ, Implementing Geospatial Line of Business (LoB)

#### **Section 3.2.1.2. Non-IT Coding Requirements**

As was done for the Geospatial Line of Business data call back in May and June of 2006, Non-IT costs must be broken out separately from IT costs for all future budgeting and financial reporting. This will be done using the same 8-digit IT Project (Site Project) field that the National Geospatial Program has used for the last several years. More details are provided below by IT Project Code position, including an example of a possible Non-IT coding string for NPM and Regional Program Office expenditures.

##### **1st Position**

In the case of Non-IT expenditures, the value entered in the 1<sup>st</sup> position would be a 'Y'.

##### **2<sup>nd</sup> and 3<sup>rd</sup> Positions**

NPMs outside of OEI should not use the code 'GA – Geospatial – Headquarters' for reporting on geospatial Non-IT costs incurred on their projects.

If the project under which the geospatial costs are to be incurred has been assigned a 2-digit code for use in the Agency financial systems, those geospatial costs should be entered using that 2-digit project code. For instance, geospatial costs associated with the State Water Quality Assessment Database would be reported under its two-digit project code by entering 'TM' in the 2<sup>nd</sup> and 3<sup>rd</sup> positions of the IT Project code.

For geospatial costs that cannot be linked to a particular 2-digit project code, it is recommended that the 2-digit code of 'SM' – which is used to capture costs for small/other systems that have not been assigned a unique 2-digit code – be used in the 2<sup>nd</sup> and 3<sup>rd</sup> positions of the IT project code.

#### 4<sup>th</sup> Position

In the 4<sup>th</sup> position, for Non-IT expenditures, this value should always be 'N' – to indicate that it is non-IT.

#### 5<sup>th</sup> and 6<sup>th</sup> Positions

There are also a set of costs – with corresponding codes and definitions – that have been identified as Non-IT. These two digit codes should be entered in the 5<sup>th</sup> and 6<sup>th</sup> positions of the IT Project Code field. All expenditures that fall under one of these cost categories – as defined – should be classified as Non-IT expenditures. The codes and their corresponding definitions are below:

- **YP – Data Acquisition:** Activities and costs associated with the purchase or lease of data sets from commercial, governmental, or non-governmental entities, including states, tribes, local governments, other Federal Agencies, and non-governmental organizations for use in information systems and software.
- **YC – Data Collection:** Activities and costs associated with the collection of new data (i.e., data not available commercially or from other governmental or non-governmental entities) for use in information systems and software. Includes costs associated with data development and/or the costs associated with joining a data consortium that collects/develops new data.
- **YA – Data Analysis:** Analysis of data contained within an information system or database for purposes of developing a targeted product or for answering a specific programmatic question for EPA staff and/or other EPA stakeholders (e.g., states, tribes, the public). For example, analysis of EPA data for purposes of developing a fact sheet and associated maps on permitted outfalls within a mile of a priority watershed in New Jersey. Data analysis is usually done after initial data collection, data processing, and automated distribution are complete.
- **YD – Data and Information Distribution (non-automated):** Any data or information dissemination that is not truly automated in nature (i.e., not part of an information system or web-based service). Can include a wide variety of formats and mechanisms, e.g., development of static web content, creation of CD-ROMs and DVDs. Can also include the distribution of a variety of different types of files, including shapefiles, coverages, personal databases, spreadsheets, relational database files, outside of an information system or automated web-based service.
- **YM – Program Management:** Includes a suite of activities associated with management of information and related information systems, including policy and guidance development, governance development (e.g., creation of steering committees, work groups, etc. and associated charter and standard operating procedures), standards development (e.g., development of FGDC standards), and strategic planning support (e.g., data acquisition planning, strategic plan development).
- **YO – Outreach:** Includes activities - such as training and help desk support - focused on providing education and assistance to EPA staff and/or EPA stakeholders for purposes of enabling increased understanding and/or usage of data and tools in activities such as decision making or program evaluation efforts.

### 7<sup>th</sup> and 8<sup>th</sup> Positions

A value of ‘BQ’ must now be entered in the 7th and 8th positions of the IT Project Code for all geospatial-related expenditures to facilitate Geospatial Line of Business reporting. This code must be entered for all transactions and costs – both IT and non-IT.

**Note:** In many cases, this ‘BQ’ value will be the only means of identifying an NPM or Regional Program Office financial transaction or budgeting line as geospatial, so it is crucial that this value be entered accurately.

The following example helps to illustrate a possible IT coding string for geospatial costs incurred by an NPM or Regional Program Office for Data Acquisition (Purchase):

#1 Designates Non-IT Cost	#2 Project Code	#3 Project Code	#4 Non-IT Indicator	#5 Cost Areas	#6 Cost Areas	#7 Special Purpose	#8 Special Purpose
Y	T	M	N	Y	P	B	Q

- 1st character is ‘Y’ = Non- IT Related Cost (instead of ‘L’ for IT cost)
- 2nd and 3rd characters identify the Non-IT “mirror” project code: i.e., ‘TM’ State Water Quality Assessment Database. Other possible codes could include:
  - Any 2-digit project codes used by your NPM or Regional Program Office that has/will have geospatial costs
  - SM – Small/Other Systems
- 4th Character: ‘N’ = Non-IT
- 5th and 6th characters are ‘YP – Data Acquisition (Purchase)’. Other possible Geospatial Non-IT codes include:
  - YC - Data Collection;
  - YA - Data Analysis;
  - YD – Data and Information Distribution (Manual);
  - YM - Program Management; and
  - YO – Outreach
- 7th and 8th characters = BQ Implementing Geospatial Line of Business (LoB)